DEALING WITH UNCERTAINTY

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DEALING WITH UNCERTAINTY

Research monograph – First Edition

FOREWORD

The main theme of the research monograph and the Economics of Digital Transformation (EDT) conference was „Dealing with uncertainty“. As every year, our contributions covered a broad field of research in the areas of regulatory economics, industry and the European single market, entrepreneurship, local economic development, organization and innovation, digital marketing and monetary policy in the age of digital currencies. The papers published in this research monograph present the best contributions of the conference of the Faculty of Economics and Business of the University of Rijeka, which took place in Opatija, Croatia, from June 23-25, 2022 (www.edt-conference.com). During the three days of the conference, more than 70 researchers from the European region contributed with their presentations. Six sessions on different topics were organized as part of the conference program. We were also privileged to have renowned keynote speakers as well as panel discussions on technologies of public interest and smart cities and the traditional Unger funding panel. We are particularly proud of our PhD students who presented their doctoral theses in a special PhD session.

In addition, we have done our best to inform renowned scientific indexing databases about our research contribution to enable a wide dissemination of our research efforts and to increase the interest of researchers and practitioners in this growing field of research. The best papers from the conference have been selected for publication in the international journal Proceedings of Rijeka Faculty of Economics-Journal of Economics and Business (Vol. 40, No. 2, 2022).

Finally, we would like to express our gratitude for the great contribution of our keynote speakers Corrado Macchiarelli (Principal Economist at the National Institute of Economic and Social Research, NIESR), Gazi Salah Uddin (Linkoeping College), Kazi Sohag (Graduate School of Economics and Management, Ural Federal College) and Hoda Mansour (College of Business and Technology, College Business Administration, Jeddah). Additional thanks go to Nicholas Zingale (Cleveland State University) and Alberto Ferraris (College of Turin) who served as keynote speakers and panelists for the Technologies in the Public Interest and Smart Cities panel. Special thanks to panelists Cameron LeMack (Cleveland State University), Julieta Matos Castano (College of Twente), Abigail Poeske (Cleveland State University), and Veljko Jeremić (College of Belgrade, Faculty of Organizational Sciences). Also, our gratitude goes to Alan F. Unger and The Unger Fundation for supporting our activities through the Unger panel and Unger program which provides generous funding for the Conference. We are very grateful to our contributors, reviewers, program and organizing committee members, partner universities and sponsors, as well as our students, who received many compliments from our guests for their knowledge, manners and hospitality.

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INTRODUCTION

This research monograph consists of 29 articles that address the causes and consequences of the growing uncertainties in the post-COVID world. The chapters of the monograph deal with various areas related to the main topic of the monograph. Part of the research deals with the effects of the uncertain social and economic environment on companies. These contributions address the dynamics of the labor market, the legal and economic aspects of attracting investment, the interactions between entrepreneurship and digitalization and the impact of uncertainty on different sectors of the economy. The second group of contributions deals with the macroeconomic impact of less predictable economic indicators. Contributions address government processes responding to the potential crisis arising from changes in the tax system, methodological challenges important for accurate macroeconomic and government reporting, changes and responses within the government financial system, legal aspects the supranational and national economic systems as well as with the various issues of finance and management of local authorities in times of uncertainty. A large part of the paper deals with the exponential impact of ICT and digitalization processes on various economic sectors. The new challenges of marketing, which is increasingly shifting into the digital space, are also discussed. Finally, a number of contributions address the emerging problems of migration, which is fundamentally affecting the labor market across Europe and worldwide, looking in particular at the state of student mobility and the position of universities in this dynamic environment of human capital mobility.

As our authors explain, the transition to a sustainable economy has become one of the EU's key policy priorities in recent years, as it is "essential for the well-being of our society and our planet". The "green" and "digital" or "dual" transition to a sustainable economy is an ongoing process that must be facilitated not only by a strong political commitment, but also by a solid legal framework. This trend of transition confronts current trends of deregulation and globalization of markets, which increase the impact of risks on business operations, while the identification and management of various forms of risks by achieving the fundamental objective increasingly contributes to keeping a business functioning in the modern can survive and work successfully in an economic environment. On the other hand, at the global political level, we are observing strong trends of deglobalization, affecting certain sectors such as energy, technology and other goods that are defined as sensitive to national security and interests.

All these contributions give this monograph the traditional perspective dictated by the objectives of the conference, which includes both a transdisciplinary and an interdisciplinary perspective on the challenges of the growing uncertainties of the post-COVID world. We are sure that the scientific contributions will provide interested readers with important information and arguments. We therefore hope you enjoy reading our authors' contributions and hope that you will regularly attend our annual conference.

CHAPTER 1

Companies and Wage Shifting due to changes in Personal Income Taxes: Empirical evidence from a Croatian Tax Reform

Jasena Torma[1], Nikola Motik[2]

ABSTRACT

In 2017 Croatian tax system went through large income tax reform in which marginal tax rates were significantly decreased and individual tax-free allowance was increased. In theory, these income tax changes should increase wages or employment-related income if employers do not change employment contracts. But, the reform also increased the incentive to avoid taxation by changing worker's income. Empirical evidence on the degree of personal income tax shifting to employees via the wage level is highly controversial and rare. Using a single country event study with a panel of Croatian workers, we use a difference-in difference method where we treated private sector as a treatment group and state-owned companies as a valid control group to answer our research question: Do wages rise when income related taxes fall? This paper estimates that on average wages after tax reform have increased but this reform was not effective for each individual, particularly depending on type of economic activity. Our paper links on a vast literature regarding the business tax competition to small but growing literature on the effective incidence of the income taxation.

Key words: *Government policy, incidence, tax reform, wages.*

JEL classification: *H22, H25, I38, J08, J38.*

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1. Introduction

Taxation has a key role in the modern economy. In Croatia in the period of less than 30 years, numerous changes in both the taxation as well as the contribution system have taken place. Policy makers and researchers have long been interested in how potential changes to the personal income tax system affect the overall economy. The efficiency of taxation plays an important role in achieving economic growth and fiscal consolidation. Well-designed tax policies have the potential to raise economic growth, but there are many stumbling blocks along the way and certainly no guarantee that all tax changes will improve economic performance (Gale and Samwick 2014). With the pressures of global competition, corporate income tax plays an important role in the tax system of each economy. Corporate income tax raises sizeable government revenue and has important interactions with the personal income tax system (Clausing, 2012).

Croatia is classified among countries with a high tax wedge (Grdović Gnip and Tomić 2010). In 2016 Croatian Ministry of Finance decided to implement a significant tax reform which was effective from January 2017. Main tax reform included change in personal income tax which increased the tax-free allowance and the reduction of the top tax rate on personal income. This tax reform significantly lowered marginal tax rates for middle and high income workers, while low income workers were relatively unaffected by the reform. Also this tax reform was done by simultaneously lowering the marginal tax rate while broadening the tax base. Top marginal tax rate was lowered from 40% to 36%, reduction of personal income tax rates was also done from 25% to 24%, and the lowest rate of personal income tax which was 12% was entirely abolished.

Credible empirical evidence on the incidence of changes in personal income taxation is scarce. Sufficient and exogenous variation in tax rates is essential for identifying the causal effect of higher/lower income taxes. Since all companies in Croatia were affected by the tax reform, our analysis is based on a counterfactual comparison of private and state owned companies in a period from January 2016 until December 2017. In the private sector wages are determined by the market force while in the public sector wages are set in collective agreements and during the period which we study this reform, wages did not change.

In this research we use the Croatian Business Tax Reform 2017 (hereinafter CBTR 2017) as a quasi-experiment to shed light on the empirical question on how did companies respond in terms of paid wages to shifts in lower labor taxes. Using a single country event study, we established a valid control group. We use a difference in difference model to answer our research question: Do wages rise when taxes fall? Concretely, we identify the direct incidence of the CBTR 2017 on wages in the Croatian economy through a difference-in-differences approach (DiD) using state companies in Croatia as the control group and private companies as a treatment group.

Question of how the tax relief is split between firms and their employees is of high importance for policy makers. Our paper links on a vast literature

regarding the business tax competition to a small but growing literature on the effective incidence of income taxation. Sufficient and exogenous variation in personal income taxation is essential for identifying the causal effect of change in taxation.

In this paper we use a single country design for the following reasons. First it enables us to establish a valid control group more easily. Second, the Croatian labor market is characterized by a variety of wage setting institutions which include firm level collective bargaining as well as wage setting on the basis between firms and individual employees.

To our knowledge, this paper is the first to study the effects of the CBRT 2017 using micro-level data. This paper uses data from the Ministry of Finance database from a sample which represents the entire working population in Croatia. Changes in tax policy have implications for all parties involved in this process, government in terms of government revenue, workers in terms of their pay and firms in terms of their costs.

The paper is structured in five sections. Section two presents the literature review. Section three explains characteristics of Croatian labor income taxation and the changes which occurred before and after the tax reform. Section four uses econometric model to investigate the impact of taxation. Section five consists of main conclusions and limitations of the research are stated.

2. Literature review

In the last four decades, considerable reforms to corporate income taxes in industrial countries were incorporated. The last couple of years many tax reforms with a downward trend were introduced in Croatia. In this period, statutory corporate income taxes in OECD countries fell from an average of 23.3% in 2016 to an average of 21.5% in 2021 (OECD, 2022). Reductions in income tax rates affect the behavior of individuals and companies through both income and substitution effects.

Most studies of labor taxation are based on aggregate level. Empirical estimates confirm the expectation of the negative effect of labor taxes on GDP growth rates. Auten and Carroll (1999) using data from Tax Reform Act of 1986 (TRA) in the USA conclude that tax changes also explain rising income inequality.

Zidar (2019) investigates how tax changes for different income groups affect aggregate economic activity. Author confirms the positive relationship between tax cuts and employment growth where he finds the heterogeneous effects of income tax. Tax changes are largely driven by tax cuts for lower-income groups and the effect of tax cuts for the top 10% on employment growth is small.

According to Gale and Samwick (2014), given the various channels through which tax policy affects growth, a growth inducing tax policy would involve: substitution effects that encourage work, saving, and investment; income

effects that are small and positive or are negative; a reduction in distortions across economic sectors and across different types of income and types of consumption; and minimal increases in the budget deficit.

Attinasi et al. (2016) during the period from 2010 to 2013 showed that EU countries which were in need for large fiscal consolidation tend to increase labor taxation. When fiscal consolidation is no longer needed, countries adopt more growth-friendly measures such as reducing the tax burden on labor in order to boost growth and employment.

Palić, Žmuk and Grofelnik (2017) analyse the impact of personal income tax on economic developments in Croatia in the period from 2000 until 2016. The results of the research show that personal income taxation has a significant negative impact on the economic growth in the long-run.

Most comparable research to ours is from Moore et al. (2014) where authors use the German Business Tax Reform to measure do wages rise when corporate income falls. Its effect on wages which is used only on manufacturing sector is identified by means of a difference-in-differences model where as a control group French firms are used. Authors conclude that German business tax reform had a significant and sizeable wage effect which in short–run implies a wage increase of 7.9%.

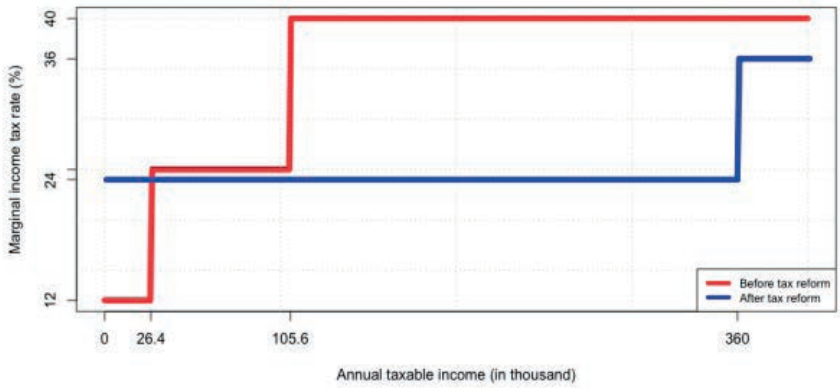
3. The Croatian Income Tax Reform

This section explains characteristics of Croatian labor income taxation and the changes which occurred before and after the tax reform.

3.1. The Personal Income Tax in Croatia

Croatia has introduced personal income tax in 1994 meaning that it is relatively young direct tax in Croatia (Sikirić, 2017). Next, it is designed as progressive income tax rates schedule meaning that the marginal income tax rate increases as taxable income increases. Taxable base is calculated by applying prescribed tax deductions and tax allowances (i.e. non-taxable parts of income) to the total amount of monthly income. Tax deductions and tax allowances may, depending on the type of income, also be applied when calculating monthly tax prepayments. The following tax rates and tax bands are used on an annual basis (i.e. in the process of annual assessment of tax liability) to calculate personal income tax (PIT) are visible in Figure 1. Before tax reform, income tax rates were in three tax brackets. After the reform, personal income tax rate has two tax brackets.

Figure 1: Marginal income tax rates before and after tax reform

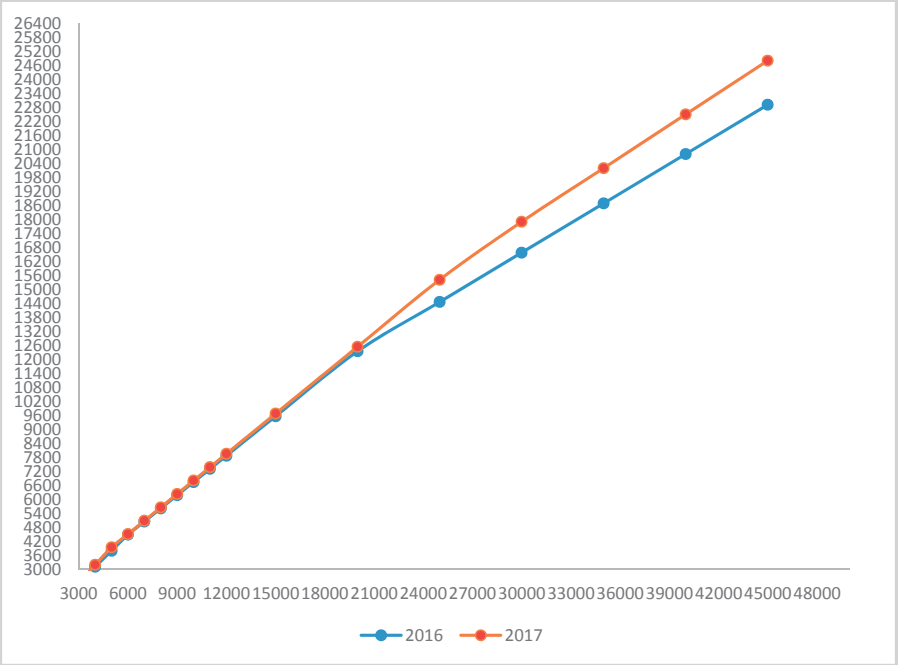


Source: Authors

The aim of tax reform was to lower the labor cost, increase the competitiveness of Croatian companies and to boost corporate investments. Annual income before CBTR 2017 reform were the following; in between HRK 0 and 26,400 HRK 12%, in between 26,400 HRK and 105,600 HRK 25% and in excess of 105,600 HRK 40%. Also, personal allowance was much lower, before CBTR 2017 it was HRK 31,200 annually, now HRK 45,600 or 46% increase.

This study uses the same individuals before the tax reform (no switchers in any terms; employers, exit of the labor market and so on) and after for a short period of time (12 months before the CBTR 2017 reform and 12 months after). This way we can control for the effect that individuals do not change the type of the job when the taxes change and do not vary effort on the job since in our case we assume this since the nominal changes workers receive did not decrease.

Figure 2: Notional representation of net wage and gross wage for a single living in the capital city for 2016 and 2017 tax year.



Source: Author's calculation based on the

From Figure 2 it is visible that this tax reform significantly lowered marginal tax rates for middle and high income workers, while low income workers were relatively unaffected by the reform.

3.2. Surtax

Cities and municipalities in Croatia may levy an additional tax, the so-called surtax. The decision on the amount of the surtax rate lies with the city or municipality officials and is levied according to the individual's place of residence or habitual abode in Croatia. For taxpayers who live in towns where surtax is levied, their income is subject to the surtax. Almost every city and municipality in Croatia has a surtax with the capital city having the largest, which is 18%.

4. Empirical analysis

The following subsections describe the database, econometric model, and presents the estimation results.

4.1. Description of variables

In order to create the database, we have used a couple of data sources. First, we use a sample of workers from a list of companies which are used in the INV-P questionnaire from Croatian Bureau of Statistics. INV-P questionnaire is used for annual survey on gross fixed capital formation. Companies in this survey are used by method of judgmental sample because the practice has shown that those chosen companies are a good basis for analyzing the whole economy. List of companies includes all types of companies which are divided in the following categories; micro entrepreneurs, small entrepreneurs, medium-sized entrepreneurs, institutions, insurance companies, state budget and beneficiaries of the state budget as well as non-profit institutions. In 2016, a sample of these companies included 10,352 companies. Second, we used the JOPPD report for companies which were included in the INV-P survey. JOPPD form is the central tax report on taxed and untaxed income to Tax Administration of Croatia. Each employer in Croatia is obliged to submit the JOPPD form monthly where they need to report the amount of net and gross wages, as well as number of employees and number of worked hours. Third, companies are classified by NACE Rev. 2 classification (hereinafter activity) which enables us not just to track in which main economic activity each company operates, but also to divide companies between the state and the privately owned firms. Information about the Register of Business Entities from where we can get information whether company is privately or state owned is done by Croatian Bureau of Statistics.

4.2. Econometric model

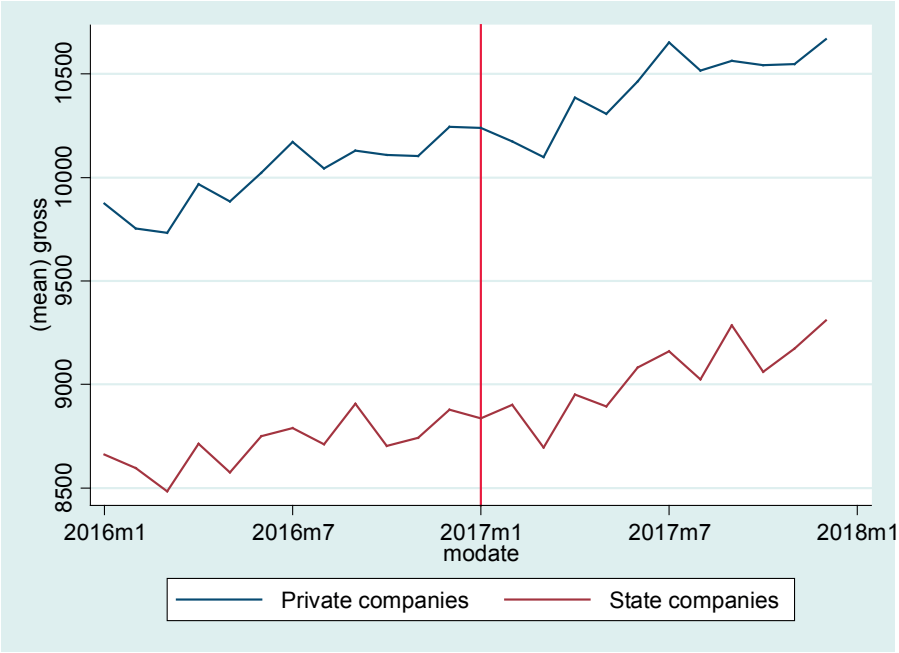
In our research we have used a balanced panel data model because we wanted to control for non-switchers i.e. we wanted that our comparison is based on the *same* individual before and after the tax reform who worked for the same company3. We have used various techniques to visualize and identify outliers. Some outliers were not in line with the economic logic and we have decided to remove that observations because we knew that they were incorrect.

Since all companies in Croatia were affected by the tax reform, our analysis is based on a counterfactual comparison of private and state owned companies in a period from January 2016 until December 2017. In the private sector wages are determined by the market force while in the public sector wages are set in collective agreements and during period which we study this reform, wages did not change. Using a single country event study, we were able to establish a valid control group.

Next we wanted to check whether our cross-group research designs between private and state companies full fills necessary either implicit or explicit common trend assumption (Fuest et al., 2015). From figure 3 by visual inspection we see that common trend assumption for private and state companies holds.

3 Feldstain (1995) while studying the effect of marginal tax rates on taxable income uses the *same* individual before and after the tax reform.

Figure 3: Mean of gross wage for each individual for period January 2016 until December 2017, vertical line represents the start of the tax reform period



Source: Author's calculation based on the Ministry of Finance JOPPD form and on the INV-P sample from Croatian Bureau of Statistics

Wage setting system differs and this is visible from Figure 3 which reveals that on average gross wages among private sector workers are higher in comparison to state sector workers. Positive wage premium for private sector workers in Croatia is present.

To quantitatively measure the effects of the income tax reform, we estimated our model with a classical difference-in-difference (DiD) estimator, comparing the change in outcomes between the treatment and the control group. We controlled for individual and activity characteristics. Specifically, we estimated the following model:

$$y_{it} = \alpha + \beta_1[\text{Post}_t] + \beta_2 T_i + \beta_3[\text{Post}_t]T_i + \sum_k \beta_k z_{kit} + \sum_j \beta_j x_{jit} + \epsilon_{it} \qquad (1)$$

where outcome *y* depended on individual characteristics *z*, sector characteristics *x* and the exposure to the treatment group *T*. The *post* is a dummy which takes the value zero for the period before the tax reform and 1 after the tax reform. The validity of these DiD estimates hinges on a reliable measurement of the control group's behavior and exposure to the treatment and the control groups. The effects of the tax reform on wages is reported in Table 1. Columns show the estimation results of the DiD.

Table 1: Main results: Effects of tax reform on gross wage

	Difference-in Difference
post	**351.75*** **
	(3.13)
treatment	**1454.58*** **
	(9.40)
post*treatment	**98.47*** **
	(12.87)
hours worked	**54.7*** **
	(0.20)
activity_2	**1813.9*** **
	25.49
activity_3	**18.38* **
	(10.17)
activity_4	**3364.60*** **
	(12.08)
activity_5	**-21.86* **
	(11.4)
activity_6	**646.65*** **
	(13.83)
activity_7	**-129.71*** **
	(10.89)
activity_8	**1071.94*** **
	(10.95)
activity_9	**708.00*** **
	(15.67)
activity_10	**4079.01*** **
	(16.33)
activity_11	**2773.08*** **
	(14.5)
activity_12	**1366.52*** **
	(35.42)
activity_13	**4146.17*** **
	(19.89)

activity_14	**-1556.59*** **
	(18.45)
activity_15	**1413.44*** **
	(9.75)
activity_16	**906.78*** **
	(9.68)
activity_17	**1712.46*** **
	(10.4)
activity_18	**635.56*** **
	(12.1)
activity_19	**5416.88*** **
	(121.04)
R -squared	**0.07**
Observations	**9 667 032**

Source: Author's calculation

Note: In parentheses we report robust standard errors. ***p<0.01, **p<0.05, *p<0.1.

On average in state companies over time gross wages have increased by almost HRK 352 (significant at 1%) and before tax reform gross wages between private and state companies were by HRK 1 455 differently which represents a sizeable magnitude (also significant at 1%). CBRT 2017 tax reform using this DiD estimator shows that average gross wage of private firms after the reform has increased by almost HRK 99 (also significant at 1%) meaning that the tax reform had the positive impact on gross wage. From econometric perspective, model reports that different industries pay different wages were for three sectors we get results with a negative coefficient indicating that there is some evidence of heterogeneous effects of CBRT 2017 tax reform. Particularly sectors with negative coefficients are: (1) Water supply, sewerage, waste management and remediation, (2) Wholesale and retail trade, repair of motor vehicle and motorcycles and (3) Administrative and support service activities. Gross earnings it those units of economic activities are historically among the lowest.

5. Conclusions

Since CBTR 2017, Croatian Government has adopted another package of lower income taxation which started in 2021. Question of how the tax relief is split between firms and their employees is of high importance for policy makers. Our paper links on a vast literature regarding the business tax competition to a small but growing literature on the effective incidence of income taxation. Changes to tax rates and tax bands can cause many behavioral changes. The worldwide evidence on behavioral responses to tax changes tends to agree only on the belief that higher income tax rates will

lead to behaviors that have a negative effect on tax revenues. These include reducing labor supply and tax avoidance.

Taxes are often perceived as a necessary evil that both taxpayers and companies would like to minimize − or even to completely get rid of. Still, there is often a substantial gap between the prescriptions of an “optimal tax system” and actual tax schemes. In other words, actual tax schemes often impose unnecessary economic burdens and distortions. Everyone could benefit from improving the tax system. Long-awaited tax reform that would include property tax in Croatia was already blocked since the legislators after proposing (let alone implementing) such tax reform realized that such a reform could cost them (re)election. Tax reform that decreases taxes is welcome and should lead to several positive economic effects.

In the last five years, tax rates have significantly decreased and income thresholds have significantly increased. The continuation of tax reform in Croatia introduced, amongst other legislative changes, further decreases in personal income tax rates. The new, permanently lowered income tax rate makes Croatia a more attractive place for companies to locate investments and will discourage profit shifting to low-tax jurisdictions. The lower rate incentives new investments that will increase productivity, and lead to higher levels of output, employment, and income in the long run. All of these should help Croatian economy to become a more globally competitive location for new investment, jobs, innovation, and growth.

In this research we report that wage setting system differs were on average gross wages among private sector workers are higher in comparison to state sector workers. Positive wage premium for private sector workers in Croatia is present. Next we report that on average in state companies over time gross wages have increased. CBRT 2017 tax reform using this DiD estimator shows that average gross wage of private firms after the reform have increased meaning that the tax reform had the positive impact on gross wage. Further we saw some evidence that suggests that different activities pay different wages were for three types of actives, we provide some negative evidence i.e. heterogeneous effects from the CBRT 2017 tax reform. Particularly activities with negative coefficients are: (1) Water supply, sewerage, waste management and remediation, (2) Wholesale and retail trade, repair of motor vehicle and motorcycles and (3) Administrative and support service activities. Gross earnings it those units of economic activities are historically among the lowest so these results do not come as a big surprise.

Main limitation of this study is that it does not include wider effects on the Croatian economy. Variety of nontax factors such as factors in employees behavioral responses: decisions whether to work or not; how many hours to work; whether to incorporate and pay income related taxes; or whether to re-locate to or from other parts of the region are not included.

References

1. Attinasi, M. G., Berardini, F., De Stefani, R. and Osterloh, S. (2016) “The effects of labour income taxes on labour market performance: an empirical analysis”, Banca d’ Italia – Current Issues Fiscal Policy [Internet]. Available at: <https://www.bancaditalia.it/pubblicazioni/altri-atti-convegni/2016-current-issues-fiscal-policy/Attinasi_Berardini_DeStefani_Osterloh.pdf> [Accessed: May 3, 2022]
2. Auten, G., Carroll, R. (1999) “The effect of income taxes on household behavior“, Review of Economics and Statistics, 81 (3), pp. 681-693.
3. Clausing, K. A. (2012) “In Search of Corporate Tax Incidence”, Tax Law Review, 66(4), pp. 419-443.
4. DeBacker, J., Heim, B. T., Ramnath, S. P., Ross, J. M. (2019) “The impact of state taxes on pass-through businesses: Evidence from the 2012 Kansas income tax reform“, Journal of Public Economics, Vol. 174, pp. 53-75.
5. Feldstein, M. (1995) “The effect of marginal tax rates on taxable income: a panel study of the 1986 tax reform act“, Journal of Political Economy, 103 (3), pp. 551-572.
6. Gale, W. G., Samwick, A. A. (2014) “Effects of income tax changes on economic growth”, Economic Studies. Available at: <https://www.brookings.edu/wpcontent/uploads/2016/06/09_Effects_Income_Tax_Changes_Economic_Growth_Gale_Sa mwick.pdf> [Accessed: April 14, 2022]
7. Grdović Gnip, A., Tomić, I. (2010) “How hard does the tax bite hurt? Croatian vs. European worker, Financial Theory and Practice, 34(2), pp. 109-142.
8. Law on Personal Income Tax, Official Gazette 109/93, 127/00, 177/04, 115/16
9. Moore, N., Kasten, T., Schmidt, C. M. (2014) “Do Wages Rise when Corporate Taxes Fall? - Evidence from Germany’s Tax Reform 2000“, Ruhr Economic Papers, No. 532, Rheinisch-Westfälisches Institut für Wirtschaftsforschung (RWI), Essen, http://dx.doi.org/10.4419/86788609
10. OECD (2022) “Statutory Corporate Income Tax Rates”, (database). Available at: <https://stats.oecd.org/Index.aspx?DataSetCode=CTS_CIT> [Accessed: April 14, 2022]
11. Palić, I., Žmuk, B., Grofelnik, B. (2017) “The long-run impact of personal income taxation on economic development: Evidence from Croatia”, Croatian Review of Economic, Business and Social Statistics (CREBSS), Vol. 3, No.1, pp. 35-44.

12. Sikirić, A. M. (2017) “The impact of individual taxation on gender equality in Croatia”, The EU Mutual Learning Programme in Gender Equality. European Commission, Available at: <hr_comments_paper_se_2017.pdf (europa.eu) > [Accessed: October 3, 2021]

13. Zidar, O. (2019) “Tax Cuts for Whom? Heterogeneous Effects of Income Tax Changes on Growth and Employment”, Journal of Political Economy, Volume 127, Number 3, pp. 1437-1472.

CHAPTER 2

Methodological challenges of consolidating general government financial statements in Croatia

Davor Vašiček[1]

ABSTRACT

Consolidated financial statements are the financial statements of a group of entities presented as if they were a single economic entity. The basic principles of consolidation of financial statements are economic unity, unique methodological ¸basis for the recognition of the financial statement elements, a single reporting period and unique reporting monetary unit.

International Public Accounting Standards 6 - Consolidated and Separate Financial Statements, and the European System of Accounts 2010 (ESA 2010) provide a technical methodological framework for carrying out the process of consolidating the financial statements of all entities in the general government sector. Following the application of ESA 2010, the general government sector in the Republic of Croatia has been expanded to include the units that use very different accounting and financial reporting systems depending on their legal status. Therefore, in order to prepare the consolidated financial report of general government, it is necessary to make methodological adjustments and reclassifications of elements of the financial statements of entrepreneurs, foundations, banks and non-profit organizations in accordance with the rules of government accounting. The article presents the results of qualitative analysis of the differences in the accounting systems of the entities participating in the general government sector. It also proposes procedures for their adjustment in order to create a unified methodological basis necessary for the preparation of the consolidated financial report of the state.

Key words: *consolidation, financial statements, general government, ESA 2010,*

JEL classification: *E60, G18, H72*

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1. Introduction

Upon accession to the European Union, Croatia assumed the obligation to report to the European Commission on the situation of its public finances in accordance with the methodology of the European System of National and Regional Accounts (hereinafter ESA 2010). ESA 2010 is a relatively new methodology used in the compilation and transmission of national accounts data in order to establish compatibility and comparability of data with other EU members. The introduction and application of the ESA 2010 methodology had a significant impact on public finance statistics in Croatia, i.e. on the data on the development of revenue, expenditure and the balance of the general government budget, as well as on the debt of the consolidated general government. The application of ESA 2010 means that part of public enterprises and nonprofit organizations have been reclassified from the nonfinancial and financial public enterprises subsector to the general government subsector. This reclassification provides better insight into the financial position of the public sector. The reclassification has a significant impact on the level of government debt and the government budget deficit, and thus on the picture of fiscal sustainability and macroeconomic stability. However, the reclassification of individual units into a government subsector also poses methodological challenges in aggregating information on the government's financial position and results of operations.This arises from the fact that these are different economic units with very specific operations, some of which apply corporate accounting, bank accounting, investment fund accounting and/or nonprofitaccounting. Since the entities reclassified to the general government subsector apply different accounting rules for recording elements of the financial statements, it is not possible to consolidate their financial statements directly using the usual consolidation methods and procedures. In order to perform the consolidation, the financial statements must be prepared in advance using a single accounting method. In Croatia, these are the methods and rules prescribed by the Budget Act and the related regulations on accounting and financial reporting in the budgetary system. The preparation of the consolidated financial statements of general government does not complete the process of preparing information for statistical reporting in accordance with the ESA 2010. This results from the fact that this international statistical system is based on accrual accounting principles. The Croatian system of budgetary accounting (government accounting), on the other hand, is based on the principles of modified accrual accounting. In the course of national reporting, this requires further adjustments of part of the consolidated data to the aforementioned methodology.

2. Literature review

The impact of the introduction of the ESA 2010 methodology has been systematically studied and analyzed from various aspects. The reclassification of the general government sector and the impact of the application of the ESA 2010 are areas that are continuously monitored and analyzed by the national statistical and public finance authorities. Using these rules, reports

on the Excessive Deficit Procedure (Statistics Office, 2021) are prepared on a regular basis. The Croatian National Bank (CNB, 2015) systematically studied and analyzed the introduction of ESA 2010 and other changes in monetary and financial statistics. Tomek and Andabaka (2019) also examine and quantify in detail the impact of the application of ESA 2010 on public finance statistics and the Croatian government budget. Bajo and Juričić (2015) analyzed public-private partnership contracts and concessions in the context of government borrowing. Galinec and Kandžija (2018) examined the impact of stock-flow adjustments on changes in Croatian government debt. Vašiček and Drezgić (2018) analyzed the interdependence between the application of the fair accounting concept and fiscal consolidation in the context of the application of the ESA 2010. In contrast, the topic of consolidation of the state's financial statements is scarcely represented in the professional and academic literature. The professional framework for consolidation of financial statements in the public sector is set by International Financial Reporting Standard 6 - "Consolidated and Separated Financial Statements" and Standard 35 - "Consolidated Financial Statements" (IFAC - IPSASB, 2022). However, these standards are not yet applied in Croatia. Moreover, their application does not apply to government business enterprises (GBE). GBEs apply IFRS. IFRS 10 - "Consolidated Financial Statements" (IFAC, 2021) is relevant for the consolidation of their financial statements.

The international accounting standards do not regulate the harmonization of accounting rules in cases where the scope of consolidation consists of companies that use different accounting bases. It is actually impossible to standardize and unify these procedures, but it is necessary to analyze them in detail, identify methodological differences and eliminate them by applying the accounting rules of the leading member of the consolidation group. Uniform application of IPSAS in the public sector would solve this methodological problem. Indeed, these standards are based on accrual accounting, just like the ESA 2010, and their application would allow the consolidation procedures for the financial statements to be carried out using proven techniques of addition of similar elements and elimination of reciprocal transactions. The consolidated financial statements of the general government would thus be more reliable and accurate. The need for harmonization of accounting systems is also supported by the results of the research conducted by Nistor and Stefanescu (2018) and Vašiček and Vašiček (2019).

3. Analysis model

This study focuses on the process of consolidating the government's financial statements. Consolidated financial statements are a sum of financial statements of an economic entity presented as individual financial statements. In the case of a homogeneous group of budgetary units belonging to the general government sector, the process is carried out using standardized procedures. Methodological problems arise when consolidating the financial statements of extra-budgetary users of central government. These are different entities with very specific operations, some of which use corporate, bank, investment fund and non-profit accounting. This research includes a

qualitative comparative analysis of the application of budgetary accounting and financial reporting to the operations of extrabudgetary users of the central government budget. These entities apply different accounting systems in accordance with the regulations. This means that their financial statements are different in content and form and cannot be directly consolidated. In order for their financial statements to be included in the government's consolidated financial statements, they must be reclassified and prepared using a separate methodology. This means that they are prepared using the prescribed rules of government accounting. The first phase of this research consists in an in-depth qualitative analysis of each accounting system used by the consolidation participants. This implies the analysis and systematic presentation of the rules for the recognition of income, expenses, assets, liabilities and financial results of the individual consolidation participants. For this purpose, it is necessary to examine the relevant professional and legal framework provided by international standards and national legislation. This means that the accounting systems of the companies must be examined on the basis of the International Financial Reporting Standards, taking into account the specifics of their activities in the real and financial sectors. In addition, it is necessary to examine the accounting system of non-profit organizations on the basis of Croatian legislation and, finally, the Croatian system of state accounting itself. The second phase of the study compares the basic rules for the accounting recording and presentation of the elements of the financial position and financial performance. It also identifies methodological differences that need to be eliminated and proposes procedures for standardizing and/or reducing accounting information to a comparable basis.

The application of research results in the preparation of reports for consolidation means, in certain cases, the translation of accounting information on individual transactions resulting from the operations of the extrabudgetary user into accounting information using the state accounting system. The procedure requires complex accounting knowledge and is very professional. Considering the peculiarities of the operations of each consolidation entity, the procedure requires an individual in-depth analytical approach and cannot be automated by the technologies of IT. Precisely for the reasons mentioned above, there are no uniform and legally binding methodological guidelines issued by the legislator. The aim of this work is therefore to provide a scientific and expert-based qualitative model for identifying differences and defining basic procedures for harmonizing financial statements for their consolidation.

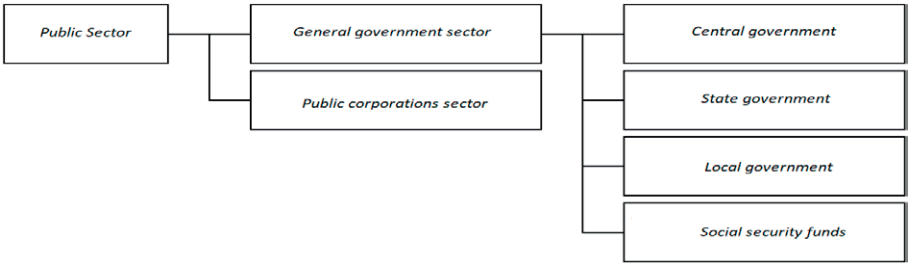
4. Institutional and professional background and analysis

In this part, the institutional framework of the Croatian public sector, i.e. the general government sector, is presented as an area of research on the topic. In addition, the fundamentals and the consolidation process of the government's financial statements are briefly presented. The focus is on the extra-budgetary users of the state budget, whose financial statement elements cannot be consolidated without reclassification and revaluation. The reason for this is that different accounting rules are applied in their presentation.

4.1. The general government scope

The sector of general government is the dominant part of the public sector. Depending on the political and territorial-economic organization of each country, public sector is composed of the components shown in Figure 1.

Figure 1: Structure of the public sector scope



Source: adapted from Lorson et al., 2019, p. 153.

The general government sector (S.13) consists of institutional units that are not market producers and whose production is for individual and collective consumption. They are financed by compulsory payments from units belonging to other sectors and by institutional units that primarily carry out the redistribution of national income and wealth (Bureau of Statistics, 2015).

In the Republic of Croatia, the general state consists of the so-called “central state” and the “local” state (units of local and regional self-government), including their budgetary and extra-budgetary beneficiaries. Institutional coverage is determined by applying the Decision on Statistical Classification of Institutional Sectors (OG 1/2015). The Statistical Classification of Institutional Sectors 2010 (SKIS 2010) is a mandatory national standard for the collection, compilation, processing, analysis, provision and publication of statistical data important for the statistical monitoring of the country’s economic development. Using this standard, the official register indicates that the total state includes 6372 units. Of these, 690 units belong to the central government sector, 5,679 to the local/regional government sector, and 3 extrabudgetary national social funds.

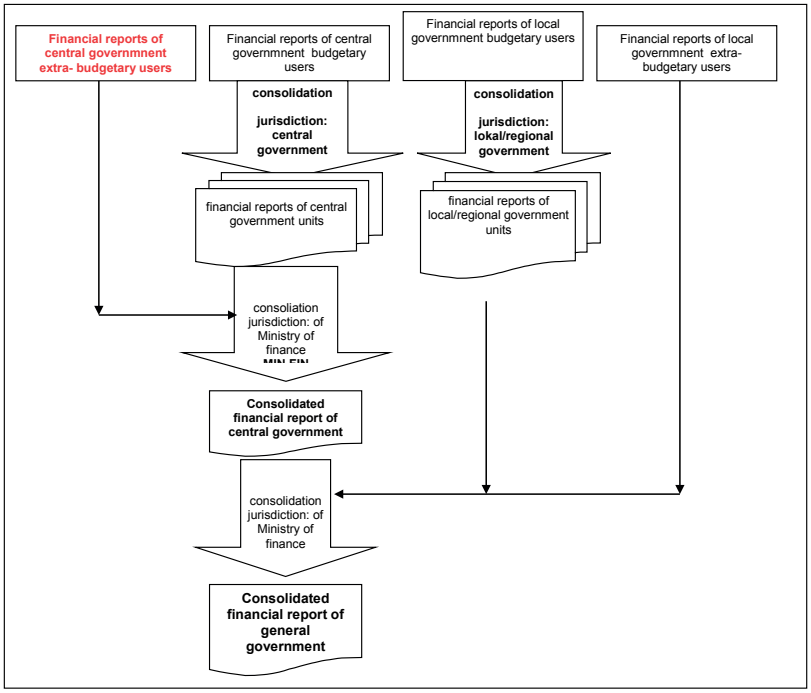
4.2. The process of consolidation of financial statements

Pursuant to Article 18 of the Ordinance on Financial Reporting in Budget Accounting (OG, 2022), consolidated financial statements are reports in which the data of a group (several interrelated budgets and/or budgetary and non-budgetary users) are presented as if they were a single entity.As for the coverage of the consolidated financial statements, it is defined by the provisions of the Budget Act (OG, 2021), i.e. the Register of Budgetary and Extrabudgetary Beneficiaries pursuant to the Regulation on the Determination of Budgetary and Extrabudgetary Beneficiaries of the State Budget and Budgets of Local and Regional Self-Government Units and on the Manner of Keeping the Register of Budgetary and Extrabudgetary Beneficiaries (OG, 2014a).Once a year, not later than the end of May, the Ministry of Finance

shall publish a list of budgetary and extra-budgetary recipients of funds from the state budget and budgetary and extra-budgetary recipients of funds from the budgets of local and regional (regional) self-government units, the Register of Budgetary and Extra-Budgetary Recipients. In addition, the updated list is published monthly on the website of the Ministry of Finance. Each beneficiary is published with a number from the register (RBU number), which proves its institutional affiliation to the sector of the general budget, and a consolidated financial statement of the general budget is prepared based on the financial statements of these beneficiaries. The register of budgetary and extra-budgetary users helps ministries and units of local and regional self-government to decide which units should be consolidated. At the same time, the register ensures the consistency of coverage necessary for statistical analysis. In order for the Ministry of Finance to consolidate the general budget, ministries responsible for the state budget and units of local and regional self-government are required to consolidate the financial statements of all budgetary users under their jurisdiction that are listed in the register of budgetary and extra-budgetary users. The process of consolidating all elements of the Croatian state budget is specified in Article 107 of the Budget Act (OG, 2021) or in Article 18 of the Regulation on Accounting in Budgetary Accounting (OG, 2022).

The scheme of the process and responsibility for consolidation is shown in the following figure.

Figure 2: Process of consolidation of financial statements



Source: adapted from Jakir-Bajo and Štefković (2021)

4.3. Rules of financial statements consolidation

The basic prerequisite for carrying out the consolidation of financial statements of economically related companies is that they cover the same reporting period, are expressed in the same currency unit and are prepared using the same methodology, i.e. the same accounting rules.The application of accounting rules for a given budget and its budget users is precisely prescribed in the Regulation on Budgetary Accounting and Chart of Accounts (OG, 2014b). This ensures the methodological correctness of the consolidation of financial statements prepared under the same accounting rules and methods for the same transactions and operations. Also, the application of the financial reporting framework in budgetary accounting (OG, 2022) ensures consistency in the application of consolidation methods. The methodological challenge and the need to adapt to the requirements of consolidation are the financial statements of 11 extra-budgetary users of the state budget. These are entities that prepare their financial statements in accordance with the rules of corporate and non-profit accounting. In 2021, these were, in particular: Croatian Pension Insurance Institution, Croatian Health Insurance Fund, Croatian Labor Administration, Croatian Waters, Fund for Environmental Protection and Energy Efficiency, Croatian Roads Ltd, Croatian Motorways Ltd, Croatian Railway Infrastructure Ltd, Croatian Railway Passenger Transport Ltd, State Agency for Deposit Insurance and Bank Rehabilitation, and Restructuring and Sales Center. 22 County road administrations are also included in the consolidation of the general government, but their financial reports are harmonized with the reports of the budgetary units.

After reclassifying the financial statements of the aforementioned entities, applying the rules of budgetary accounting, methodological homogeneity is achieved and consolidation can be performed. For this purpose, two basic procedures are applied. The first is to add the financial statements of the governing entity and the entities belonging to it in the same amount, as if they were a single accounting entity. The second procedure consists of eliminating transactions and business events within the Group in order to avoid duplicating receivables/payables, income/receipts and expenses/expenditures at Group level.

5. Results and discussion

In the following section, the results of each research phase are presented. Also, the basics and characteristics of accounting systems of extra-budgetary users of the state budget included in the consolidation of the state are presented. The main differences in recording elements of their financial statements are identified and a model of their adaptation for reporting in the budgetary accounting system is presented.

5.1. Applied accounting systems

The following table shows the extrabudgetary users of the state budget, grouped by the types of accounting systems they use in preparing financial statements.

Table 1: Type of accouinting and accounting basis

Entity	Type and accounting basis
Budgetary entites: • Croatian Pension Insurance Institute, • Croatian Health Insurance Fund, • Croatian Employment Service	Governmental (budgetary) Accounting/ Modified acruall Accounting
Government Business Enterprises: • Croatian Roads ltd. • Croatian Motorways ltd., • Croatian Railways Infrastructure ltd., • Croatian Railways Passenger transport ltd.	Corporate accounting/ Full Acruall Accounting
Non-profit organizations: • Croatian Waters, • State Agency for Deposit Insurance Bank Rehabilitation • Restructuring and Sale Center, • Environmental Protection and Energy Efficiency Fund	Nonprofit accounting / Limited Acruall Accounting

Source: authors work

The accounting of budget users is regulated in detail by the Budget Law and the related Regulation on Accounting and the Establishment Plan, as well as the Regulation on Accounting in the Budget System. The system was designed back in 2002 as a transitional phase for the application of international accounting standards for the public sector. Its further development did not take place. It is characterized by significant changes in relation to the aforementioned standard, which will be presented later in the paper.

Accounting of Government Business Enterprises (GBE) is based on the Accounting Act (OG, 2015). This law directs entrepreneurs to the direct application of Croatian Financial Reporting Standards or International Financial Reporting Standards. The system is based on the full application of acruall accounting, including the concept of fair value.

The accounting of non-profit organizations is regulated by the Law on Financial Operations and Accounting of Non-Profit Organizations (OG, 2014c). Since 2008, it has been based on the principle of incomplete acruall accounting. This results from its non-market nature, where the concept of fair value does not apply.

5.2. Fundamental characteristics of accounting systems

The table below presents the basic characteristics of the accounting systems used by the participants in the consolidation of the government's financial statements. Their application results in different measurement and recognition of elements of the financial statements. Before carrying out the consolidation of financial statements, these differences should be eliminated by applying the rules of state accounting in all entities participating in the consolidation.

Table 2: Rules for recognition of elements of basic financial statements

	Budgetary entities	Non-profit organizations	Government Business Enterprises
Basis of Accounting	Modified cash/accrual accountig	Acruall Accounting	Full Acruall Accounting
Legal basis	Budget Law	Law on financial operations and nonprofit accounting	Accounting Law
Basic features of the accounting system	Revenue is recognized at the time of collection (cash basis) Acquisition costs of fixed assets and inventories are not capitalized: one-time cost at the time of acquisition Inventories are not presented on the balance sheet Accruals – Recognition of elements in the period to which they belong is strictly limited only to so-called continuous expenses Provisions for costs and risks are not recognized Donations of long-term non-financial assets between entities of the general budget are recognized directly in capital The concept of fair value is not applied The performance report includes both receipts and expenditures of financial assets related to borrowing and investing in securities. The financial result is not distributed	Revenues and expenses are recognized when the event occurs, regardless of payment / collection Acquisition costs of fixed assets are capitalized: - asset consumption = depreciation expense over the useful lifetime Accruals – Recognition of elements in the period to which they belong Provisions for costs and risks are recognized Time disbursements are mandatory Donations of non-financial assets with non-depreciable assets are recognized directly in capital The concept of fair value is not applied The financial result is not distributed	Revenues and expenses are recognized when the event occurs, regardless of payment / collection Acquisition costs of fixed assets are capitalized: - asset consumption = depreciation expense over the useful lifetime Accruals – Recognition of elements in the period to which they belong Provisions for costs and risks are recognized Time disbursements are mandatory The concept of fair value is applied The financial result is distributed

Source: author's work

Comparing the basic characteristics of the accounting systems of GBE and NGOs with the budgetary accounting system, the need for an analytical approach to the preparation of certain information in their financial statements becomes clear. In particular, this means that the procedure for their recording must be carried out according to different rules. In particular, business transactions must be evaluated and classified using the rules of budgetary accounting. Direct reclassification of individual items in the financial statements is not possible.

5.3. Basic accounting procedures

Given the previously outlined differences in the application of accounting rules, GBEs and NGOs must perform the following highly demanding accounting measures for the purpose of consolidating their financial statements:

1. Exclude from the total income determined all income not collected.

2. Deferred income based on the application of IAS 20 or on the basis of project financing must be included in total income for the reporting period to the extent of the amounts collected.

3. All investments in fixed assets during the reporting period must be recognized in their entirety as capital expenditure, with the stated cost of calculated depreciation of fixed assets excluded from expenditure.

4. Identified deficits and expenditures of long-term non-financial assets shall be excluded from expenditures and added to capital. Similarly, identified surpluses of these assets shall be excluded from revenue and accounted for as an increase in capital.

5. Unrealized exchange differences should be excluded from the report on the financial result. According to budgetary rules, only realized exchange rate differences are reported in the income and/or expenses of the reporting period. Therefore, unrealized exchange rate differences must be reported in the balance sheet (negative differences as prepaid expenses and positive differences as deferred income).

6. Provisions for risks and charges for which expenses of the reporting period are recognized should be excluded.

7. Allowances for non-current and current assets for which operating income and expenses are recognized should be excluded as a charge or in favor of capital. This results from the fact that the concept of budgetary accounting does not provide for the application of fair value.

8. It is necessary to include from the accounting records data on income and expenses of financial assets related to borrowing and investment in financial assets (securities).

9. It is necessary to determine the financial result as the difference between revenues and expenses, income and expenses. The result will be significantly different from the financial result determined in the original financial statements. By including revenues and expenses in the determination of

the result, the concept of profit/loss is completely abandoned and the result is determined as a surplus/deficit of revenues and income in relation to expenses and expenditures.

The above procedures cannot be carried out using the data in the original financial statements, since they are synthesized. Therefore, it is necessary to analyze the changes recorded in all relevant accounts of the general ledger and revalue them according to the rules of budgetary accounting. This will result in very significant changes, especially in the items of recognized income, accrual of expenses and capital expenditures. As a result, the financial result determined according to budgetary accounting rules will not be comparable with the original financial result. The largest deviations occur in the case of GBEs that have financed their investment activities with government grants and other financial sources (loans/credits). Their value is recognized as an expense of the reporting period instead of being spread over the entire useful life of the acquired asset using the depreciation calculation mechanism. A particularly challenging adjustment to the data takes place in the first year of application of the budget rules. In this case, all opening balances of individual balance sheet items of assets and liabilities must be "translated" according to the budgetary accounting rules. Only after that it is possible to apply the above mentioned procedures for the reporting period.

In addition to the changes in the content of the value of the individual elements of the financial statements, adjustments must also be made in the formal sense. Namely, the formal form of the financial statements of budgetary units contains elements that are all presented in detail in and in accordance with the economic classification. The financial statements of other entities contain elements that present in aggregate form individual forms of assets, liabilities, capital, revenues and expenses. For the purposes of consolidating financial statements, it is therefore necessary to also prepare financial statements structured in the manner prescribed for budgetary units. Therefore, financial statements outside the budgetary users of the state budget must be prepared according to fundamentally different rules, both in material and formal terms.

6. Conclusions

As an EU Member State, Croatia is obliged to apply the ESA 2010 statistical methodology. The application of this methodology also implies a uniform sectorization of the entire national economy. As a result, government scope has been extended to extra-budgetary units under government control. Some of them are defined as nonprofit organizations by virtue of their legal basis, while others are government business enterprises (GBEs).

Aggregate data on the financial position and financial performance of general government require the preparation of a consolidated financial statement that includes all its components. For the consolidation of the financial statements of all components, the criteria of economic linkage, single currency, and reporting period are met, but the problem is the application of uniform accounting rules. GBEs and NGOs do not apply the uniform government accounting rules as other subjects of the general government. Therefore, the

scope of general government includes entities that apply different accounting bases in preparing financial statements. These are various modifications of accrual accounting. Therefore, the elements of their financial statements must be remeasured and reclassified for consolidation purposes using the modified accrual basis of accounting prescribed by the governmental accounting system.

This is a demanding analytical procedure that requires a high level of knowledge of the characteristics of the various accounting systems. It is not possible to directly reclassify financial statements outside of budgetary users because they contain synthetic data on individual elements. Moreover, they do not fully and consistently follow the economic classification.

National regulators have not established uniform rules for the "translation" of financial statements for the purpose of their consolidation. This is understandable to some extent, as companies are different and their activities are specific in many respects.

Therefore, the adjustment process must be carried out through an individual analysis of the main business transactions. Subsequently, their recognition is carried out by applying the rules of state accounting and presenting them in the form of financial statements of the budgetary units.

In the paper, the basic areas of the different accounting recognition of the individual elements of the financial statements have been studied and presented. It also lists the procedures that need to be performed as part of their harmonization. Therefore, the results of the study can serve as a basic model for the convergence of the content of the financial statements of heterogeneous units of the state.

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References

Books

1. Lorson P., et al. (2019): European Public Sector Accounting,. Imprensa da Universidade de Coimbra, Coimbra University Press.
2. Vašiček, V; Vašiček, D. (2019): "Public sector Accounting, Auditing and Control in Croatia // Public sector Accounting, Auditing and Control in South Eastern Europe / Vašiček, Vesna ; Roje, Gorana (ed.).Cham, Switzerland: Palgrave Macmillan, Springer Nature Switzerland AGB, 2019. str. 1-28 doi:https://.org./10.1007/978-3-030-13353-8
3. Vašiček, D.; Drezgić, S (2018): "Contemporary Government Accounting and Fiscal Consolidation" // Tax Policy and Fiscal Consolidation in Croatia ", Blažić, H.; Grdinić, M.(eds.).,Rijeka: University of Rijeka, Faculty of Economics and Business, 2018.

Journals

1. Bajo, A. & Juričić, D. (2015) "When do obligations from public-private partnership and concession contracts become part of the general government debt? " Insitute of Public Finance, Zagreb, Newsletter, No. 101. doi: 10.3326/nlh.2015.101 https://www.ijf.hr/upload/files/file/ENG/newsletter/101.pdf
2. Galinec, D. & Kandžija, T. (2018) "The Impact of Stock-Flow Adjustments on Changes in Croatian General Government Debt Level". Proceedings of the Faculty of Economics, University of Mostar, (Journal of Economy and Business, Special Issue 2018.) https://hrcak.srce.hr/en/zbornikefmo
3. Jakir-Bajo, I. & Štefković, M. (2022) "Consolidated financial statements in the budget system for 2021", TIM4PIN Magazin br.2, Tim4Pin d.o.o, Zagreb
4. Nistor, S.N. & Stefanescu, C.A. (2018) "Public accounting reporting, under an achievable metamorphosis?", Current Science, Vol. 114, No. 10, Current Science Association, Bangalore https://www.jstor.org/stable/26495652
5. Tomek, M.& Andabaka, A. (2019) "The effects of the introduction of the methodology of the European System of Accounts 2010 on public finance statistics in Croatia", Croatian and comparative public administration: A journal of theory and practice of public administration, Craoatian Institute of public administration, Zagreb, Vol. 19 No. 4, 2019.

Conference papers from Conference proceedings

1. Vašiček, V.; Vašiček, D.; Pajković, I (2022) "Public sector accounting and potential implementation of IPSAS/EPSAS in South East European countries" // Proceedings of FEB Zagreb 13th International Odyssey Conference on Economics and Business / Sever Mališ, Sanja; Jaković, Božidar; Načinović Braje, Ivana (eds.). Faculty of Economics and Business, University of Zagreb, Zagreb

Official publications:

1. Bureau of Statistics (2015) Decision of Sectoral classification of institutional units 2010. - SKIS 2010 (OG 1/2015), https://web.dzs.hr/App/Sektorizacija/Documentation/SektorskaKlasifikacijaESA2010.pdf)
2. Bureau of Statistics (2021) Excessive deficit procedure Report, Republic of Croatia 2010), announcement 12.1.2/1, april 2021., https://www.dzs.hr/Hrv_Eng/publication/2021/12-01-02_01_2021.htm
3. Croatian National Bank (2015): Introduction of the ESA2010 standard and other changes in monetary and financial statistics of the CNB. https://www.hnb.hr/documents/20182/121822/h-esa-prezentacija-hecimovic.pdf/f5c74039-1415-4f71-9e03-0f5744b57ed5
4. Ministry of Finance of the Republic of Croatia (2020): Guidelines for the Prepararation for the State Budget of Republic of Croatia for 2021 and projection 2022- Smjernice%20za%20izradu%20DP%20RH%20za%202021%20i%20projekcija%20za%202022%20i%202023.pdf
5. IFAC (2021) International Financial Reporting Standard 10 - Consolidated Financial Statements, https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ifrs-10-consolidated-financial-statements.pdf
6. IFAC – IPSASB (2022) International Public Sector Accounting Standard 6, “Consolidated and Separated Financial Statements” (IPSAS 6), https://www.ipsasb.org/publications/ipsas-6-consolidated-and-separated-financial-statements-1
7. IFAC – IPSASB (2022) International Public Sector Accounting Standard 35, “Consolidated Financial Statements” (IPSAS 35), https://www.ipsasb.org/publications/ipsas-35-consolidated-financial-statements
8. Official Gazette of the Republic of Croatia (OG 2014 a): Ordinance on budget accounting and Chart of Accounts, No. 124/2014, 115/2015, 87/2016, 3/2018, 126/2019, 108/2020.
9. Official Gazette of the Republic of Croatia (OG 2014b): Ordinance on determining budgetary and extra-budgetary beneficiaries of the state budget and budgetary and extra-budgetary beneficiaries of the budget of local and regional (regional) self-government units and on the manner of keeping the Register of budgetary and extra-budgetary beneficiaries, No. 142/2014, 23/2019, 83/2021
10. Official Gazette of the Republic of Croatia (OG 2014c): Law on Financial Operations and Accounting of Non-Profit Organizations, No.121
11. Official Gazette of the Republic of Croatia (OG 2015): Accounting Law, No.78/15, 134/15, 120/16, 116/18, 42/20, 47/20
12. Official Gazette of the Republic of Croatia (OG 2021): Budget Law, No. 141
13. Official Gazette of the Republic of Croatia (OG 2022): Rulebook on financial reporting in budget accounting, No. 37

CHAPTER 3

Reflections on the evolution of the fiscal equalization system of the Republic of Croatia

Marina Čolig[2], Saša Drezgić[3]

ABSTRACT

The current system of fiscal equalization in the Republic of Croatia is largely complicated, but also insufficiently equitable, mainly due to the mechanism of income tax distribution. One of the problems of income tax equalization was that different equalization rates were applied to different territories. The income tax sharing mechanism mainly helped the areas that were included in the special financing system without considering whether some local units needed assistance or not. Moreover, the mechanism of interbudgetary transfers itself was poorly regulated, with insufficient qualitative and clear criteria for awarding grants. The model of horizontal financial equalization was based on the criteria for awarding grants from the central budget, without taking into account the economic indicators of local units in determining the criteria. The aim of this paper is to prove that the new model of financial equalization makes the method of distribution of income tax revenues, financial equalization of local units as a whole, and the system of financing decentralized tasks simpler and fairer. It also aims to show that the new model reduces disparities among local units, which are primarily due to differences in tax capacity in the collection of surcharges and income taxes. The results of the research, using the method of comparative analysis of the two financing systems of local and regional self-government units and the calculation of the Gini coefficient of concentration, show that the new model of fiscal equalization is simpler and more transparent and that fiscal inequalities between local government units in Croatia have been reduced. Future research should focus on the analysis of the fiscal equalization system that includes non-tax revenue sources of local governments. The paper also addresses future uncertainties related to the impact of the recovery after

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COVID 19 and the looming recession on fiscal inequalities among local government units.

Key words: *fiscal federalism, fiscal decentralization, fiscal equalization, Republic of Croatia, COVID 19*

JEL classification: *E62, H71, H72, H76*

1. Introduction

In Croatia, the fiscal equalization model is based on two basic mechanisms: vertical equalization based on revenue sharing and horizontal equalization based on current and capital grants. Through the system of financial equalization, the government also tried to compensate for the development of underdeveloped areas in Croatia. The granting of special status based on various criteria (e.g. geographical location) resulted in a large number of local government units with special status in financing, which led to insufficient transparency and integrity of the financing system. Indeed, until now, government have used tax sharing as an instrument of the vertical, as well as the horizontal, model of fiscal equalization to reduce disparities between local government units caused by uneven economic development. The new system leads to a greater separation between the equalization mechanisms of the fiscal equalization system and the mechanism to compensate for development disparities.

This paper pays particular attention to the new system of fiscal equalization and its impact on reducing fiscal disparities among local government units. Local governments finance public services with tax and non-tax revenues within their jurisdiction. However, when they are unable to do so, central government intervention and fiscal equalization mechanisms are needed. Moreover, in the countries of Central and Eastern Europe, reforms of the system of sharing public power, including fiscal equalization, are part of the general dynamics of fiscal consolidation and the demand for greater efficiency of the local public sector. These reforms were particularly important for enabling greater resilience in case of economic shocks such as one caused by COVID 19 pandemics (Krajišnik et al., 2019; Hodžić et al., 2020; Dauti and Elei, 2022; Milanovic and Stamenkovic, 2022).

Recent empirical research by domestic authors suggests that one of the most important causes of problems related to the system of financing local units in Croatia is the insufficient quality of calculation of tax capacity and tax needs of these units (Ott, Bajo and Pitarević, 2003; Bajo and Bronić, 2004, 2007; Jurlina-Alibegović, 2004, 2006; Bajo et al., 2020).

The aim of this paper is to demonstrate, based on theoretical findings and empirical research, that the new model of fiscal equalization determines the distribution of income tax revenues in a simpler and fairer way and improves the system of fiscal equalization of local government units as a whole, as well as the system of financing decentralized tasks. In addition, it will be shown that the new model reduces the differences between local government units, which are primarily due to differences in tax capacity in the collection of surcharges and income taxes. The research hypothesis is: by creating a new model of fiscal equalization, the system of income tax distribution has been simplified and clarified, and fiscal inequalities between local government units in the Republic of Croatia have been reduced.

The research results show that the new model of fiscal equalization is simpler and more transparent, and that fiscal inequalities between local authorities in the Republic of Croatia have been mitigated. Moreover, the system is more

crisis-proof in this way, which has already been demonstrated during the crisis caused by the COVID 19 pandemic.

The paper is divided into five chapters. After the introduction, the second chapter provides a brief review of the relevant literature. The third chapter describes the research methodology, while the research results are presented in the fourth chapter. The last chapter is a conclusion with recommendations for further research.

2. Literature review

The part of public finance that deals with the vertical structure of the public sector and examines the role of the different levels of government and their interaction through fiscal instruments is called fiscal federalism (Oates, 1999). The underlying model is based on the work of Musgrave (1959) and was later developed further by Oates (1972). The theory of fiscal federalism is concerned with the logical allocation of public sector functions and finances among multiple levels of government (King, 1984). Much of the literature on fiscal federalism covers a wide range of relatively unrelated areas (Bird, 2005), such as the "decentralization theorem" (Oates, 1991), the division of revenue collection responsibilities (McLure, 1993), discussions of intergovernmental spillovers and grants (Break, 1980), fiscal mobility and migration (Wildasin, 1991), and vertical fiscal imbalances and dependencies (Hunter, 1977).

The development of the theory of fiscal federalism can be divided into two phases. Oates (2008) distinguishes between the traditional theory of fiscal federalism (or the first-generation theory of fiscal federalism) and the modern theory of fiscal federalism, which has developed in two directions. The first (second-generation fiscal federalism theory) developed as a result of financial crises due to the irresponsible behaviour of the decentralized level of government. It challenges the traditional and largely positive view of the role of fiscal decentralization and points out that fiscal decentralization can have serious destabilizing effects on the public sector as a whole. The second direction (political economy approach) represents a more conventional development of public sector theory. Its central concern is the application of fiscal models and political institutions to the analysis of fiscal decentralization.

The leading representatives of the first generation of the theory of fiscal federalism were concerned with the problem of optimization of private and public spending (Samuelson, 1954, 1955), the theory of the cost of public goods at the local level (Tiebout, 1956), the distribution of public finance functions (Musgrave, 1959). In addition they were concerned by the role of the private and public sectors in the provision of goods and services in a market economy (Arrow, 1969), then optimal community size and club theory (Buchanan, 1965), and the positive aspects of fiscal decentralization (Oates, 1972).

The traditional theory of fiscal federalism (or first-generation fiscal federalism theory) assumes a fiscal federalism in which the central government plays a key role in macroeconomic stabilization, implements basic revenue

redistribution policies, and ensures the provision of public goods of national importance. At the same time, lower levels of government play a key role in providing local public goods whose consumption is spatially confined to the territory of subnational units, thus achieving a more efficient allocation of resources (Oates, 2005).

Central to the study of modern fiscal federalism theory, the first direction, is the concept of "soft budget constraint," originally introduced by Kornai (1979, 1980), who studied enterprises in socialist countries and found that these enterprises were protected from bankruptcy because they could count on support from the central government budget in the event of financial difficulties (Oates, 2008). In the context of fiscal federalism, this involves the assumption that the central government will provide financial assistance to lower levels of government when needed. Such an expectation of assistance has significantly reduced incentives for more responsible fiscal behaviour. The literature has attempted to explain this phenomenon (Wildasin, 1997; Qian and Roland, 1998; Goodspeed, 2002) through game theory between the lower levels of government and the central government, where the central government does not provide financial assistance to the lower levels of government in the first stage. In the second stage, lower levels of government evaluate the veracity of these claims and decide the degree of prudence in financial operations, and in the third stage (if any), the central government decides whether to provide financial support to lower levels of government experiencing financial difficulties (Oates, 2008).

Contemporary fiscal federalism theory, the second school of thought, rejects two assumptions of traditional theory, arguing that local officials need not aim to maximize the welfare of their administrative units and that a centralized supply of public goods is not necessarily uniform (Oates, 2008). Theorists in this vein believe that centralization contributes to better coordination and internalization of potential externalities, while decentralization ensures to a greater extent that the supply of public goods and services is consistent with the preferences of the local population (Oates, 2008). Similarly, Oates (2008) points out that decentralization increases the accountability of local officials and limits their scope for lobbying and corrupt activities (Besley and Case, 1995; Edwards and Keen, 1996).

Based on these two directions, second-generation theories are emerging that examine the behaviour of various political and fiscal institutions under conditions of imperfect information, with an emphasis on analysing the effect (incentive system) of these institutions on the behaviour of actors seeking to maximize their utility (Oates, 2005). Brennan and Buchanan (1980), for example, view fiscal decentralization as a mechanism that limits the growth aspirations of the central government, with competition among decentralized lower levels of government, similar to the private sector, limiting the central government to increasing its control over available economic resources. A decentralized tax system with mobile taxpayers provides a partial or complete substitute for explicit fiscal constraints on taxation (Brennan and Buchanan, 1980). Leviathan.

There are two main considerations for decentralizing the provision of public

goods and services to regional authorities. The classic argument of Musgrave (1959) and Oates (1972), based on the model of Tiebout (1956), is that regional governments can best meet the preferences and needs of their residents. More recently, arguments for decentralization have been based on the concept that regional governments are able to provide public services (and targeted transfers) at lower cost than central government because of information advantages, lower administrative costs, and competitive political discipline. However convincing these arguments may be, the decentralization of spending and revenue collection responsibilities means that different regions have different fiscal capacities. Without fiscal equalization, they would not be able to provide public services at tax rates that would be common in a centralized environment. Therefore, fiscal equalization can be seen as an instrument for effective decentralization, as it enables the benefits of decentralization while avoiding its adverse effects.

The decentralization of fiscal sovereignty in federations has resulted in different regions having different capacities to provide public goods and services, so these differences cannot be mitigated without a system of fiscal equalization (Oates, 1999).

Fiscal equalization can be seen as a necessary complement to decentralization because it offsets the tendency of decentralization to create inequalities among regions in their capacity to provide public goods and services. Alignment performs a variety of possible tasks. Much of the literature focuses on correcting inefficiencies caused by fiscal decentralization. In parallel, equalization in this sense can be a tool to achieve horizontal equality among residents of different regions, i.e., to ensure that people with a given income can receive comparable public services at comparable tax rates in all regions. Equalization can also serve as a stabilizing tool by protecting regions from negative shocks that they cannot handle on their own. Similarly, consistency over time can be a problem, especially when regional budgets are “soft” due to the inability of the central government to make commitments. Finally, equalization transfers can potentially serve to correct biased regional decisions (Boadway, 2003).

The fiscal equalization literature generally does not explicitly consider the benefits of decentralization, but instead focuses solely on ensuring that different regions have comparable fiscal capacity to deliver public services. However, the design of equalization systems should take into account that different regions behave differently (Roemer, 1998).

We distinguish between vertical (vertically) and horizontal (horizontally) fiscal equalization. Vertical fiscal equalization occurs when vertical fiscal imbalances arise when the revenues allocated to lower levels of government are insufficient to meet the expenditures for the public functions they perform (McLure and Martinez-Vazquez, 2004).

The central government uses transfers in the form of shared tax revenues to correct vertical budget imbalances. Tax sharing can be defined as a mechanism whereby one level of government (usually the central government) collects revenue from one or more taxes and then shares it with lower levels

of government (Bird, 2005). Revenue sharing can be defined on a per-tax basis or as a pool of agreements (Bajo, 1998).

Efficient revenue sharing bridges vertical inequalities by bridging the gap between the defined responsibilities for spending of lower levels of government and fiscal capacities to finance these responsibilities (Bird, 2005). However, there is no prescription on how and in what way revenues from common taxes are shared; each state regulates this in its own way. The most common taxes are VAT, the income tax, and the profit tax, but depending on the state, there may also be various consumption taxes, taxes on the use of natural resources, and many others.

The purpose of horizontal fiscal equalization is to compensate for horizontal fiscal imbalances caused by the fact that not all local units within a country have the same fiscal capacity. Unequal fiscal capacity is caused by differences in tax bases, with local units with lower tax bases raising less revenue to finance their expenditures and vice versa (McLure and Martinez-Vazquez, 2004).

Horizontal fiscal equalization is implemented through grants. We usually distinguish between the allocation of grants by the central government and grants between regions, which are allocated directly to poor units on a cooperative basis (e.g., in Germany, Ahmad, 1997). Thus, grants are intended to mitigate fiscal inequalities in order to ensure the required level of public services in all local units (Bajo and Bronić, 2007).

Different authors talk about different types of grants, but the most common division is between conditional grants, whose use is limited, and unconditional grants, whose purpose is not defined (Oates, 1999).

Most countries require a combination of grants, from conditional grants for a specific purpose to achieve central government policy objectives to other conditional and unconditional grants to achieve vertical or horizontal balance. An important lesson from the literature, as well as from the experience of other countries, is that grants affect macroeconomic stability, but also efficiency and distributional objectives. Gap-filling grants to cover the deficit of lower levels of government are dangerous and should be avoided as much as possible to reduce the risk of irresponsible fiscal policy. Central authorities will continue to rely on earmarked grants for a variety of reasons. However, the objectives and criteria for awarding grants should be clearly defined in order to control their use in the case of earmarked grants. If this is not the case, it may lead to inefficient use of resources and corrupt behaviour (Ahmad, 1997).

Fiscal federalism theory debates whether the size of an unconditional grant has the same impact on public spending as an increase in (private) community income by the same amount. According to median voter theory, this effect would be the same (Rosen, 1999). Grants, regardless of their nature, have been shown to increase public spending more than the corresponding growth in income. This is the so-called flypaper effect, which shows that subsidized levels of government are more willing to spend funds from grants than those from their own revenue sources (Jurković, 2002).

The basic instrument to reduce vertical fiscal inequalities is revenue sharing, mostly tax revenue sharing (joint taxes), while the main instruments to mitigate horizontal fiscal inequalities are grants (Ahmad, 1997).

In revenue sharing, the state leaves a portion of tax and/or non-tax revenues to local government units. A portion of the revenue remains in the local unit's tax base area. In its basic form, this fiscal instrument does not help mitigate fiscal inequities (Buchanan and Wagner, 1970), so it has found broader application in mitigating vertical fiscal imbalances. Although there is no generally accepted view that central government revenues should be shared with local government units, in practice revenue sharing refers mainly to tax revenues. Tax revenue sharing is less effective than non-earmarked aid in implementing fiscal equalization. However, if fiscal inequities among local government units are still to be addressed through revenue sharing, the sharing formula must be simple, transparent, and provide the desired incentives (Rao, 2007).

Grants are an important tool of fiscal federalism and have different effects. Some of the most important potential effects are: (1) internalization of the spillover effect, (2) fiscal equalization, and (3) improvement of the overall tax system (Oates, 1999). Bodway and Flatters (1982) also identify three main reasons for grants: (1) closing the fiscal gap in the balance of resources and responsibilities among levels of government, (2) correcting spillover effects, and (3) ensuring fiscal equity.

However, there is a large body of empirical work that points to concerns about the effects of grants in practice (Oates, 2008). Rodden (2003) notes that grants are a key element in creating a soft budget constraint and have led to "transfer dependency," reducing incentives for responsible financial behaviour by local units. Padovano (2007) argues in his paper that transfers between regions can hinder the process of income convergence that affects economic growth. In the absence of objective criteria for granting subsidies, filling gaps or co-financing deficits of local governments is likely to lead to macroeconomic difficulties (Ahmad, 1997).

Therefore, the role of grants must be limited: They must not be a major source of local revenue, otherwise "transfer dependency" will result. Many economists stress the importance of relying on their own sources of revenue to provide autonomy and fiscal discipline to decentralized levels of government. The grant system must be transparent and predictable. Also, the central government's discretion in awarding grants should be limited (Oates, 2008).

3. Methodology

The problems associated with multiple comparisons of income inequality were first pointed out by the American economist Lorenz. In his work, Lorenz (1905) pointed out several shortcomings associated with the comparison of wealth concentration among fixed groups of individuals. He showed (what is now known as the Lorenz curve) that the curve starts and ends at the same

points in the case of an unequal distribution. The same is true in the case of an equal distribution, which is curved in the middle, and it is interpreted as a curve of income concentration. Gini took Lorenzo's ideas further by proposing a simple and easy-to-understand measure of inequality, the Gini coefficient (Portnov and Felsenstein, 2010).

The Gini coefficient is a common indicator of fiscal inequality of local government units and is used in particular to measure inequalities in income distribution and wealth. The Gini coefficient is a measure of statistical dispersion that represents the average distance between all possible pairs of variables of interest in the observed population, expressed as a proportion of the total (cumulative) value of the variables of interest (see Gini, 1912 and 1921). There are several ways to calculate the Gini coefficient. In its simplest form, the Gini coefficient of inequality in the distribution of fiscal (tax) capacities of local government units can be written as follows:

$$Gini = \frac{1}{2n^2\overline{y}} \sum_{i=1}^{n} \sum_{j=1}^{n} |y_i - y_j|$$

Where yi and yj denote the fiscal capacities of local units i and j, and is the average fiscal capacity (Portnov and Felsenstein, 2010). Values of the Gini coefficient range from 0 to 1, with higher values of the coefficient indicating greater inequality and vice versa. When measuring the inequality of fiscal capacities among local government units, the value of the Gini coefficient 0 means that all local units have equal fiscal capacities. In other words, any part (percentage) of the population (local units) has exactly the same share (percentage) of the total tax capacity of all local units combined (for example, 10% of the total number of local government units have exactly 10% of the total cumulative fiscal capacity). On the other hand, the value of the coefficient 1 would denote a hypothetical situation in which the total fiscal capacity (of all local government units together) would belong to one local government unit (while the fiscal capacity of all other local units would be 0, Primorac, 2013).

In addition to the numerous solutions of numerical expressions, inequalities can be represented graphically in various ways. One of the most common forms of graphical representation is the Lorenz curve mentioned earlier. The Lorenz curve is a concentration curve that represents the distribution of the total value (sum of all values of the observed numerical variables) of a numerical sequence among its members (Figure 2.1). Applied to the representation of concentration - i.e. inequality - in the fiscal capacities of local government units, it shows the cumulative share of the population (number) of local government units (sorted by increasing value of fiscal capacity): $x_1 \leq x_2 \leq \ldots \leq x_i \leq \ldots \leq x_N$)) with respect to the corresponding cumulative proportion of fiscal capacity. The coordinates of the points on the Lorenz curve are given by the coordinates of the members of the cumulative sequences, with the first point being the origin of the coordinate system with coordinates T0 (0,0) and the last TN (1,1). The coordinates of the other points on the Lorenz curve have coordinates T_1 ((F_x (x_i);F_t (T_i)), za *i*=1,2,…, *N*, where:

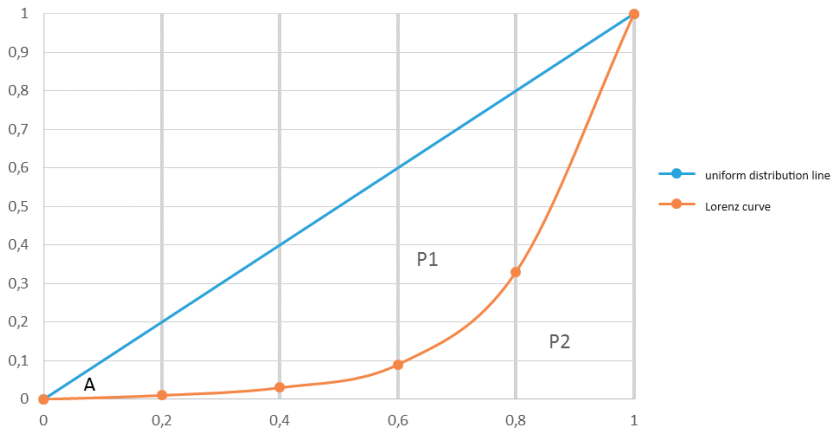
$$F_x(x_i) = \frac{i}{N}, \quad i = 1,2,\ldots, N,$$

present values of the empirical distribution function, and

$$F_t(T_i) = \frac{\sum_{j=1}^{i} x_j}{\sum_{i=1}^{N} x_i} \quad i = 1,2,\ldots, N,$$

members of the cumulative sequence of subtotal proportions. The figure usually shows, in addition to the Lorenz curve, the direction of uniform distribution passing through points (0,0) and (1,1), and indicates the state in which inequalities do not exist (state of complete equality). The direction of uniform distribution with coordinate axes closes an angle of 45 degrees (Šošić and Serdar, 2002, Primorac, 2013).

Figure 1: Lorenz curve



The Gini coefficient is directly related to the Lorenz curve and represents the ratio between the area between the Lorenz curve and the direction of the uniform distribution and the area of the triangle ABC, i.e. the ratio of the areas P1 and P2 in the diagram. The further the Lorenz curve is from the direction of equal distribution of inequalities, the higher the value of the Gini coefficient and vice versa.

The Lorenz curve is related to the Gini coefficient by the expression:

$$G = 1 - \sum_{i=1}^{k} p_i \left[F_T(T_i) + F_T(T_{i-1})\right], F_T(T_0) = 0$$

Where pi denotes the relative frequencies of distribution, and Fr (Ti) the values of the cumulative subtotal sequence, ie the cumulative proportions of the subtotal (Šošić and Serdar, 2002, Primorac, 2013).

The study covers the territory of the Republic of Croatia in the period from 2017 to 2018 (2 years), namely 2017, when the old model of financial equalization applied, and 2018, when the amendment to the Law on Financing of Local and Regional Self-Government Units applies the model of financial equalization.

The aim of the study is to determine whether the application of the new financial equalization model has reduced the fiscal inequalities between local government units based on the Gini coefficient of concentration. For the calculation of the coefficient, the revenues from income taxes and duties, as well as the total aid paid from the state budget of the Republic of Croatia, were used in relation to the number of inhabitants, based on the 2011 Census. In addition, the aforementioned inequalities are presented graphically using the Lorenz curve. The analysis is based on annual data from the databases of the Ministry of Finance (2017 and 2018)[4].

4. Empirical data and analysis

The effectiveness of the new fiscal equalization model is evaluated by calculating the Gini coefficient. In other words, the inequalities in the tax capacity of local government units will be assessed based on the distribution of income tax revenues prior to the entry into force of the new law and the support received by the LRU (R) S under Articles 39 and 40 of the Law on the Execution of the 2017 State Budget. (OG 118/16 and 113/17) and the application of the new financial equalization model introduced by the new Law on Financing of Local and Regional Self-Government Units (OG 127/17).

The Gini coefficient ranges from 0 to 1, where 0 represents complete equality and 1 represents complete inequality. If the value of the Gini coefficient is higher after the application of the new fiscal equalization model than before its application, it can be concluded that the instruments used are not effective in reducing fiscal inequalities and vice versa.

Table 1: Fiscal inequalities of local and regional self-government units before and after the new fiscal equalization model

Local government unit	**Gini coefficient Old model (2017)**	**Gini coefficient New model (2018)**
Municipalities	0.2039	0.1060
Cities	0.1941	0.0998
Counties	0.2033	0.1121

Source: Author's calculation according to the data of the Ministry of Finance (Ministry of Finance, 2018)

4 https://mfin.gov.hr/istaknute-teme/lokalna-samouprava/financijski-izvjestaji-jlp-r-s/203

The current system of fiscal equalization through revenue sharing, current grant allocations, and income tax refunds was intended to compensate for differences in the taxing power of local units. However, in setting the criteria for horizontal fiscal equalization, tax capacity was not accurately calculated, economic inequality was not taken into account, and the justification for maintaining a special status in financing was not analysed.

Table 1 shows that the Gini coefficient demonstrates the positive impact of the new fiscal equalization model on mitigating fiscal inequalities among local government units. The calculation took into account total distributed income tax and per capita income, and the Gini coefficient was observed particularly at the level of municipalities, cities and counties.

A graphical representation of fiscal inequality before and after the new fiscal equalization model using the Lorenz curve follows. For clarity, unit fiscal inequalities are shown separately for municipalities, cities, and counties. The closer the curves are to the direction of equal distribution of inequalities, the lower they are, and vice versa (Figure 1).

Figure 1: Lorenz curve of municipal inequality before and after the new fiscal equalization model

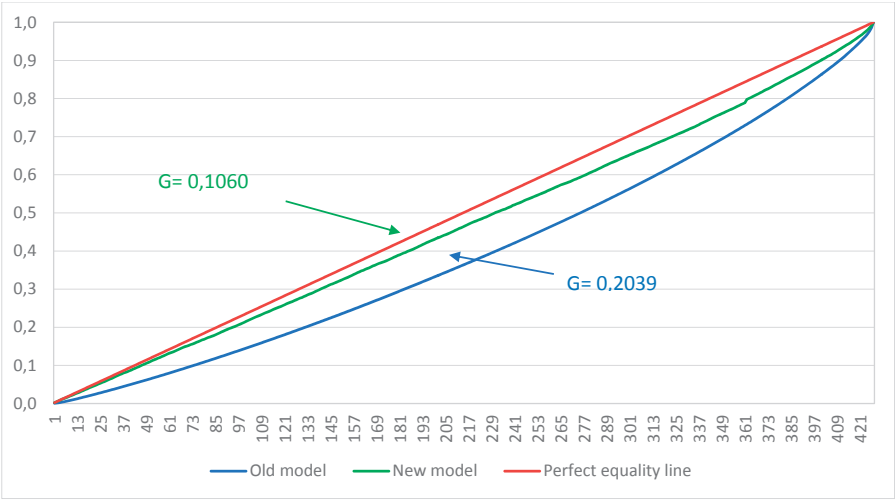
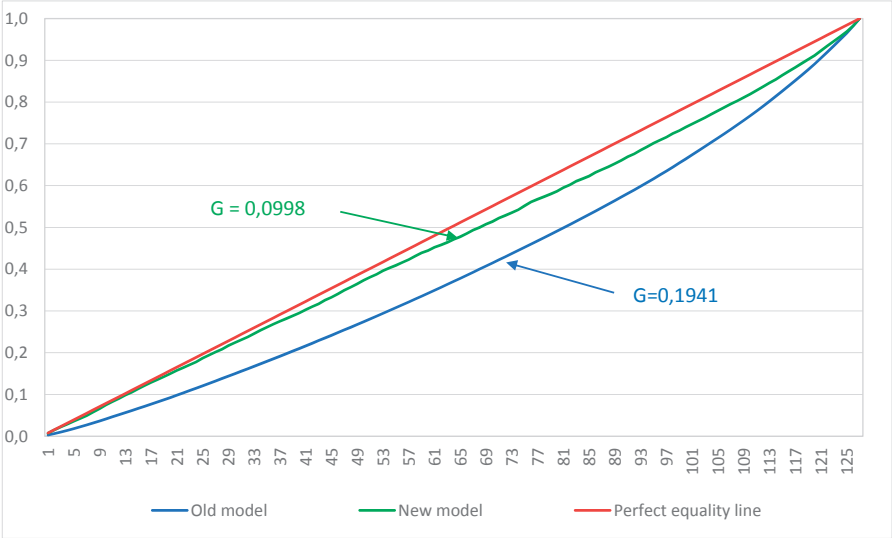


Figure 1 confirms the findings on the effectiveness of the new financial equalization model based on the calculation of Gini coefficients for municipalities. Before the implementation of the new law on financing local and regional self-government units, the Gini coefficient was 0.2039, and after the implementation of the new law at the beginning of 2018, inequalities are significantly lower and the Gini coefficient is 0.1060. With the new financial equalization model, the Lorenz curve approaches the equality line, indicating a reduction in fiscal inequalities.

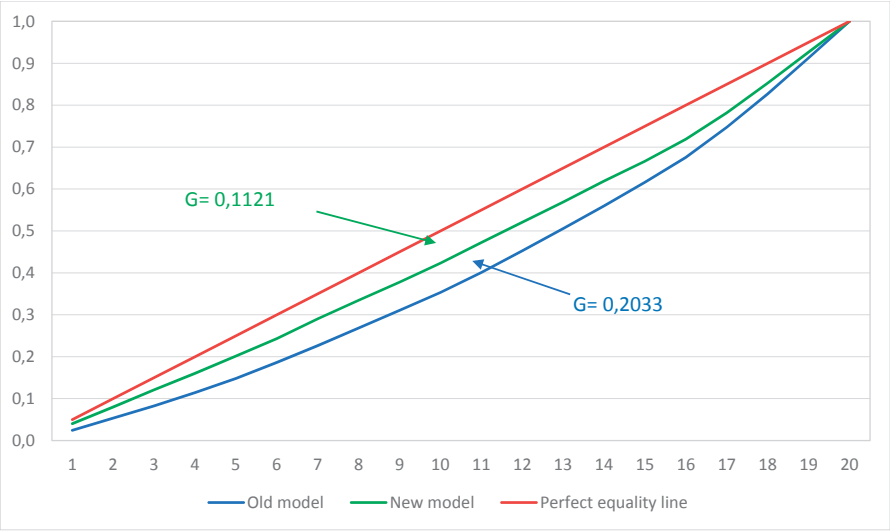
Figure 2: Lorenz curve of urban inequality before and after the new fiscal equalization model



Source: Author's calculation according to the data of the Ministry of Finance (Ministry of Finance, 2019)

Figure 2 confirms the findings on the effectiveness of the new fiscal equalization model based on the calculation of Gini coefficients for cities. Before the implementation of the new law on financing local and regional self-government units, the Gini coefficient was 0.1941, and after the implementation of the new law at the beginning of 2018, inequalities are significantly lower and the Gini coefficient is 0.0998. With the new model of financial equalization, the Lorenz curve approaches the equality line, indicating the reduction of fiscal inequalities.

Figure 3: Lorenz curve of county inequality before and after the new fiscal equalization model



Source: Author's calculation according to the data of the Ministry of Finance (Ministry of Finance, 2019)

Figure 3 confirms the findings on the effectiveness of the new fiscal equalization model based on the calculation of Gini coefficients for districts. Before the implementation of the new law on financing local and regional self-government units, the Gini coefficient was 0.2033, and after the implementation of the new law at the beginning of 2018, inequalities are significantly lower and the Gini coefficient is 0.1221. With the new model of financial equalization, the Lorenz curve approaches the equality line, indicating a reduction in fiscal inequalities.

We can conclude that the graphical representations of inequalities in the tax capacities of municipalities, cities and counties before and after the new model of fiscal equalization through the application of the new financing law of local and regional self-government units as of January 1, 2018 confirm the results obtained through the calculation of Gini coefficients. It should be emphasized that the new financial equalization model mitigates the differences in the tax capacity of local units, as the Lorenz curve approaches the equality line.

Moreover, all local government units are equal in the financing system, whose simplicity and transparency are even more pronounced compared to the old model. Moreover, the new financial equalization model is based on the mitigation of differences in revenue potential.

5. Results and discussion

The new system of financial equalization has significantly changed the system of financing local entities. The current system of fiscal equalization through revenue sharing, allocation of current grants, and reimbursement of income taxes was intended to compensate for differences in the fiscal capacity of local government units. However, in establishing the criteria for horizontal fiscal equalization, fiscal capacity was not calculated, economic inequalities were not taken into account, and the justification for maintaining a special status in financing was not analysed. The frequent legislative changes regulating the distribution of taxes, especially income taxes, have led to confusion regarding the function and fiscal impact of taxes on the financial position of local government units.

One of the fundamental problems with income tax apportionment was that different apportionment rates applied to different areas. Areas with assisted status, hill and mountain areas, and municipalities and cities on islands with completed financing of capital projects had a privileged position in the distribution of income tax. However, the question arises whether these areas actually need more financial support. The distribution of income tax should not depend on which area a municipality or city is located in, but on its fiscal capacity and fiscal needs. The distribution of income tax has mainly helped the areas that are included in the special financing system, without taking into account whether some local units need help or not. For all these reasons, it was necessary to change the current system of financial equalization.

The new fiscal equalisation model was particularly important as a shock absorber in 2020 and 2021, when local governments faced significant budget challenges due to the impact of the COVID 19 pandemics. Local governments experienced revenue shortfalls due to reduced economic activity, which negatively impacted tax revenue collection. In addition, local government budgets were under pressure due to fiscal subsidies, especially for local businesses, and higher spending on municipal services. In this case, the new fiscal model provided more equitable financing that protected local governments with weak fiscal capacity, as well as a better mechanism for allocating additional transfers from the central government to mitigate the negative fiscal impact of the COVID 19 pandemics.

6. Conclusions

The evaluation of the effectiveness of the new fiscal equalization system was tested on the hypothesis that the creation of a new model of fiscal equalization simplified and clarified the system of income tax distribution and reduced fiscal inequalities between local authorities in Croatia. To test the hypothesis, one of the main objectives was to compare the fiscal inequalities between local governments before and after the application of the new fiscal equalization model through statistical analysis by calculating the Gini coefficient. The research confirmed the hypothesis, so it can be said that the new system of fiscal equalization is based on a better calculation of

the tax power of local units. However, the question remains whether the tax capacity of the local unit is sufficient to make decisions on the allocation of grants and other decisions related to the financing of local units, or whether we should also know the tax needs of each local unit. It is also a fact that the methodology of the new system does not include in the financial equalization framework revenues from land ownership, which are a particularly important source of inequity among local governments. Indeed, revenues from fees and contributions are relatively higher in more developed municipalities, especially in larger cities and towns where tourism is predominant. Therefore, part of the tax capacity remains outside the equalization system. These problems could be solved by introducing a property tax, but despite several attempts, the introduction of this form of tax in the Croatian tax system has not been possible.

References

1. Ahmad, E. i Craig, J. (1997.). Intergovernmental transfers, U.T. Ter-Minassian (ur.), Fiscal Federalism in Theory and Pratctice, Washington: International Monetary Fund
2. Arrow, K. J. (1969.). The Organization of Economic Activity: Issues Pertinent to the Choice of Market versus Non-Market Allocations (pp. 1-16), Washington DC: Joint Economic Committee of Congress
3. Bajo, A. (1998.). Financijsko izravnanje, Financijska praksa 22 (4-5), 649-652.
4. Bajo, A. i Bronić, M. (2004.). Fiskalna decentralizacija u Hrvatskoj: problemi fiskalnog izravnanja. *Financijska teorija i praksa*, 28(4), 445-467.
5. Bajo, A. i Bronić, M. (2007.). Procjene učinkovitosti modela fiskalnog izravnanja u Hrvatskoj, *Financijska teorija i praksa* 31(1), 1-24.
6. Bajo, A., Primorac, M., Drezgić, S. (2020.). Fiskalni federalizam, Financije županija, gradova i općina, Sveučilište u Zagrebu, Ekonomski fakultet, 89-117
7. Bahl, R. W. (1999.) Intergovernmental Transfers in Developing and Transition Countries: Principles and Practice, Washington, D.C.: World Bank.
8. Besley, T. i Case, A. (1995.). Incumbent Behavior: Vote-Seeking, Tax-Setting, and Yardstick Competition, American Economic Review, 85(1), 25-45. DOI: 10.3386/w4041.
9. Bird, R.M. (2005.). Fiscal Federalism, U Cordes, J.J., Ebel, R.D., Gravelle, J.G. (ur.) The Encyclopedia of Taxation and Tax Policy, Second edition, Urban Institute Press
10. Brennan, G. i Buchanan, J. (1980.). The Power to Tax, Cambridge University Press

11. Boadway, R. i Flatters, F. (1982.) Efficiency and Equalization Payments in a Federal System of Government: A Synthesis and Extension of Recent Results, *The Canadian Journal of Economics*, 15(4), 613-633. DOI: 10.2307/134918.

12. Boadway, R. (2004.). The Theory and Practice of Equalization. *CESifo Economic Studies,* 50 (1), 211-54. DOI: 10.1093/cesifo/50.1.211.

13. Break, G.F. (1980.). Financing Government in a Federal System, Washington, D.C.: The Brookings Institution

14. Buchanan, J. M. (1965.). An Economic Theory of Clubs. *Economica*, *New Series*, 32(125). DOI: 10.2307/2552442.

15. Buchanan, J. M. i Wagner, R. (1970.) An efficiency basis for federal fiscal equalization. U J. Margolis (ur.), Analysis of Public Output. New York: Columbia University Press

16. Dauti, B., Elezi, S. (2022). Economic growth in the Central East European Union and the Western Balkan countries in the course of Stability and Growth Pact and COVID-19, Zbornik radova Ekonomskog fakulteta u Rijeci : časopis za ekonomsku teoriju i praksu, Vol. 40 No. 1, 2022., 29-61, https://doi.org/10.18045/zbefri.2022.1.29

17. Edwards, J. i Keen, M. (1996). Tax Competition and Leviathan. *European Economic Review*, 40(1), 113-134. DOI: 10.1016/0014-2921(95)00057-7.

18. Gini, C. (1912.). Variabilità e mutabilità. Studi Economico-Giuridici dell`Università di Cagliari 3, 1-158.

19. Gini, C. (1921.). Measurement of Inequality of Incomes. The Economic Journal, 31 (121), 124-125. DOI: 10.2307/2223319.

20. Goodspeed, T. J. (2002.). Bailouts in a Federation*, International Tax and Public Finance*, 9, 409-421. DOI: 10.1023/A:1016563902580

21. Hunter, J. S. H. (1977.). Federalism and Fiscal Balance: A Comparative Study, Canberra, Australia: Australian National University Press and Centre for Research on Federal Financial Relations

22. Hodžić, S., Demirović, A., Bečić, E. (2020). The relathionship between fiscal policy and economic growth in CEE countries, Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu, Vol. 38 No. 2, 2020., 653-666, https://doi.org/10.18045/zbefri.2020.2.653

23. Jurković, P. (2002.). Javne financije, Masmedia, Zagreb

24. Jurlina-Alibegović, D. (2004.). Measurement of fiscal capacity for Croatian local and regional Governments units. Skopje: Center for Economic Analyses. Dostupno na: https://cea.org.mk/documents/proekti/Measurement%20of%20fiscal%20capacity%20for%20Croation%20LRGUs.pdf

25. Jurlina-Alibegović, D. (2006.). Financiranje regionalnog razvitka. Doktorska disertacija. Zagreb: Ekonomski fakultet.

26. King, D. (1984.). Fiscal Tiers: The Economics of Multilevel Government, London: George Allen i Unwin

27. Kornai, J. (1979.). Resource-Constrained Versus Demand-Constrained Systems, *Econometrica*, 47(4), 801-819. DOI: 10.2307/1914132

28. Kornai, J. (1980.). Economics of Shortage, Amsterdam: North-Holland

29. Krajišnik, M., Gligorić, D., Gojković, B. (2019.). Effects of fiscal consolidation in Western Balkan Countries, Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu, (37), 2, 527-551, https://doi.org/10.18045/zbefri.2019.2.527

30. Lorenz, M. O. (1905). Methods for measuring concentration of wealth. Journal of the American Statistical Assoaciation, 9, 209-219. DOI: 10.2307/2276207.

31. McLure, C. E., Jr. (1993.). Vertical Fiscal Imbalance and the Assignment of Taxing Powers in Australia, Stanford: Hoover Institution

32. McLure, C. E. i Martinez-Vazquez, J. (2004.). The assignment of revenues and expenditures in intergovernmental fiscal relations, Washington, DC: The World Bank

33. Milanovic, M., Stamenkovic, M. (2022). Impact of Covid-19 pandemic on economic performance of European Countries, Zbornik radova Ekonomskog fakulteta u Rijeci : časopis za ekonomsku teoriju i praksu, Vol. 40 No. 1, 2022., 177-200, https://doi.org/10.18045/zbefri.2022.1.177

34. Musgrave, R. A. (1959.). The Theory of Public Finance, New York: McGraw-Hill

35. Oates, W. E. (1972.). Fiscal Federalism, NY: Harcourt Brace Jovanovich

36. Oates, W. E. (1991.). The Theory of Fiscal Federalism: Revenue and Expenditure Issues- A Survey of Recent Theoretical and Empirical Research. U Remy Prud'homme (ur.), Public Finance with Several Levels of Government. The Hague/Koeningstein: Foundation Journal of Public Finance.

37. Oates, W. E. (1999.). An Essay on Fiscal Federalism. *Journal of Economic Literature*, 37(3), 1120-1149. DOI: 10.1257/jel.37.3.1120.

38. Oates, W. E. (2005.). Toward A Second-Generation Theory of Fiscal Federalism, *International Tax and Public Finance,* 12, 349-373. DOI: 10.1007/s10797-005-1619-9

39. Oates, W. E. (2008.). On The Evolution of Fiscal Federalism: Theory and Institutions, National Tax Journal, 61(2), 313-334. DOI: 10.17310/ntj.2008.2.08.

40. Qian, Y. i Roland G. (1998.). Federalism and the Soft Budget Constraint. *American Economic Review*, 88(5), 1143-1162. DOI: 10.2139/ssrn.149988.

41. Ott, K., Bajo, A. i Pitarević, M. (2003.). Fiskalna decentralizacija u Hrvatskoj. Zagreb: The Fiscal Decentralization Initiative for Central and Eastern Europe: Institut za javne financije.

42. Oates, W. E. (2008.). On The Evolution of Fiscal Federalism: Theory and Institutions. *National Tax Journal*, 61 (2), 313-334. DOI: 10.17310/ntj.2008.2.08.

43. Portnov, B. A. i Felsenstein, D. (2010.). On the suitability of income inequality measures for regional analysis: Some evidence from simulation analysis and bootstrapping test, Socio-Economic Planning Sciences, 44(4), 212-219. DOI: 10.1016/j.seps.2010.04.002.

44. Padovano, F. (2007.). The Politics and Economics of Regional Transfers: Decentralization, Interregional Redistribution and Income Convergence, Edward Elgar, Cheltenham, UK.

45. Primorac, M. (2013.). Fiskalna decentralizacija i ublažavanje lokalnih nejednakosti u zemljama Europske unije i Republici Hrvatskoj, Doktorska disertacija, Ekonomski fakultet Sveučilišta u Zagrebu

46. Rao, M. G. (2007.). Resolving Fiscal Imbalances: Issues in Tax Sharing. In Boadway, R. and Shah, A., Intergovernmental Fiscal Transfers: Principles and Practice. Washington, D.C.: The World Bank, 319-338.

47. Romer, E. J. (1998.). Theories of Distributive Justice, Harvard University Press

48. Rosen, H. S. (1999.). Javne financije, Institut za javne financije, Zagreb

49. Rodden, J. (2003.). Reviving Leviathan: Fiscal Federalisam and the Growht of Government, International Organization

50. Samuelson, P. A. (1954.). The Pure Theory of Public Expenditure. *Review of Economics and Statictics*, 36 (4), 387-389.

51. Samuelson P.A. (1995.). Diagrammatic Exposition of a Theory of Public Expenditure. In: Estrin S., Marin A. (eds) Essential Readings in Economics. Palgrave, London. DOI: https://doi.org/10.1007/978-1-349-24002-9_8

52. Šošić, I. i Serdar, V. (2002.). Uvod u statistiku, Školska knjiga, Zagreb

53. Tiebout, C. M. (1956.). A Pure Theory of Local Expenditures. *Journal of Political Economy*, 64 (5). DOI: https://doi.org/10.1086/257839

54. Wildasin, D. E. (1991.). Income Redistribution in a Common Labor Market. *American Economic Review*, 81(4), 757-774. DOI: 10.2307/135788.

55. Wildasin, D. E. (1997.). Income Distribution and Redistribution within Federations. *Annales D'Économie Et De Statistique*, (45), 291-313. DOI:10.2307/20076061

56. Zakon o izvršavanju Državnog proračuna Republike Hrvatske za 2017. godinu (NN 118/16 i 113/17)

57. Zakon o financiranju jedinica lokalne i područne (regionalne) samouprave (NN 127/17)

CHAPTER 4

The role of EU competition law in the digital and sustainable economy

Ana Pošćić[1], Adrijana Martinović[2]

ABSTRACT

In the recent years, the transformation to a sustainable economy has become a key political priority of the EU. It is declared to be 'essential for the wellbeing of our society and our planet'. The green and digital, or the 'twin' transition towards sustainable economy is an ongoing process, which will shape our lives and economy in the years to come. It needs to be facilitated not only by the strong political commitment, but also by a robust legal framework, which is at the same time flexible enough to take into account the innovative dimension of this transition. Undoubtedly, sustainability is embedded in the EU's constitutional legal framework. But how is it reflected in a specific area of law, namely competition law? Although the competition law and policy are not among the most conspicuous, and definitely not among the most appropriate tools for achieving sustainable development goals, their role in the twin transition should not be overlooked. The twin transition rests primarily on innovative business models, which sometimes challenge the traditional competition enforcement standards. This paper will explore the impact of the green and digital transition in the EU competition law. Digitalisation, innovation, and introduction of environmentally friendly production processes create crucial and complex intersections capable of achieving long-term sustainability gains. However, to produce a large-scale impact, they sometimes require some kind of cooperation across the supply chains, or among competitors, which falls under the scrutiny of competition law. The current approach of the legal profession to such arrangements has

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often been criticised as 'too conservative' (Vestager, 2019). Many authors agree that 'competition law should not be part of the problem, but part of the solution' (Holmes, 2020), and that it should not obstruct industry initiatives intended to deliver sustainability objectives. The authors will examine the goals and values of the EU competition law and policy in view of the current sustainability challenges, and focus on the question whether the EU competition law live up to the challenge of the twin transition?

Key words: *sustainable development, green and digital transition, EU competition law and policy*

JEL classification: *K21, K32, L40, Q01, Q56*

1. Introduction

The famous Brundtland Report in 1987 has defined sustainable development as development that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland Report, 1987: 16). This definition perfectly encapsulates the essence of sustainable development, which has in the meanwhile become the global benchmark and standard for all policy areas, from international to local level. Sustainable development is not (just) about environment protection. It is inextricably linked with sustainable economy, or sustainable economic growth. Promoting sustained, inclusive and sustainable economic growth, with decent work for all, is one of the UN Sustainable Development Goals (United Nations, 2015). There are three crucial dimensions of sustainable development: economic, social and environmental, which are indivisible and balanced (United Nations, 2015: 1). In the last couple of decades, the European Union (EU) has steadily progressed its efforts for achieving sustainable, fair, and inclusive growth, by creating and adopting political, legal and financial preconditions fit for this purpose. The Sustainable Development Goals are proclaimed to be "at the heart of EU's policymaking and action" (European Commission, 2019a: 2), and the transformation to a sustainable economy is the EU's key political priority, as it is "essential for the wellbeing of our society and our planet" (see, e.g. European Commission, 2019a: 1; European Commission, 2020a: 1), and for the development of "an innovative and sustainable society" (Ecco-Innovation Observatory, 2020: 6).

This paper will first briefly analyse how the concepts of sustainable development and competitive sustainability have evolved and gained prominence in the EU legal and policy framework (2.), and then proceed with assessing their effects in the field of competition law, primarily concerning the evaluation of private sustainability initiatives against the rules on the prohibition of anti-competitive agreements under Article 101 of the Treaty on the Functioning of the European Union (TFEU) (3.). Examples of the innovative approaches which have already been suggested in some Member States reveal that the EU, despite its enthusiastic promotion of sustainability issues, is slow in adapting its competition rules to the reality of the present and the future sustainability challenges (4.).

2. Competitive sustainability as a new paradigm: The EU legal and policy framework

2.1. The constitutional essence of sustainability

What is the normative power of sustainability/sustainable development? Legal scholars have labelled it a concept, a goal, a policy objective, a guideline, an ideal a meta-principle, a weak norm of international law, a concept or principle of customary law, or a legal principle, depending on author's perspective (Verschuuren, 2016: 276; see also Ellis, 2008).

The idea that sustainability and the respect for environmental standards are

mandated by the EU constitutional framework and should be mainstreamed in the competition policy and law enforcement is steadily progressing in the academic literature (Iacovides and Vrettos, 2022; Holmes, 2020; Verschuuren, 2016; Dunne, 2020). Sustainability is embedded in the EU's constitutional legal framework (see, e.g. Article 3 TEU; Article 21 TEU; Article 11 TFEU). When it comes to the specific legal basis in primary law for the Union's environmental policy (Article 191 TFEU), there is no explicit mentioning of sustainable development among the objectives, or among the principles upon which this policy is based. On the other hand, seeking to promote "balanced and sustainable development" as a continued task of the EU is mentioned in the preamble of the Charter of Fundamental Rights of the EU, and its Article 37 on environmental protection explicitly refers to the "principle of sustainable development", requiring that a high level of environmental protection and the improvement of the quality of the environment must be integrated into the policies of the Union and ensured in accordance with the principle of sustainable development.

Despite these references to sustainable development, whether as a concept, guideline, value, or a (legal) principle, the fact remains that sustainable development is not defined in the EU primary law. Many authors have questioned its normative-legal nature, and examined whether any concrete obligations arise under it (Verschuuren, 2016: 285; Jans and Vedder, 2012; Epiney, 2019; Epiney, 1999; Ellis, 2008). Nevertheless, the TFEU codifies principles through which sustainability is achieved. The most prominent example is the principle of integration from Article 11 TFEU. This is a horizontal clause which requires the integration of environmental protection requirements into the definition and implementation of the Union's policies and activities, in particular with a view to promoting sustainable development. This provision supports the integration and translation of sustainable development into more concrete commitments. At the same time, its application is "complex and context-dependent" because it is "formulated in broad and sweeping terms" (Nowag, 2016:1). Despite the limited enforceability of this obligation (on the debatable nature and effect of other horizontal clauses in EU law see e.g. Schwarze, 2019: 463-484; Wegener, 2021; Grabitz, Hilf and Nettesheim, 2011: Artikel 11), it is, without a doubt, a true legal obligation, and the potential of Article 11 TFEU for the transformation of the consumer welfare test in competition law merits further analysis.

Sustainability is acknowledged in the political commitments of the EU (see under 2.2.), as well as the practice of the European Commission and case law of the Court of Justice of the EU (CJEU). Already in 1999, the Commission granted an exemption to an agreement between producers and importers of washing machines (accounting for some 95 % of European sales) which involved discontinuing the least energy efficient machines, and pursuing joint energy efficient targets with a view of developing more environmentally friendly machines. Despite increasing prices (by up to 19 %) and removing competition on one element of competition, the Commission accepted that the collective benefits for society (i.e. a reduction in energy consumption) outweighed these costs (European Commission, CECED case). An early understanding of the concept of sustainable development in the case law

of the CJEU emphasises the importance of finding a proper balance among conflicting interests. As Advocate General Léger explains: “The concept of sustainable development does not mean that the interests of the environment must necessarily and systematically prevail over the interests defended in the context of other policies pursued by the [Community …]. On the contrary, it emphasizes the necessary balance between various interests which sometimes clash, but which must be reconciled.” (CJEU, case C-371/98).

2.2. The political commitment to sustainability objectives

Sustainable development, as we understand it, includes taking into account environmental concerns, but also digital transformation, innovation, the use of new technologies, as well as social concerns. Sustainable development is not a goal, it is a process, whereas sustainability is an objective. Decoupling economic growth from resource use is the essence of sustainable development (see also European Commission, 2019b: 2). In this view, ‘green’ and ‘digital’ (or ‘twin’) transition are key enablers of the transformation towards a sustainable economy, or competitive sustainability, as Europe’s new growth paradigm. All EU actions and policies have to contribute to the European Green Deal objectives (European Commission, 2019b: 3). Since 2020, sustainability is integrated in the European Semester process, thus making it an economic and employment policy priority for the EU (European Commission, 2019a; European Commission, 2021e: 3).

Competitive sustainability is proclaimed as Europe’s guiding principle for the future in other strategies as well (see e.g. European Commission, 2020b: 2; European Commission, 2021c: 5, 16, 17; European Commission, 2020c: 2). ‘Competitive sustainability’, is structured around four dimensions: environment, productivity, stability and fairness (European Commission, 2019a: 1, 4). Neither of these strategies contains a clear definition of this relatively novel concept, but its objectives are clear: achieving a climate neutral, resource efficient and agile digital economy (European Commission, 2020b: 2). It can be defined “as the ability of an economy, companies and industrial ecosystems to excel relative to international competitors in their transition to sustainable economy (with climate neutrality at its core) through investment in the necessary innovation” (CISL, 2020: 3). In addition to competitive sustainability, there is also environmental and social sustainability, which “… go hand in hand” (European Commission, 2020a: 5). The commitment to achieve “…inclusive, sustainable, just and jobs-rich recovery, based on a competitive economy and that leaves no one behind” is part of the European Pillar of Social Rights (European Commission, 2021a; European Commission 2021f: 3; Porto Social Commitment, 2021) and it becomes especially important in the post-pandemic period. Building on the ideas developed in the previous sustainable development strategies (see e.g. European Commission 2001a; European Council 2006; European Commission 2009), the European Green Deal (European Commission, 2019b) sets out a long-term strategy for a sustainable Europe. Further initiatives, such as the New Circular Economy Action Plan (European Commission, 2020c), the Biodiversity Strategy for 2030 (European Commission, 2020d) and the Zero Pollution

Action Plan (European Commission, 2021d) develop the blueprint for action towards a digitalised and sustainable European society. Together with other policy instruments (see, e.g. European Commission, 2020e: 4; European Commission, 2020f) they build up an intricate network of measures and targets in different fields to achieve this overarching common objective. The main focus is placed on the potential that the innovative digital technologies have and the role they might play in the transformation towards sustainable society (Ecco-Innovation Observatory, 2020: 6, 26). Newly launched European policies have strong links to digitalisation and a transformation towards an innovative and sustainable society (Ecco-Innovation Observatory, 2020: 6). They strive to create preconditions and a framework for a "…sustainable and smart future" (European Commission, 2020g: 2). Solidarity, prosperity, and sustainability pave "the European way" to a digitalised economy and society (European Commission, 2021b: 2). The transition to a more economically, environmentally and socially sustainable Europe is indissociable from the transition to digitalization (European Commission, 2020b: 2).

Whether we talk about the concepts of sustainable economy, sustainable competitiveness, or competitive sustainability (see CISL, 2020: 9, 10), in the world of business, the concept of sustainability has evolved from the idea of reducing environmental footprint, to placing an accent on innovation and the overall impact. Sustainability is, and should be, simply "how […] business is done" (Chouinard, Ellison and Ridgeway, 2011). Companies "pursuing sustainability and digitalisation are more likely to succeed than others" (European Commission, 2021c: 16).

Can digitalisation contribute to the socio-ecological transformation of economy and consequently, to sustainable development goals? The main premise of the EU strategies is that the uptake of innovative digital solutions can help achieve sustainability objectives in various sectors of the economy (European Commission, 2022: 6). However, it is also recognised that the digital infrastructures and technologies themselves will have to become more sustainable and energy and resource efficient (European Commission, 2021b: 3). It is still unclear whether the growing application of digital technologies fosters or impedes transition towards sustainable development. There are possible adverse effects of the digital transformation on sustainability, in the form of direct and indirect ecological impacts, potential health impacts as well as adverse economic and social effects (disempowerment, disruption and undermining of traditional institutions and structures (Ecco-Innovation Observatory, 2020: 7-8)). Digitalisation by itself is a challenge to competition law and policy (see more in Pošćić and Martinović, 2020a: 246), as well as a challenge for sustainability. It is reasonable to assume that digitalisation does not automatically lead to sustainability, but the interconnectedness between digitalisation and sustainability cannot be denied.

The same can be claimed for the effect of sustainability and digitalisation in competition law.

Of course, there will be tensions and collisions when sustainability initiatives meet with the existing legal framework and regulatory structures in the EU competition law. Sustainability initiative can be limited to a company level,

but in order to achieve greater sustainability gains, a coordinated action is necessary. However, a coordinated action between competitors in the market immediately raises red flags as to whether an anti-competitive behaviour is at hand.

The existing policy instruments at EU level seem to send an ambiguous message when it comes to private sustainability initiatives. The European Commission (European Commission, 2022: 13-14) emphasises the key role of the EU competition policy in achieving the European Growth Model, which is based on competitive sustainability, especially in maintaining level playing field and supporting companies to innovate and grow. At the same time, it is highlighted that only rigorous enforcement of EU competition rules ensures that all companies active in the Single Market, especially SMEs, can compete and innovate on their merits (European Commission, 2020b: 8).

3. Private sustainability initiatives under the scrutiny of the EU competition law: Article 101 TFEU and sustainability

3.1. Indifference of competition rules towards sustainability issues?

Various demand and supply side market failures, such as a negative impact on the environment, or consumer bias, are considered as external costs and are not integrated in the product or service price (see Volpin, 2020: 3). Integrating sustainability initiatives into everyday business processes and production is usually associated with significant costs. An undertaking is likely to suffer extra costs and competitive disadvantage if it is the first competitor in the market (the so-called “first mover disadvantage”) which decides to internalise these external costs (e.g. costs associated with more sustainable production methods intended to mitigate air pollution or use of plastic in packaging, etc.; see Holmes, 2020: 357, 367). Another issue that undertakings willing to integrate sustainability are confronted with is the so-called “free rider problem”: a situation in which one undertaking invests in sustainability, only to witness its competitors enjoy the benefits of that intervention, without investing in it themselves. Those situations can be avoided if the undertakings agree to jointly pursue a sustainable initiative, provided that this is not considered as an anti-competitive behaviour. We agree with the authors who claim that there is a space for sustainable initiatives in the EU competition law. Nevertheless, many competitors refrain from entering into similar arrangements in fear of competition infringements. A conservative and traditional approach of the legal profession to applying the rules of competition, without taking into account the importance of such sustainability initiatives, is liable to impede progress in combating the effects of the climate change (Holmes, 2020: 357).

This chapter will analyse possible paths for competition law in facilitating sustainability initiatives. We shall give an overview of the various ideas that perceive “competition law as part of the solution not part of the problem” (Holmes, 2020: 355; Volpin, 2020: 5).

Traditionally, competition law is indifferent to sustainability issues, as they

are usually associated with non-economic or non-competition interests. Gerbrandy refers to the "sustainability deficit" in the EU competition law (Gerbrandy, 2017:543). This is because competition law and policy are not perceived as being particularly suitable in advancing sustainability goals. However, we live in the period which entails at least a moral duty to take action in every possible field, including competition policy (Holmes, 2020: 356). This is in line with the European Commission's attitude towards sustainability that calls everyone, even competition enforcers, to make contribution to change (Vestager, 2019; European Commission, 2021g). One way to achieve this would be to encourage (or at least not discourage) undertakings to conclude agreements with possible beneficial effects for the environment, e.g. agreements that reduce greenhouse gas (GHG) emission, enhance animal welfare in food production, or agreements concerning efficient energy consumption of household appliances (see Holmes, 2020: 356-357). Despite good intentions, we have to be careful. Anyone having at least basic knowledge of competition law knows that this is a very slippery terrain, as it potentially provides an opportunity to enter into prohibited cartels. To what extent, and should these initiatives be promoted at all? Judging from the Commission's typical attitude, the risk for sustainability agreements being seen as impediments to effective competition is high. Despite the current strict approach, we concur with many authors who point out that the existing competition rules can be applied or slightly modified to include sustainability initiatives as part of competition assessment (Volpin, 2020: 5; Murray, 2020). There is room for more flexibility in applying the existing arrangements (see Loozen, 2019). To enable the current competition rules to accommodate sustainability concerns, traditional competition goals need to be reassessed.

The traditional competition goals are focused on enhancing efficiency, which can be measured by a set of concrete materialized indicators. Improving the quality of products and consumer welfare are observed as the most important. The final goal in every competition assessment is the consumer well-being. The goals of EU competition law focus primarily on consumer welfare, but are not limited to it, as they include an intricate network of overlapping values, such as effective competition as such, fairness, efficiency and innovation, plurality and economic freedom (see Ezrachi, 2018). As the consequences of global warming are becoming visible in every corner of the world, competition assessment cannot ignore sustainability concerns and public interests anymore, or fail to quantify non-economic gains. This puts a difficult task before competition enforcers: on one hand, they will be required to find the right balance between private initiatives that support sustainability, and on the other hand, they should not readily accept sustainability as an automatic justification for anti-competitive behaviour.

The role of competition law in relation to sustainability has been described in literature as that of a "sword and shield" (Nowag, 2019: 5). Competition rules can be used as a "sword" to attack and slash down certain undertakings' behaviour that might have a negative effect on the environment. On the other hand, competition rules might be able to "shield" possible competition infringements that promote sustainability (Holmes, 2020: 384). Both approaches presume extensive understanding of competition goals towards

sustainability, efficiency and consumer welfare (OECD 2020: 19).

From the above premise, it follows that competition law can be used as a tool to foster private sustainability initiatives. There are two provisions which merit further analysis: Article 101(1) TFEU that prohibits anti-competitive agreements, and Article 101(3) TFEU that provides justifications to escape this prohibition. Apart from that, many sustainability initiatives will fall outside of the scope of competition rules.

3.2. The possible application of Article 101 TFEU to sustainability initiatives

Pursuant to Article 101(1) TFEU, all agreements between undertakings, decisions by associations of undertakings and concerted practices which may affect trade between Member States and which have as their object or effect the prevention, restriction or distortion of competition within the internal market are prohibited. All concepts relevant for the application of this provision (undertaking or association of undertakings, agreements or concerted practices, effect on trade between Member States, object or effect of an agreement or a concerted practice, and prevention, restriction or distortion of competition within the internal market) are autonomous concepts of EU law (see more in Pošćić and Martinović, 2020b: 1031). Article 101(3) TFEU provides an exemption to this prohibition.

The agreement has to fulfil four conditions to be exempted. Under Article 101(3) TFEU, Article 101(1) TFEU can be declared inapplicable in case of agreements that contribute to improving of the production or distribution of goods or to promoting technical or economic progress, while allowing consumers a fair share of the resulting benefit, provided that they do not impose restrictions that are not indispensable to the attainment of these objectives and afford such undertaking the possibility of eliminating competition in respect of a substantial part of the product in question. It is possible, under the current framework, to interpret this exemption to encompass non-economic or public interests, especially sustainability and environmental matters (see Dunne, 2020). However, it is necessary to clarify these conditions in order to encourage undertakings to tune into sustainability issues, instead of avoiding such business decisions out of fear of possible competition infringements.

As mentioned above, the European Commission's traditional economic approach is liable to stifle the undertakings' sustainability initiatives. This approach originates from the 2004 Commission's Guidelines on the application of Article 101(3) TFEU, where only economic efficiency is valued (European Commission, 2004). This might prove discouraging for undertakings willing to produce certain products and provide some services that are in line with environmental and sustainability initiatives. Article 101(3) TFEU is perceived as a framework for economic assessment of possible anti-competitive agreements. This would make sense if the only goal of competition law is consumer welfare seen from the perspective of allocative efficiency. However, competition goals go beyond consumer surplus. According to Holmes, consumer welfare should be regarded as consumer

well-being, which includes not only narrow financial considerations in the sense of consumer surplus, or short-term price effects, but also, e.g. clean air, healthy food, etc. (Holmes, 2020: 363). This approach takes us closer to public interest and long-term sustainability valuation. The question is, can the notion of consumer welfare be extended so as to include these non-monetary values that are impossible or extremely difficult to quantify, or that do not even materialise in the short-term? The 2004 Guidelines on the application of Article 101(3) TFEU do not offer sufficient clarification and guidance on this issue, as they do not contain precise instructions how to quantify benefits. This partly explains why undertakings are reluctant in concluding sustainability agreements.3 Due to unclear and imprecise rules, undertakings will rather "escape then dare" (van der Zee, 2020: 191). Despite the fact that Guidelines are only soft law, they have undeniably shaped the practice of the Commission in the application of Article 101(3) TFEU.

We believe that the exemption provided under Article 101(3) TFEU is the most suitable provision under the current EU legal framework for assessing sustainability agreements between competitors which restrict competition. However, since this assessment is currently based predominantly on economic reasons, this would be possible only if we move from the usual assessment of materialised benefits towards non-price and non-monetary values. Efficiency gains may also encompass sustainability gains (see e.g. ACM, 2021: 12). A more extensive understanding of consumer welfare could embody human well-being in a more general way.

Before we turn to this specific issue, it is necessary to provide a concise overview of the possible position of sustainability agreements in competition law. From the competition point of view, sustainability agreements could be classified as follows: agreements that do not restrict competition, agreements that come under the Albany doctrine and fall outside the Article 101 TFEU, agreements that fall under the necessity doctrine, standardization agreements, and agreements assessed under the exemption provided in Article 101(3) TFEU (Holmes, 2020: 368; see also Gerbrandy, 2017; Monti and Mulder, 2017). These agreements, and their impact on competition law, will be analysed in turn.

As to the first, it is interesting to note that some environmental agreements were considered not to be caught by Article 101(1) TFEU under the old 2001 Commission Guidelines on the applicability of Article 81 of the EC Treaty on horizontal cooperation agreements (2001 Horizontal Guidelines; European Commission, 2001b). Under this scenario, environmental agreement would be unlikely to restrict competition if certain conditions are fulfilled: it does not place any individual obligation on the parties, or if parties only commit loosely to contributing to a sector-wide environmental target, the agreement stipulates environmental performance with no effect on product and production, or it gives rise to genuine market creation. In 2011, the 2001 Horizontal guidelines

3 A study conducted in 2020 revealed that nine out of ten businesses consider collaboration crucial for achieving sustainability goals. At the same time, almost 60 % of business leaders indicate that they did not pursue concrete sustainability initiatives because the legal risk was too high. See Linklaters (2020).

were replaced by the 2011 Commission Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements (2011 Horizontal Guidelines; European Commission, 2011), where such arrangement is completely left out. Holmes, however, emphasises the old Guidelines can be helpful in interpreting similar provisions from the new 2011 Horizontal Guidelines (Holmes, 2020: 369).

Another possibility for an agreement not to be caught by Article 101(1) TFEU concerns the concept of undertaking. Article 101(1) TFEU is applicable only to undertakings, as defined and interpreted in the case law of the CJEU. The concept of undertaking is a functional one, concentrated on the nature of activities and includes every entity engaged in economic activity regardless of its legal status and modes of financing (CJEU, case Höfner, C-41/90). It is possible to derive specific criteria from the definition: an undertaking has to offer goods or services on the market, bear economic or financial risk emerging from doing business and has to have a possibility to make profits. Many agreements between undertakings that carry out activities which include public dimension, or provide social function, could possibly fall outside the Article 101 TFEU. This should not, however, provide a safe haven for agreements that promote sustainable goals as part of their plan to achieve profits.

The second type of sustainability agreements might benefit from the Albany line of case law of the CJEU (CJEU, case C-67/96). This case concerned a sensitive area of collective bargaining, and the CJEU held that agreements concluded in the context of collective negotiations between management and labour in pursuit of social policy goals fall outside of Article 101(1) TFEU. A parallel reasoning could be applied to sustainability agreements (van der Zee, 2020:193.)

The third type of agreements might be considered under the so-called necessity doctrine. Such agreements might fall outside Article 101(1) TFEU because they entail ancillary restraints or because they entail restraints which are objectively necessary. Those are agreements or some provisions in agreements that are necessary for the achievement of a particular legitimate purpose (Wish and Bailey 2018: 136), e.g. agreements involving environmental regulatory assignments. However, we are yet to witness whether this avenue would be pursued in practice.

The fourth solution is to treat sustainability agreements as standardization agreements, whose primary objective is to define technical or quality requirements with which current or future products, production processes, services or methods may comply, as elaborated in the 2011 Horizontal Guidelines (European Commission, 2011). They can cover various issues, such as agreements setting out standards on the environmental performance of products or production processes. It is suggested that these agreements, in view of their objective, should easily be found to be in compliance with Article 101(1) TFEU (Holmes, 2020: 382-383).

The last, and probably the most preferable way would be to exempt sustainability agreements pursuant to Article 101(3) TFEU. The exemption

is concerned with consumer welfare, so the main dilemma is how to interpret consumer welfare, in other words, can it be interpreted more broadly so as to take also non-economic and non-competition interests into consideration. We believe that this is the most preferable route.

Exemption provided under Article 101(3) TFEU renders Article 101(1) inapplicable if the agreement contributes to improving the production or distribution of goods or to promoting technical or economic progress, while allowing consumers a fair share of the resulting benefit, and which does not impose on the undertakings concerned restrictions which are not indispensable to the attainment of these objectives and afford such undertakings the possibility of eliminating competition in respect of a substantial part of the products in question. Consequently, in order to qualify for the exemption under Article 101(3) TFEU, the agreement has to fulfil four conditions.

The agreement must "contribute to improving the production or distribution of goods or to promoting technical or economic progress". The Commission is mostly focused on economic evidence, which has led to accusations that it promotes markets based on cheap products and the idea that "cheap is good" (Fair trade, 2019: 3). However, the wording of this provision suggests that the economic progress is one of the alternative criteria ("technical *or* economic progress"). A more extensive evaluation should not be limited only to economic cost and value. The improvement of quality of life or innovation can entail also environmental issues. An older Commission's decision in case CECED could serve as a valuable guidance. Here, the Commission granted an exception to an agreement between producers and importers of washing machines pursuing environmentally friendly strategies. The Commission decided that collective benefits outweigh the costs associated with the price increase (European Commission, CECED case, 1999). This shows that environmental protection objectives were intended to be "woven into the interpretation and application of Article 101(3) TFEU", as rightly observed by Buhart and Henry (Buhart and Henry, 2021: 149-150).

One of the most controversial criteria relates to the requirement that consumers should be allowed "a fair share of the resulting benefit". There are several issues to analyse here in view of sustainability. One is the definition of consumers. Usually it includes direct and indirect users of the products. What about benefits for the society as a whole? Not all members of society are considered as consumers on the relevant market, and this group is sometimes difficult to identify. Another issue is that sometimes the benefits to consumers are not materialised immediately, and may only arise in the long term. Should the future advantages also play a role in the assessment and to what extent? What advantages and which markets should be taken into account? Only those advantages that have materialised on the relevant market, or any other market without the necessity to show specific relationship with the relevant market? According to the current framework, benefits to other markets can be taken into consideration, but these markets must be closely related. In specific situations, it might be possible to take into account other markets, or markets that have no specific link with the relevant market (see, e.g.

CJEU, Joined cases C-501/06 P, C-513/06 P, C-515/06 P and C-519/06 P). We should avoid a too narrow reading of this provision, but in the interest of legal certainty, it is still necessary to set clear limits to its interpretation. When it comes to sustainability issues, such as climate change, or animal welfare, we believe that future consumers and future benefits, wherever materialised, should also be taken into consideration. This would be in line with sustainability principles (Holmes, 2020: 377). Quantifying sustainability benefits, which mostly involve out-of-market efficiencies requires careful consideration (OECD, 2021a: 12, 13). In order to assess the future benefits, it is important to frame the time in which advantages might occur (OECD, 2021b: 19). The notion of fair share refers not only to price considerations but also to the quality of new and improved products that can compensate for any anti-competitive effects. Measuring financial advantages and objective materialised benefits is already a very complex task. This is why subjective perceptions of consumers are rarely taken into account. However, subjective perceptions are extremely important when substantiality issues are at stake. Presently, measuring consumer welfare in the Commission's assessment often boils down only to price considerations, but there is also evidence that broader welfare standard is setting in (see van der Zee, 2020: 196-199). Dynamic efficiency is about improving allocative and productive efficiency. The sustainability agreements may raise prices, but on the other side improve quality that at the end benefits consumers.

Having in mind the pressing need to adapt the EU competition policy to support the EU's green ambition, the European Commission acknowledges that more guidance is needed to encourage companies to jointly invest, identify solutions, produce, and distribute sustainable products (European Commission, 2021g). However, in expressing its intention to revise the existing and adopt new guidelines by the beginning of 2024, the Commission does not seem ready to revise its position on the assessment of a "fair share" of benefit to consumers, which entails full compensation for the harm (see also Jansen, Beeston and Van Acker, 2021: 39). The problem is that full compensation will be difficult to achieve in view of future, and out-of-market benefits.

Even if the agreement fulfils those criteria it has to pass the proportionality principle. The last one relates to the no elimination of competition on the relevant market. According to that condition, the protection of rivalry and the competitive process is given priority over potentially pro-competitive efficiency gains which could result from restrictive agreements (European Commission, 2004: para. 105). In other words, it recognises that the rivalry between undertakings is an essential driver of competitive process. It is necessary to compare the degree of competition existing prior to the agreement, and the impact of the restrictive agreement on the actual and potential competition (European Commission, 2004: paras. 107, 108).

We believe that whichever avenue is taken, the secret lies in the proper balancing and applying the proportionality principle. With digitalisation and the use of new technologies, such as AI and algorithms, we might be able to better measure sustainability gains. This is where digitalisation and

sustainability go hand in hand. Apart from that, there should be a clear guidance on the integration of non-economic benefits which cannot be quantified and measured, but still substantially contribute to sustainability. The Commission should "think green" (Buhart and Henry, 2021), or even resort to "greener", "deeper green", or "deepest green" options (Monti, 2020: 126-130) when applying Article 101(3) TFEU, in order to avert the existential threat to the environment that we are facing. We agree that Article 101(3) TFEU might be crucial for achieving sustainability objectives in compliance with competition law.

3.3. Sustainability as an opportunity and an objective of the well-functioning markets: The Dutch example

The Netherlands Authority for Consumer and Markets (ACM) has for a long time been trying to prioritise sustainability as an objective and a key feature of well-functioning markets, that work well for people and businesses alike (ACM, 2021: 3). We believe that this approach is really interesting, innovative and in line with the challenges posed by the green and digital transition. However, it has not fared so well with the European Commission (Jansen, Beeston and Van Acker, 2021: 10). The latest draft version of the ACM's Sustainability Agreement Guidelines from 2021 tries to incorporate some of the concerns voiced by the European Commission. We agree with the authors claiming that the ACM draft Guidelines could "serve as a source of inspiration for a modern EU approach to sustainability and competition policy", as they create "an intelligent modus operandi" for a more cooperative sustainability initiatives (Jansen, Beeston and Van Acker, 2021: 40). The idea is simple: sustainability agreements that do not restrict competition; or those that restrict competition, but produce benefits that offset competition restrictions, are seen as an opportunity, not a threat. The ACM is open to discuss the potential agreements in advance, and identify if there are any competition concerns. Fines will not be imposed on undertakings that have contacted ACM in advance, even if it turns out eventually that they are incompatible with the Dutch Competition Act; or on undertakings that have published their agreements and followed the Guidelines in good faith (ACM, 2021: 3). This is an expression of good faith, collaboration, and progressive thinking in achieving the common objective: sustainability for current and future generations. The 2021 ACM's second draft Guidelines have been published after a long round of negotiations and public consultations, and following two high-profile cases decided by the CMA in the last decade, where competition concerns collided with sustainability initiatives. The first case was about the so-called Energy Agreement for Sustainable Growth that involved 40 organisations, potential competitors, who agreed to gradually close down coal-fuelled power plants in order to encourage the production of energy from more sustainable sources (see Mulder, 2020). The ACM concluded that such agreement is caught under Article 101(1) TFEU, and conducted a cost-benefit analysis to verify whether it complies with the criteria for exemption under Article 101(3) TFEU. By applying the standard economic approach, it concluded that these criteria were not fulfilled. Consumers would end up paying much higher prices, which were disproportionate to the estimated value of benefit.

Another case illustrating the tension between competition law and sustainability initiatives is known as the "Chicken of Tomorrow" case. At the beginning of 2013, the organisations from the poultry sector agreed to gradually move to a production of only sustainable produced meat from 2020 onwards. Here, the ACM relied mostly on the consumer willingness-to-pay test, in an attempt to quantify the benefits of improvements to animal welfare. The ACM found that the potential advantages did not outweigh the limitation of consumer choice, as there would be no possibility for consumers to buy meat produced in the old fashion (see Mulder, 2020; Holmes, 2020: 399; Gerbrandy, 2017: 540, 541; Volpin, 2020: 7).

These cases resulted in a wider public debate in the Netherlands, which have put the issue of sustainability agreements in competition law at the forefront (see Mulder, 2019: 23; Gerbrandy, 2017; Monti and Mulder 2017). In addition to the draft legislative instruction on the assessment procedures, which was criticised and rejected by the Commission for a number of reasons,4 a draft legislative proposal was prepared, but has still not been adopted. It proposed the possibility of the so-called declaration of general effect for private sustainability agreements, similar to the possibility which exists in the field of labour law, for collective agreements (Mulder, 2020). This would mean that certain private sustainability initiatives would in some special circumstances circumvent possible competition problems. The Commission insisted not to put the legislation in force. The result is that Article 101 TFEU could not be used to allow private undertakings to pursue other goals beyond consumer welfare. We agree with Mulder who claims that the currently entrenched EU competition law favours the demand side of markets and mandates the same direction in decision-making in the Member States (Mulder, 2019: 9). This suppresses progressive initiatives, that try to reconcile environmental, social and animal welfare standards with competition concerns, and that would allow for lawful cooperation and consolidation of competition and sustainability needs.

4. Concluding remarks

We have started with the difficult question: Can the EU competition law live up to the challenge of twin transition? Obviously, there is no easy or straightforward answer. Competition law and policy have traditionally shown indifference to sustainability objectives, with some notable exceptions. However, we need to change our way of thinking, understanding and applying the usual concepts. There is no denying that competition law and policy can play an important role in advancing sustainability objectives. Many authors agree that sustainability concerns can be incorporated under the existing framework for competition law and policy in the EU. Nevertheless, it is necessary to have clearer guidelines in order to encourage the change

4 Most notably, the Commission stressed out that the objectives of the draft legislative instruction were contrary to Article 101(1) TFEU, as well as Article 101(3) TFEU, because they take into account the positive effect to the whole society, whereas Article 101(3) TFEU is limited to the positive effects on users of products or services. See Mulder, 2020: 23-25.

our society needs to become truly sustainable. Finding the right balance between private sustainability initiatives, public policies, and consumer well-being is a difficult task, that cannot be put away for later, or swept under the carpet. Undertakings need help in their self-assessment, just as consumers need to be protected, having their broader well-being in mind. We believe that the EU has to take a more proactive role and guide the national competition enforcers in this important mission.

References

Books:

1. Epiney, A. (2019) Umweltrecht der Europäischen Union, 4th ed., Facultas, Nomos.
2. Grabitz/Hilf/Nettesheim (2011): Das Recht der Europäischen Union: EUV/AEUV, C. H. Beck.
3. Jans, J. H., Vedder, H. H. B. (2012) European Environmental Law After Lisbon, 4th ed., Zutphen: Europa Law Publishing.
4. Nowag, J. (2016) Environmental Integration in Competition and Free-Movement Laws, Oxford: Oxford University Press.
5. Schwarze: EU-Kommentar (2019) Becker, Ulrich; Hatje, Armin, Schoo, Johann; Schwarze, Jürgen (eds.), 4th ed., Nomos Verlagsgesellschaft, Baden-Baden.
6. Wegener, B. W. (2021) Europäische Querschnittpolitiken, 2nd ed., Enzyklopädie Europarecht, Band 8, Nomos.
7. Whish, R., Bailey, D. (2018) Competition Law, 9th ed., Oxford: Oxford University Press.

Journals:

1. Buhart, J., Henry, D. (2021) Think Green Before You Apply: EU Competition Law and Climate – Change Abatement, *World Competition* Vol. 44, No. 2, pp. 147-167.
2. Dunne, N. (2020) Public Interest and EU Competition Law, *The Antitrust Bulletin* Vol. 65, No. 2, pp. 256-281, doi: 10.1177/0003603X20912883.
3. Gerbrandy, A. (2017) Solving a Sustainability- Deficit in European Competition Law, *World Competition* Vol. 40, No. 4, pp. 539-562.
4. Holmes, S. (2020) Climate Change, Sustainability, and Competition Law, *Journal of Antitrust Enforcement*, Vol. 8, pp. 354-405, doi: 10.1093/jaenfo/jnaa006.
5. Iacovides, M. C., Vrettos, C. (2022) Falling through the cracks no more? Article 102 TFEU and sustainability: The nexus between dominance, environmental degradation, and social injustice, *Journal of Antitrust Enforcement*, Vol. 10, Issue 1, pp. 32–62, https://doi.org/10.1093/jaenfo/jnab010.

6. Jansen, P., Beeston, S. J., Van Acker, L. (2021) “The sustainability guidelines of the Netherlands Authority for Consumers and Markets: an impetus for a modern EU approach to sustainability and competition policy reflecting the principle that the polluter pays?”, *European Competition Journal*, published online 28.10.20221, doi: 10.1080/17441056.2021.1995227.

7. Loozen, E. (2019) Strict Competition Enforcement and Welfare: A Constitutional Perspective Based on Article 101 TFEU and Sustainability, *Common Market Law Review*, Vol. 56, pp. 1265-1302.

8. Monti, G. (2020) “Four Options for a Greener Competition Law”, Journal of European Competition Law & Practice, Vol. 11, Issue 3-4, pp. 124–132, https://doi.org/10.1093/jeclap/lpaa007.

9. Monti, G., Mulder, J. (2017) Escaping the Clutches of EU Competition Law: Pathways to Assess Private Sustainability Initiatives, *European Law Review* Vol. 42, pp. 635-656.

10. Mulder, J. (2019) A Constitutional Reflection on the Economisation and Modernisation of EU Competition Law: a Case Study from the Netherlands, *The Competition Law Review* Vol. 14, No. 1, pp. 9-31

11. Nowag, J. (2019) Competition Law’s Sustainability Gap? Tools for an Examination and a Brief Overview, *LundLawCompWP*, Vol. 3, pp. 1-11.

12. Pošćić, A., Martinović, A. (2020a) Rethinking Effects of Innovation in Competition in the Era of New Digital Technologies, *InterEULawEast - Journal for international and European law, economics and market integrations*, VII, 2, pp. 245-261.

13. Pošćić, A., Martinović, A. (2020b) EU Competition Law in the Digital Era: Algorithmic Collusion as a Regulatory Challenge. In Petrašević, T., Duić, D. eds., EU 2020 – Lessons from the past and solutions for the future, Osijek: Pravni fakultet, pp. 1016-1039, doi:10.25234/eclic/11937.

14. van der Zee, E. (2020) Quantifying Benefits of Sustainability Agreements Under Article 101 TFEU, *World Competition* Vol. 43, No. 2, pp. 189-208.

Internet sources:

1. ACM – Autoriteit Consument & Markt (2021) Second draft version – Guidelines on sustainability agreements: Opportunities within competition law. Available at <https://www.acm.nl/en/publications/second-draft-version-guidelines-sustainability-agreements-opportunities-within-competition-law> [Accessed June 1, 2022]

2. Chouinard, Y., Ellison, J., Ridgeway, R. (2011) The Sustainable Economy, *Harvard Business Review*. Available at <https://hbr.org/2011/10/the-sustainable-economy> [Accessed June 1, 2022]

3. Ecco-Innovation Observatory (2020) EIO Biennial Report 2020: Eco-Innovation and Digitalisation, Case studies, environmental and policy lessons from EU Member States for the EU Green Deal and the Circular

Economy. Available at <https://ec.europa.eu/environment/ecoap/sites/default/files/eio5_eco-innovation_and_digitalisation_nov2020.pdf> [Accessed June 1, 2022]

4. Ezrachi, A. (2018) EU Competition Law Goals and the Digital Economy, Oxford Legal Studies Research Paper No. 17/2018, Available at SSRN <https://ssrn.com/abstract=3191766 or http://dx.doi.org/10.2139/ssrn.3191766> [Accessed June 1, 2022].
5. Fair trade (2019) Briefing Note. EU competition law and sustainability in food systems. Addressing the broken links. Available at <https://fairtrade-advocacy.org/wp-content/uploads/2019/04/FTAO-Briefing-note-Competition-Law-and-Sustainability_Addressing-the-Broken-Links.pdf> [Accessed June 1, 2022]
6. Linklaters (2020) Response by Linklaters to the ACM's consultation on the draft guidelines on sustainability agreements. Available at <https://www.acm.nl/sites/default/files/documents/6-response-linklaters.pdf> [Accessed June 1, 2022]
7. Murray, G. (2020) Sustainability and competition law: So what is allowed? Available at <https://viewpoints.bakermckezie.com/post/102g97t/sustainability-and-competition-law-so-what-is-allowed> [Accessed June 1, 2022]
8. OECD (2020) Sustainability and Competition, OECD Competition Committee Discussion Paper, Available at <http://www.oecd.org/daf/competition/sustainability-and-competition-2020.pdf> [Accessed June 1, 2022]
9. OECD (2021a) Measuring environmental benefits in competition cases – Note by Nadine Watson, DAF/COMP(2021)14. Available at <https://one.oecd.org/document/DAF/COMP(2021)14/en/pdf> [Accessed June 1, 2022]
10. OECD (2021b) Environmental considerations in competition enforcement, OECD Competition Committee Discussion Paper. Available at <https://www.oecd.org/daf/competition/environmental-considerations-in-competition-enforcement.htm> [Accessed June 1, 2022]
11. University of Cambridge Institute for Sustainability Leadership (CISL) (2020) Developing the EU's 'competitive sustainability' for a resilient recovery and dynamic growth. Cambridge, UK: the Cambridge Institute for Sustainability Leadership. Available at https://www.cisl.cam.ac.uk/resources/low-carbon-transformation-publications/developing-the-eus-competitive-sustainability-for-a-resilient-recovery-and-dynamic-growth [Accessed June 1, 2022]
12. Vestager, M. (2019) speech at Brussels Sustainability Conference. Available at: <https://ec.europa.eu/newsroom/comp/items/661165, 2019> Accessed: [May 25, 2022]

Chapters from a book:

1. Ellis, J. (2008) “Sustainable development as a legal principle: A rhetorical analysis”. In Ruiz Fabri, H., Rüdiger, W., Gogolin, J. eds., Select Proceedings of the European Society of International Law, Vol. 2, Hart, Bloomsbury Publishing.
2. Epiney, A. (1999) “Zum Konzept der Nachhaltigen Entwicklung in der Europäischen Union”. In Epiney, A., Scheyli, M., Hohmann, H. eds., Das Konzept der Nachhaltigen Entwicklung. Völker- und europarechtliche Aspekte, Bern: Stämpfli Verlag.
3. Mulder, J. (2020) “EU competition law vs. private regulation: Restrictive or Enabling”. In de Cock Buning, M., Senden, L. eds., Private Regulation and Enforcement in the EU. Finding the Right Balance from a Citizen’s Perspective, Hart Publishing, pp. 475-496.
4. Verschuuren, J. (2016) “The growing significance of the principle of sustainable development as a legal norm”. In Fisher, D. ed., Research Handbook on Fundamental Concepts of Environmental Law, Cheltenham, UK – Northhampton, MA, USA: Edward Elgar Publishing, pp. 276-305.

Official publications:

1. Brundtland Report (1987) Report of the World Commission on Environment and Development, Our Common Future <https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf> [Accessed June 1, 2022]
2. Charter of Fundamental Rights of the European Union (2016), OJ C 202, 7.6.2016.
3. European Commission (2001a) Communication from the Commission A Sustainable Europe for a Better World: A European Union Strategy for Sustainable Development (Commission’s proposal to the Gothenburg European Council), COM/2001/0264 final.
4. European Commission (2001b) Commission Notice — Guidelines on the applicability of Article 81 of the EC Treaty to horizontal cooperation agreements, OJ C 3, 6.1.2001, pp. 2–30.
5. European Commission (2004) Communication from the Commission - Guidelines on the application of Article 81(3) of the Treaty, OJ C 101, 27.4.2004, pp. 97–118.
6. European Commission (2009) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Mainstreaming sustainable development into EU policies: 2009 Review of the European Union Strategy for Sustainable Development, COM(2009) 400 final.
7. European Commission (2011) Communication from the Commission - Guidelines on the applicability of Article 101 of the TFEU to horizontal co-operation agreements, OJ C 11, 14.1.2011, pp. 1–72.

8. European Commission (2019a) Communication from the Commission to the European Parliament, the Council, the European Central Bank, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank. Annual Sustainable Growth Strategy 2020, COM(2019) 650 final, Brussels, 17.12.2019.

9. European Commission (2019b) Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions. The European Green Deal, COM(2019) 640 final, Brussels, 11.12.2019.

10. European Commission (2020a) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A strong social Europe for just transitions, COM(2020) 14 final, Brussels, 14.1.2020.

11. European Commission (2020b) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. An SME Strategy for a sustainable and digital Europe, COM(2020) 103 final, Brussels, 10.3.2020.

12. European Commission (2020c) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A new Circular Economy Action Plan For a cleaner and more competitive Europe, COM(2020) 98 final, Brussels, 11.3.2020.

13. European Commission (2020d) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. EU Biodiversity Strategy for 2030 Bringing nature back into our lives, COM(2020) 380 final, Brussels, 20.5.2020.

14. European Commission (2020e) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system, COM(2020) 281 final, Brussels, 20.5.2020.

15. European Commission (2020f) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Chemicals Strategy for Sustainability. Towards a Toxic-Free Environment, COM(2020) 667 final, Brussels, 14.10.2020.

16. European Commission (2020g) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Sustainable and Smart Mobility Strategy – putting European transport on track for the future, COM(2020) 789 final, Brussels, 9.12.2020.

17. European Commission (2021a) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Building an economy that works for people: an action plan for the social economy, Luxembourg: Publications Office of the European Union.

18. European Commission (2021b) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. 2030 Digital Compass: the European way for the Digital Decade, COM(2021) 118 final, Brussels, 9.3.2021.

19. European Commission (2021c) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery, COM(2021) 350 final, Brussels, 5.5.2021.

20. European Commission (2021d) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Pathway to a Healthy Planet for All. *EU Action Plan: 'Towards Zero Pollution for Air, Water and Soil'*, Brussels, COM(2021) 400 final, 12.5.2021.

21. European Commission (2021e) Communication from the Commission to the European Parliament, the European Council, the Council, the European Central Bank, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank. Annual Sustainable Growth Survey 2022, COM(2021) 740 final, Brussels, 24.11.2021.

22. European Commission (2021f) Commission Staff Working Document accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Building an economy that works for people: an action plan for the social economy, SWD(2021) 373 final, Brussels, 9.12.2021.

23. European Commission (2021g) Directorate-General for Competition, Competition policy brief. 2021-01, September 2021 <https://data.europa.eu/doi/10.2763/962262> [Accessed June 1, 2022].

24. European Commission (2022) Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions. Towards a green, digital and resilient economy: Our European Growth Model, COM(2022) 83 final, Brussels, 2.3.2022.

25. European Council (2006): Renewed EU Sustainable Development Strategy, 15/16 June 2006, DOC 10917/06.

26. Porto Social Commitment, Porto Social Summit, 7th May 2021. Available at <https://www.2021portugal.eu/media/icfksbgy/porto-social-commitment.pdf> [Accessed June 1, 2022].

27. Treaty on the Functioning of the European Union (consolidated version 2016), OJ C 202, 7.6.2016.

28. United Nations (2015) Transforming our world: the 2030 Agenda for Sustainable Development, Resolution adopted by the General Assembly on 25 September 2015, A/RES/70/1

Case law:

1. Court of Justice of the European Union (CJEU), case C-41/90, Klaus Höfner and Fritz Elser v Macrotron GmbH, EU:C:1991:161.

2. Court of Justice of the European Union (CJEU), case C-67/96, Albany International BV v Stichting Bedrijfspensioenfonds Textielindustrie, EU:C:1999:430.

3. Court of Justice of the European Union (CJEU), case C-371/98, The Queen v Secretary of State for the Environment, Transport and the Regions, ex parte First Corporate Shipping Ltd, interveners: World Wide Fund for Nature UK (WWF) and Avon Wildlife Trust; Opinion of Advocate General Léger, EU:C:2000:108.

4. Court of Justice of the European Union (CJEU), joined cases Joined cases C-501/06 P, C-513/06 P, C-515/06 P and C-519/06 P, GlaxoSmithKline Services Unlimited v Commission of the European Communities (C-501/06 P) and Commission of the European Communities v GlaxoSmithKline Services Unlimited (C-513/06 P) and European Association of Euro Pharmaceutical Companies (EAEPC) v Commission of the European Communities (C-515/06 P) and Asociación de exportadores españoles de productos farmacéuticos (Aseprofar) v Commission of the European Communities (C-519/06 P), EU:C:2009:610.

5. European Commission (CECED case) (1999) Commission Decision of 24 January 1999 relating to a proceeding under Article 81 of the EC Treaty and Article 53 of the EEA Agreement (Case IV.F.1/36.718. CECED) (2000/475/EC).

CHAPTER 5

Defined duration of civil court proceedings: will this certainty be preconditions for attracting investors?[1]

Dejan Bodul[2], Marko Tomljanović[3]

ABSTRACT

The organization of an efficient judicial apparatus is the primary task of the legislative and the executive branch, which must provide the judiciary with the necessary working conditions. Namely, despite a number of successful measures taken to address the excessive length of court proceedings, it has been identified as a systemic problem by the highest judicial bodies, as well as the doctrine. The aim of this paper is to answer the legal dilemma of whether the duration of court proceedings should be prescribed by law, or is sufficient legal standard determined by autonomous terms such as "reasonable time", "Fair trial" and / or "urgent action". The secondary objective of this analysis is to find an answer to the question of which model meets the requirement of effective legal protection for investors from the perspective of relevant EU law standards.

Key words: *judiciary, duration of proceedings, attracting investors.*

JEL Classification: *K9, K0*

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1. Discussion framework

The World Bank study indicates that Croatia's approach to solving the problem of lengthy court proceedings has so far been limited to changes in procedural legislation (Amendment to the Civil Procedure Act 2019), delegating (old) cases from burdened to less burdensome courts, and monitoring and adjusting performance benchmarks for judges (although this is only indirectly related to the length of the civil proceedings)[4]. In addition, a number of other activities were aimed at reducing the number of oldest cases, better organization of work in judicial institutions, improving their capacity in the strategic planning segment, as well as providing better working conditions for judges, prosecutors and other professional and technical staff. However, is this enough since the public perception (and also professional) still perceives the courts as too slow, emphasizing the high uncertainty and inconsistency of court proceedings and decisions, while at the same time perceives the administrative burden related to court proceedings and communication with courts as overly complex (Uzelac, 2004).

2. Towards the Amendment to the Civil Procedure Act 2022.

The Ministry of Justice and Administration has made new amendments to the Law on Civil Procedure in march 2022, which aims to speed up, simplify and modernize civil proceedings. The proposed amendments introduced precise deadlines for the completion of the civil procedure. First instance proceedings should be completed within the period of 3 years, while second instance (appeal) proceedings should be completed within one year. In small claims, the proceedings before the court of first instance should be completed within a year, while appellate proceedings for small claims, with the adoption of these amendments, will last up to 6 months. A deadline for holding a preparatory hearing will also be introduced. From now on, the preparatory hearing will have to be held within 3 months from the day of receiving the response to the lawsuit, i.e. since the deadline for responding to the lawsuit has expired. After the conclusion of the preparatory hearing, the main hearing will be held within 6 months at the latest. The Supreme Court of the Republic of Croatia will be obliged to make a decision on the motion for permission of revision within a period of less than 6 months from the receipt of the motion. The Supreme Court of the Republic of Croatia will be obliged to make a decision on the revision within two years from the day of receipt of the revision.5

4 See, Bodul, D. (2022), "Nova Okvirna mjerila za rad sudaca Objektivno provjerljivi parametri ili ne?" *Informator,* No. 6717, pp. 1-3.

5 Available on the website: https://esavjetovanja.gov.hr/ECon/MainScreen?entityId=19732 (15.03.2022.).

3. A review of previous research and the contribution of this paper

In the Republic of Croatia, there are, perhaps, hundreds of scientific texts that deals with the extensive and complex issue of reasonable duration of civil proceedings (Uzelac, 2008). Moreover, there is a modest number of monographs in the field of the issue of reasonable duration of civil proceedings, in contrast to capital works and scientific articles that exist in comparative law literature (Varano, 1997; Woolf, 1997; van Rhee, 2004; Uzelac, 2011; Calvez, 2006; European Commission for Democracy through Law (Venice Commission), 2006; Organisation for Economic Co-operation and Development, 2013; Yaxin and Yulin, 2013; Fabri, 2009; Council of Europe, 2002). The analysis of a comparative view of attitudes on the issues of lengthy trials confirms that the systemic causes of lengthy court proceedings are usually related to the characteristics of the judicial system and more specifically the civil procedure model and are often very similar in systems with a high degree of procedural formalism. Therefore, they point out that in addition to improving the state of infrastructure and financing the judiciary, the right solution may be to streamline court proceedings with the aim of reducing the administrative burden for courts in terms of those elements that most significantly affect party behaviour. However, in recent years it has been noticeable that an increasing number of studies analyses the economic and legal effects of the overlength litigations. Most economic, most often, empirical research in the field of effects of litigation on investments deals with key indicators of the procedure (i.e., costs of proceedings and duration of proceedings) and performs comparative legal analysis and considers, for example, the intensity of litigation to resolve property relations (OECD, n.d.). In order to eliminate the weaknesses of the existing regulations and to make the procedure more efficient, the legal doctrine, but also the profession, analysed a number of procedural measures, which ultimately contributed to and resulted in a number of changes in legislation. In their works they analysed process actions, their advantages and disadvantages, consequences and preconditions for their successful implementation. Ultimately, from the point of view of research, the literature more or less communicates, in consensual terms, about the positive effects of previous reforms of the Law on Civil Procedure, but also about the problems and limitations of the existing legal system (Maganić, 2013, 2011, 2013; Bratković, 2016, 2017, 2018; Galič, 2014; Bodul et al., 2021). They indicate that we are in a time of stronge social transformations, so the old problems catch up with the new ones and together with them form extremely complex challenges that the state should provide in protecting violated and endangered rights. The analysed authors while speaking about civil litigation, indicate that this is a complex (and political) issue, so the statement about the existence of a crisis in terms of the need to introduce changes in existing practice is always relevant. In this context, abuses of rights in proceedings are often analysed. It is evident from the literature that at a doctrinal level the abuse of law is a conflict of law itself, i.e. written norms and the very purpose of the Law, which occurs at a certain time when the use of rights, which may have been

procedurally and materially justified, comes into conflict with the purpose and goals of legal regulation of rights in a way that negatively affects the rights and duties of third parties, both the rights and obligations of other participants and the obligations and duties of the authorities in terms of fulfilling their tasks. Thus prof. M. Dika, alleges that the abuse of rights is the use of legal powers with the aim of harming another; or with a goal contrary to good customs, conscientiousness and honesty in traffic, stating that in determining the abuse of rights, it is necessary to assess all the facts and circumstances of the case in order to establish a decision on the existence or non-existence of abuse of rights (Triva and Dika, 2004). However, doctrinal debates indicate that the reasons for abuse of rights are multiple and different, so laws and doctrine provides only basic guidelines on what circumstances the court should keep in mind when deciding whether a participant is abusing a right, but, understandably, does not elaborate additional criteria that should be taken into account in order to assess that there has been an abuse of rights, leaving the issue to be resolved in practice establishing an appropriate legal standard which is not always an easy task.

On the other hand, we should not lose sight of the fact that civil procedural law is only one of the elements of the legal system that affects the business of companies. Namely, the legal regulation of civil proceedings is not in itself sufficient to ensure the smooth functioning of economic trends in a country, since it is necessary to apply legal solutions in the field of primary status law, therefore, the Companies Act (hereinafter: CA).6 Analysing the literature, the impression is that the creators of the CA had the idea that the CA is a fundamental systemic law and that the choice of key solutions to this Act and other related regulations, such as the Civil Procedure Act (hereinafter: CPA)7, should be harmonized with the solutions adopted by the CA (Barbić, 2010; Ivanjko and Kocbek, 1996; Barbić, Buljan, Porobija, 1996; Eraković, 2008; Gorenc, 1996; Slakoper, 2009; Zlatović, et al., 2011). Doctrinally, this is quite true, but descending to the practical and empirical level of business practice and the normal functioning of the legal system, the situation is changing significantly. All modes of status change, for example, aim to strike a more rational balance between ownership and management, on the one hand, and strengthening the market, on the other (Jurić, 2006; Ledić, 2002; Maurović, 2000; Parać, 2003; Parać, 2004; Ceronja, 2010; Petrović, 1999; Porobija, 1998; Zubović, 2003). However, the reasons why, for example, the bankruptcy plan or why the status change are different as well as the factors that affect it, but it can be argued that the goal is unique - to continue doing business. Moreover, these are also current issues of modern market economies.

Analysing the above theses from the Croatian perspective, we can conclude that the existing model of litigation has not proved successful as in the European environment, i.e. that in practical application is not always an easy choice between the legal consequences of litigation. Thus, although it is indisputable that the CPA and the CA, both with accompanying regulations, are characterized by modern solutions, it must not be forgotten that the

6 Companies Act, Official Gazette, no. 111/93-40/19, hereinafter: CA.
7 Official Gazette, no. 4/77-70/19., hereinafter: CPA.

system, in legal terms, is far from complete. The public debate on some aspects of the legal regulation of the market, but also the ambiguities that have arisen in the application of existing regulations on companies clearly show the areas and issues that should be urgently regulated and / or reformed. Ultimately, the more important texts for this paper, which analyse the correlation between the duration of litigation and investment issues, are extremely modest (Bodul, 2021)8 which is unusual because the source of these controversies in legal theory stems primarily from the fact that this issue is not unambiguously resolved in the regulations, which consequently leads to different court decisions and court positions (see *infra*). This is important because domestic entrepreneurs often cite barriers to investment and a not-so-favourable business environment as special challenges, which are also seen as barriers for attracting foreign investment and for the flow of private capital. In addition, the challenges that affect the perception of business entities in relation to the judicial system are highlighted, in particular the inconsistency of case law and the length of court proceedings, as well as the general perception of corruption and undue influence.

3. Methodology of work

A comprehensive assessment / analysis of the success of any changes, including changes that should occur with the adoption of the amendment to the Civil Procedure Act, requires a comparison of what has been achieved with two reference points. The first (I) is the current situation, and the second (II) is the target state, i.e. the one that should be the intended result of the adoption and application of the aforementioned procedural regulation.

3.1. Current situation in the context of legislative possibilities for the duration of civil and non-litigation proceedings

The legal basis which established and which protects the right to a trial within a reasonable time is found primarily in Art. 29 of the Constitution of the Republic of Croatia.9 The Constitutional Court of the Republic of Croatia (hereinafter: CCRC) has received and is receiving a huge number of new cases, in which the parties call for a violation of the right to a trial within a reasonable time. The indicative method of establishing the facts shows that this Court has made a huge number of decisions in recent years, in which it has found that domestic courts, in civil and non-litigious proceedings, have not made a decision within a reasonable time frame. Moreover, CCRC has been continuously pointing out in its decisions, so for a significant period of time, the alarming “hyperproduction” of lawsuits in which the parties complain of (alleged) violation of the right to a trial within a reasonable time.10 The reasoning of these decisions could be summarized as a review of several

8 *Exempli gratia*
9 Official Gazette, no. 56/90-5/14.
10 Constitutional Court, Official Gazette, no. 21/2021 (1.3.2021.), Report on the protection of the right to a trial within a reasonable time regulated by Art. 63-70 Law on Courts (Official Gazette, no. 28/13, 33/15, 82/15 and 67/18).

years of constitutional court decision-making and attitudes, which CCRC has taken in relation to the issue of length of court proceedings as a structural problem in the Republic of Croatia.

Furthermore, the direct application of the European Convention includes Art. 6 para. 1, which reads in the first sentence: “In the determination of his civil rights and obligations or of any criminal charge against him, everyone is entitled to a fair and public hearing by an independent and impartial tribunal established by law.”11 The Convention emphasizes the importance of administering justice without delay (*bis dat*, *qui cito dat*), which may jeopardize its effectiveness and credibility. As a signatory to the Convention, the Republic of Croatia is obliged to organize its judicial systems so that the courts are able to guarantee everyone’s right to a final decision within a reasonable time. Unfortunately, over the years, the ECHR has issued dozens of verdicts against the Republic of Croatia for violating the right to a fair trial (Article 6). In several of these judgments, the ECHR found that the unreasonable length of proceedings before the courts in the Republic of Croatia constituted a violation of Art. 6. We should be aware that our jurisprudence is not capable of urgently transforming from the practice of “positivism” to the practice of “creativity”, but must nevertheless accept the fact that, through the ECHR, the principle of case law is affirmed and thus jurisprudence as a formal source of law, which requires increased attention in monitoring this source of law. We also have to mention that the ECHR does not set specific time limits for the duration of court proceedings, nor does it establish general rules regarding its duration, but in the light of the circumstances of each individual case assesses whether the duration of the proceedings is reasonable. The assessment of whether the Convention’s right to a trial within a reasonable time has been violated depends on a number of factors: the overall length of the proceedings, the complexity of the case, the conduct of the national authorities, the applicant’s conduct, the applicant’s importance, the number of stages which may justify a longer duration of the proceedings. Proceedings before the CCRC may also be included in the observed period.12 However, the delay in the proceedings before the national court due to the referral of the previous question of the CJEU is not included in the duration of the proceedings before the national court in the sense of Art. 6, par. 1 of the Convention.13

The mentioned constitutional-convention principles are also contained in a number of laws.

The Law on Civil Procedure stipulates that the obligation of the court and all participants in civil proceedings is to strive to conduct the proceedings without delay, within a reasonable time and with as little cost as possible, provided that the court’s obligation to prevent any abuse of rights (Art. 10, paragraph 1 of the CPA).14 The lack of ambition of the legislator for concrete

11 Official Gazette - International Treaties, no. 18/97, 6/99, 14/02, 1/06 and 2/10, hereinafter; Convention. See more about Convention.

12 ECHR, Süßmann v. Germany, judgment [GC], 16 September 1996, Application no. 20024/92.

13 ECHR, Pafitis v. Greece, judgment of 26 February 1998, Application no. 20323/92, § 95.

14 Official Gazette, no. 53/91-70/19.

changes in this area is visible, for example, from the last amendment to the CPA, i.e. from the Act Amending the Civil Procedure Act (OG 70/19), which amended Art. 10 para. 1 of the CPA by emphasizing that it is the duty of principle, not only of the court (as prescribed before), but also of the parties and other participants, to strive to conduct the proceedings without delay, within a reasonable time and with as little cost as possible. At the same time, the instruments for fulfilling this principled duty have not been strengthened. However, specifics exist in special procedures where the legislator not only declared the urgency of the action, but also sought to operationalize this principle through a series of provisions. *Exempli gratia,* in the procedure in litigation from labour relations, after the Amendment to the Civil Procedure Act 2019, the deadline for responding to the lawsuit is fifteen days. In labour disputes initiated by the employee against the decision to terminate the employment contract and in collective labour disputes, if the law does not specify a shorter deadline, the main hearing must be held within thirty days from the date of receipt of the response to the lawsuit. In addition, the proceedings before the court of first instance must be completed within six months from the date of filing the lawsuit, while the court of second instance must decide on the appeal within thirty days from the date of receipt of the appeal. Existing experience clearly shows that changing the law (which is seemingly the fastest and simplest solution) is not enough. In order to achieve the intended effects more important is the case law and consistent implementation of solutions developed on the basis of informed decisions supported by detailed analyses, accurate empirical data and careful monitoring of its effects. Analysing individual decisions in labour law disputes, the aforementioned raises a number of debatable issues, but the author will not deal with this in this paper, trying not to dilute the basic topic. Also, a major novelty of the 2019 CPA reform is the implementation of the pilot procedure (Chapters 32.b of the CPA (Articles 502 and 502n)) which seeks to achieve several different goals in civil proceedings, but if we try to summarize the objectives of the pilot procedure, it is an institute that should contribute to the realization of the principles of economy and trial within a reasonable time and at the same time legal certainty, which would eliminate the need for the Supreme Court to intervene in order to ensure uniform application of the right. A rule has also been introduced prohibiting double reversal and the conduct of an appellate court, having already revoked a judgment once (Article 366a).

The protection of the right to a fair trial within a “reasonable time” extends to related proceedings as a whole.

Exempli causa, the Enforcement Act stipulates that in the enforcement and insurance procedure the court is obliged to act urgently (Article 13).15 The very principle of urgency implies the court’s action without unnecessarily delaying the enforcement of final judgments, i.e. the application of the standard of the right to a trial within a “reasonable time”. Regarding the enforcement of court judgments, the ECHR already included the enforcement proceedings in the legally relevant period in the judgment Ada Prede *v.* Italy (1996), 16 while in

15 Official Gazette, no. 112/12-131/20.
16 ECHR, Di Pede v. Italy, judgment of 26 September 1996, application no. 15797/89.

Hornsby *v.* Greece (1997)17 it set out and explained in more detail its view that enforcement of the judgment is an integral part of the trial in terms of Art. 6 § 1 of the Convention. The judgments pointed out that the right to a court would be illusory if the national legal systems of the contracting parties allowed the final, binding court decision to remain unenforced. In this sense, the length of the proceedings must be calculated from the beginning of the proceedings until the enforcement of the decision rendered in the proceedings. Therefore, a violation of the right to a trial within a reasonable time is possible despite the fact that the court proceedings preceding the enforcement proceedings, observed separately, were completed within a reasonable time, if the total duration of the proceedings (including enforcement proceedings) is not in accordance with Art. 6 § 1 of the Convention as regards a reasonable time frame. In cases in which it assesses whether the duration of enforcement is in accordance with the requirement for a reasonable length of proceedings from Art. 6 § 1 of the Convention, the ECHR applies criteria such as the complexity of the proceedings, the conduct of the applicant and the competent authorities, and the amount and nature of the compensation awarded.

Furthermore, the old Bankruptcy Act18 does not explicitly determine the duration of the bankruptcy proceedings, but stipulates that the bankruptcy trustee should liquidate the bankruptcy estate within a year and a half from the reporting hearing, otherwise he is threatened with his dismissal. However, if the debtor has a larger bankruptcy estate, the rule is that the bankruptcy trustee cannot liquidate the entire property within a year and a half for objective reasons, so the question of the justification of this provision arises. This is the reason why it was deleted in the Final Proposal of the Bankruptcy Law from February 2022 and later in Amended BA in 2022.19 On the other hand, the fact that pre negotiated bankruptcy is an out-of-court procedure, *in extremis,* in which time is one of the most important elements resulted in fact that pre-bankruptcy proceedings initiated by 1 November 2017 must be completed within 120 days from the date of submission of the proposal. Exceptionally, the court may, at the debtor's request, allow an extension of the deadline for a further 90 days if it considers that it would be expedient to conclude a pre-bankruptcy agreement. The proposal for extension of the deadline must be submitted before the expiration of the deadline for which the extension is requested. In practice, it turned out that the deadline of 210 days is short for the successful completion of pre-bankruptcy proceedings, so pre-bankruptcy proceedings lasted longer than 210 days, which is against the law. On the other hand, if some time and effort was invested to conclude a pre-bankruptcy agreement, the courts knowingly acted contrary to the law and continued the proceedings if it was likely that a pre-bankruptcy agreement was concluded. Amendments of the BA in 2017 extended the deadline within which the pre-bankruptcy proceedings must be completed by prescribing it to 300 days, and this was calculated from the date of opening the pre-bankruptcy proceedings, and not from the date of submission of the proposal as previously prescribed. Exceptionally, the court may, at the

17 ECHR, Hornsby v. Greece, judgment of 19 March 1997, application no. 18357/91.
18 Official Gazette, no. 71/15. and 104/17., hereinafter: BA.
19 Official Gazette, no. 36/22.

debtor's request, allow an extension of the deadline for a further 60 days if it deems it expedient to conclude a pre-bankruptcy agreement. By extending the deadline, the legislator wanted to encourage debtors and creditors to initiate pre-bankruptcy proceedings. This is changed in the Final Proposal of the BA from March 2022 and later in Amended BA in such a way that instead of 300 days the pre-bankruptcy proceedings must be completed within 120 days, and exceptionally the court may, at the proposal of the debtor, creditor or trustee, allow extension for a further 180 days if it considers that progress has been made in the negotiations on the restructuring plan and that there is a likelihood of a successful conclusion of the pre-bankruptcy proceedings.

It is certainly interesting to mention the solutions of the Consumer Bankruptcy Act,20 which at first defined that proceedings, for example, for the most vulnerable will last up to 7 years, so the question is whether this period, both out-of-court and court proceedings, can actually be respected or will last even longer. It is clear from the practice of the ECHR that the length of these proceedings is likely to lead to a violation of the right to a fair trial within a reasonable time under Art. 6. of the European Convention. Such a violation of convention law must be corrected by the legislator by amending the provisions of the CBA which define the length of the debt repayment plan period, and which is ultimately done by the Final Proposal of the CBA from March 2022 and later CBA, and which resulted in reducing the period of consumer good behaviour period from 5 to 3 years.21

Provisions on the principle of urgency in court proceedings are also contained in the Law on Gender Equality 22 and the Anti-Discrimination Act.23

Ultimately, a large number of proceedings that was not completed within a "reasonable time", resulted in the use of the institute of request to protect the right to a trial within a reasonable time.

4. Instead of a conclusion or target state

Although it may seem that the emphasis on the need for effective trial is more recent, the problem of excessive length of court proceedings was recognized much earlier, so we find various efforts to shorten the proceedings in the distant past. The importance of efficient court proceedings, as one of the most important qualities of legal protection, has already been recognized by Roman jurists, accepting the principle of *Ne lites fiant immortales.* The effort to speed up the process stretched from the ancient period, through the Middle Ages to the present day. Criticism of slow court proceedings throughout

20 Official Gazette, no. 100/15, 67/18 and 36/22, hereinafter: CBA.

21 It is about harmonizing the verification period of insolvent entrepreneurs exercising the right to debt relief in accordance with the proposed amendments to the Bankruptcy Law, which are simultaneously sent to the legislative procedure, as well as with the solutions from Directive (EU) 2019/1023 2017/1132 on restructuring and insolvency) on frameworks for preventive restructuring, debt relief and bans, and on measures to increase the efficiency of procedures related to restructuring, insolvency and debt relief).

22 Official Gazette, no. 82/08, 138/12, 69/17, Article 30, Para. 5.

23 Official Gazette, no. 85/08, 112/12, Article 16, Para. 2. and 3.

history could be found even in the literary works of Shakespeare or Dickens.

Comparatively legally, the time dimension of court proceedings is, for several reasons, a difficult topic for legal professionals as well. Differences in procedural systems and practices and the lack of reliable empirical information make it very difficult to make an objective assessment of what is fast or slow in legal terms, especially given the complex structures in modern civil justice systems. The first question is when can we talk about "excessive" or "unjustified" delays at all. The famous *McLibel* case, which in just a few years of litigation became the longest trial in English legal history, was exceptional, while in the Italian judicial system, the unreasonable time length of civil proceedings is quite common (Matić, 2019).

Coming down to the practical level of Croatian civil justice and analysing the current treatment of the right to a trial within a reasonable time and the current (unprotected) position of potential parties to litigation and non-litigation, the question can rightly be asked how to eliminate the so called slow justice problem in civil litigation proceedings.

In the context of this inherently complex issue, as noted above, the legislator has taken a number of measures over time to shorten the length of proceedings. It can be concluded that the previous requests of the legislator addressed to the courts have not, as in some previous period, completely gone unanswered, but the question of the strength and concrete effect of the reactions has been raised. Apart from the fact that individual cases have been completed, in the context of solving the systemic problem within a reasonable time, it could be said that the systemic solution has not even begun or that, optimistically analysed, it is in the phase of finding a conceptual solution. All the measures taken did not produce a concrete solution that would, at the same time, be reactive in relation to actions that exceeded the reasonable time limit and preventive in relation to other potential cases. In other words, it is indisputable that no measure has been introduced in the judicial system that would directly affect the reduction of lawsuits aimed at the length of court proceedings. This conclusion is based on three arguments: the insight that the government has not found an adequate way to solve the problem of lengthy court proceedings, limited constitutional possibilities of courts to determine concrete measures of acceleration in each specific case and constant increase of lawsuits exclusively related to lengthy litigation. A detailed analysis of the reasoning of a number of decisions, as well as the practice of CCRC that followed, and in an effort to concretize its principles in practice and in the interest of conscience to protect the rights of parties - potential prosecutors, doctrine and judiciary has raised a number of questions. Therefore, although at first glance it might seem that the positions of the legislator who would precisely determine the duration of certain stages of the procedure represent a Solomonic decision, it seems that the first attempt to concretize it in practice will encounter dilemmas. Namely, any predetermined duration of the proceedings may come into conflict with the principle of independence of the judge. For some proceedings (interference with property, labour disputes, legal support, enforcement proceedings, bankruptcy, etc.), the duration is satisfied by the rule that these proceedings

are “urgent”. However, too many “urgent” procedures lead to the sense of urgency being lost because setting deadlines that cannot be objectively met weak authority of the legislator, but also the authority of the court. However, deadlines can be prescribed in proceedings in which, based on a previously carefully analysed situation, it is realistically possible to respect them (not possible, for example, in bankruptcy proceedings) and in that case insist on their observance even with the threat of material and disciplinary responsibility for the judge. A recent example, Art. 31 of the BA stipulates that the court “is obliged to decide on the proposal to initiate pre-bankruptcy proceedings within eight days from the date of submission of the complete proposal.” The deadline formulated in this way sets the parties the task of ensuring that the court decides on the submitted proposal within that period, because if the courts in practice decide on proposals outside the 8-day deadline, they will only be able to state the existence of bankruptcy reasons. Nevertheless, the High Commercial Court justifiably assessed the deadline as instructive.24

In conclusion, it seems that a compromise is necessary, that no exact reasonable deadline is set, but that the meaning of the stated legal standards must be quite clear to the judiciary. Finally, to quote William of Ockham from the XIV. century “If you have two theories that predict the same, choose the simpler.” Ultimately, this understanding of the importance of institutional development will determine the business environment, the conditions for economic growth, the directions of development of post-transition countries and their future position. This is also confirmed by research conducted by *Vijayaraghavan* and *Ward* (2001) which indicats that initiative will not be possible in the absence of appropriate institutions. One of the ways in which institutional capacity affects economic performance is through the allocation of resources and related actions of the public sector and ultimately the courts (Vijayaraghavan and Ward, 2001). It is evident that the Government of the Republic of Croatia is striving to address institutional weaknesses in the judicial system, especially the in courts, in order to achieve higher standards of services to citizens and the economy. It can be expected that this would improve the relative position of the Republic of Croatia on the scale of success of judicial systems in Europe. The current vision of the Croatian judiciary for 2030 seeks to strengthen predictability and improve the quality of court proceedings and decisions in (commercial) disputes, and thus create a supportive environment for economic activities and an attractive environment for business and investments.25

24 Decision of the High Commercial Court of the Republic of Croatia, No. Pž-433/16 of 8 March 2016.

25 World Bank, (2019), *Analytical Basis for the National Development Strategy of the Republic of Croatia until 2030,* Judicial Sector.

References

1. Barbić, J., Buljan, V., Porobija, B. (1996), Organi dioničkog društva, Organizator, Zagreb.
2. Barbić, J. (2010), Pravo društava, Knjiga druga, Društva kapitala, Organizator, Zagreb.
3. Bodul, D., et al. (2021) "Pravo na pošteno suđenje i e-pravosuđe: sistemska greška ili korak naprijed u zaštiti prava?" HARMONIUS - Journal of Legal and Social Studies in South East Europe, Beograd, pp. 15-36.
4. Bodul, D. (2021), "Treba li onemogućiti pripajanje trgovačkog društva kod kojeg postoji stečajni ili predstečajni razlog?", Informator, No. 6697, pp. 7-8
5. Bodul, D., et al. (2021) „Uz Zakon o parničnom postupku: treba li objektivizirati postupak imenovanja/odabira vještaka od strane sudova?" Zbornik radova VII. međunarodnog savjetovanja „Aktualnosti građanskog procesnog prava – nacionalna i usporedna pravnoteorijska i praktična dostignuća", Split, pp. 129-143.
6. Bodul, D. (2022), "Nova Okvirna mjerila za rad sudaca Objektivno provjerljivi parametri ili ne?" *Informator*, No. 6717, pp. 1-3.
7. Bratković, M. (2018), "Što je važno pravno pitanje u reviziji?" Zbornik Pravnog fakulteta u Zagrebu, Vol. 68, No. 5-6, p. 856 sqq.;
8. Bratković, M. (2018), Revizija po dopuštenju, Pravni fakultet Sveučilišta u Zagrebu, Zagreb, p. 85 sqq.
9. Bratković, M. (2017), De expensis non curat praetor supremus? in: Šago, D. et al. (ed.) Aktualnosti građanskog procesnog prava, Split, p. 439 sqq.
10. Bratković, M., Revizija po dopuštenju: hrvatske dvojbe i slovenska iskustva, in: Rijavec, V. et al. (ed.), Aktualnosti građanskog procesnog prava, Split, 2016., p. 326
11. Calvez, F. (2006), Length of court proceedings in the member states of the Council of Europe based on the case law of the European Court of Human Rights, CEPEJ
12. Companies Act, Official Gazette, no. 111/93-40/19
13. CH van Rhee, (2004), The Law's delay: An Introduction, in CH van Rhee (ed.), The Law's delay. Essays on undue delay in civil litigation, Intersentia; CEPEJ, (2004), A new objective for judicial systems: the processing of each case within an optimum and foreseeable timeframe, Framework Programme, CM, p. 119.
14. Eraković, A. (2008), Komentar Zakona o trgovačkim društvima, Organizator, Zagreb.
15. European Commission for Democracy through Law (Venice Commission),

(2006), Report on the effectiveness of national remedies in respect of excessive length of proceedings, CDL-AD, 036rev

16. Fabri, M., (2009), The Italian maze towards trials within reasonable time, The right to trial within a reasonable time and short-term reform of the European Court of Human Rights, Council of Europe, p. 17.; Council of Europe, (2002), Length of proceedings in Italy – a persistent structural problem, CM/ Inf(2002)47 Addendum.
17. Galič, A., (2014) Reshaping the Role of Supreme Courts in the Countries of the former Yugoslavia, in: Uzelac, A., van Rhee, C. H. (eds.), Nobody's Perfect. Comparative Essays on Appeals and other Means of Recourse against Judicial Decisions in Civil Matters, Intersentia., p. 298 sqq.
18. Gorenc, V. (1996), Trgovačko pravo - društva, Školska knjiga, Zagreb.
19. Ivanjko, Š., Kocbek, M. (1996), Pravo družb - statusno gospodarsko pravo, Uradni list Republike Slovenije, Ljubljana.
20. Jurić, D., (2006) „Transparentnost statusnih i financijskih odnosa povezanih društava", Zbornik Pravnog fakulteta Sveučilišta u Rijeci, Vol. 27, No. 2.
21. Ledić, D. (2002), Pravo društava i trgovačko pravo - ogledi, Pravni fakultet, Rijeka
22. Maganić, A. (2013), Videokonferencija u njemačkom građanskom procesnom pravu, in: Djelotvorna pravična zaštita u pravičnom postupku – izazovi pravosudnih transformacija na jugu Europe, Liber amicorum Mihajlo Dika (eds. Uzelac, A.; Garašić, J.; Maganić, A.), Pravni fakultet Sveučilišta u Zagrebu, Zagreb, pp. 893-924.
23. Maganić, A. (2011), Elektroničko vođenje parničnog postupka u Republici Hrvatskoj, in: Novosti u parničnom postupku, Zakon o izmjenama i dopunama Zakona o parničnom postupku (Nar. nov., br. 57/11.), (ed. Crnić, I.), Organizator, Zagreb
24. Maganić, A. (2013), Dostava prema Zakonu o izmjenama i dopunama Zakona o parničnom postupku iz 2013. in: Novela Zakona o parničnom postupku i Novi zakon o sudovima, (eds. Hercigonja, J. and Kuzmić, M.), Inženjerski biro, Zagreb, p. 106.
25. Maurović, Lj. (2000), „Zaštita manjinskih dioničara u postupku preuzimanja dioničkih društava prema hrvatskom pravu i pravu EU," Zbornik Pravnog fakulteta Sveučilišta u Rijeci, Vol. 21, No. 2.
26. Matić, A. (2019), Duljina sudskog postupka i strukturna analiza pravosudnih sustava, Pravo na suđenje u razumnom roku, Ustavni sud BiH, Sarajevo, p. 77. et seq.
27. OECD, Judicial performance and its determinants: a cross-country perspective, Main Paper, Economic Policy Paper, no. 5.; OECD, What makes civil justice effective, Giustizia civile: come promuoverne I efficienza? Short Paper, Economic Department Policy Note, no. 18.

28. Official Gazette, no. 4/77-70/19

29. Official Gazette, no. 56/90-5/14.

30. Omejec, J. (2013), Konvencija za zaštitu ljudskih prava i temeljnih sloboda u praksi Europskog suda za ljudska prava, Strasbourški acquis, Novi informator, Zagreb

31. Organisation for Economic Co-operation and Development, (2013), Judicial performance and its determinants: A cross-country perspective, OECD Economic Policy Papers, No. 5, p. 7.

32. Parać, Z. (2003), „Dileme oko preuzimanja javnih dioničkih društava“, Pravo u gospodarstvu, Vol. 2, No. 4

33. Parać, Z. (2004), Podjela društava kapitala, in: Barbić, J. et al., Novine u Zakonu o trgovačkim društvima i novi uvjeti poslovanja, Inženjerski biro, Zagreb

34. Petrović, S.; Ceronja, P. (2010), Osnove prava društava, Pravni fakultet, Zagreb

35. Petrović, S. (1999), „Preuzimanje dioničkih društava,“ Pravo u gospodarstvu, Vol. 38; Porobija, B. (1998), „Zakon o postupku preuzimanja dioničkih društava – Neke temeljne nedoumice,“ Pravo u gospodarstvu, Vol. 37

36. Slakoper, Z. (2009), Društvo s ograničenom odgovornošću, Organizator, Zagreb.;

37. Triva, S., Dika, M. (2004), Građansko parnično procesno pravo, Narodne novine, Zagreb.

38. Uzelac, A. (2004), Accelerating Civil Proceedings in Croatia - A History of Attempts to Improve the Efficiency of Civil Litigation, CH van Rhee (ed.), The Law’s delay - Essays on undue delay in civil litigation, Intersentia, pp. 283-331.

39. Uzelac, A. (2008), Accelerating Civil Proceedings in Croatia …cit., pp. 283-331, 4.; Uzelac, A. (2008), Reforming Mediterranean Civil Procedure: Is There a Need for Shock Therapy?, CH van R. and A. Uzelac (eds.), Intersentia, pp. 71-99, 74.;

40. Uzelac, A. (2011), Pravo na pošteno suđenje: Opći i građanskopravni aspekti članka 6 Europske konvencije o zaštiti ljudskih prava i temeljnih sloboda, Centar za mirovne studije (CMS), Zagreb, p. 90.; Grbić, S. (2014), Pravo na pošteno suđenje, Pravni fakultet Sveučilišta u Rijeci, Rijeka.

41. Varano, V. (1997), “Civil Procedure Reform in Italy”, The American Journal Of Comparative Law, Vol. 45., p. 657, 659.

42. Vijayaraghavan, M., Ward, W., A. (2001), Institutions and Economic Growth: Empirical Evidence from a Cross-National Analysis, Working Paper Number 001302, Clemson S.C.: Center for Intrnational Trade, Clemson University.

43. Woolf, H. (1997) “Civil Justice in the United Kingdom,” The American Journal of Comparative Law, Vol. 45, pp. 709, 715-716.

44. Yaxin, W., Yulin, F. (2013), China: Mainland. Efficiency at the Expense of Quality?, in: C.H. van Rhee i Fu Yulin (ed.), Civil litigation in China and Europe, Springer, pp. 11-37, 11.

45. Zlatović, D. (2011), et al., Društvo s ograničenom odgovornošću - pravni praktikum, Vizura, Zagreb.

46. Zubović, A. (2003), „Preuzimanje dioničkih društava u Europskoj uniji i usporednom pravu,“ Pravo i porezi, No. 6, pp. 20-24.

47. Zubović, A. (2003), „Preuzimanje dioničkih društava u hrvatskom pravu,“ Pravo i porezi, No. 5, pp. 6-14.

CHAPTER 6

Multivariate analysis in the function of clustering in Croatian cities according to the indicators of the smart environment dimension

***Ana Babić*[1]**

ABSTRACT

This article presents the application of the method of principal component and cluster analysis in the classification of 127 Croatian cities according to indicators of the smart environment (ISO 37120) as a dimension of a smart city, which includes energy, water and municipal waste, i.e. nine indicators of smart pollution. Based on selected indicators of a smart environment, through the Principal component analysis (PCA), factors are identified that represent the most important determinants that have a significant impact on the sustainability of the environment in Croatian cities. Based on the presentation of individual factors, cities are divided into groups (clusters) using cluster analysis. The resulting clusters are homogeneous, consisting of cities with similar characteristics. The aim of the paper is to present the classification method of Croatian cities for the smart environment indicators and to interpret the characteristics of individual clusters according to their impact on the environment. Three groups were formed: the biggest polluters - 29 cities, the smallest polluters - 71 cities, and tourist polluters of 27 cities. The data for the creation of smart environment indicators for all Croatian cities were collected through a system with integrated information and communication technology, the Internet of Things (IOT), Cloud and Big Data.

***Key words**: sustainability city, smart environment, PCA, cluster analysis, ISO 37120*

***JEL classification**: Q01, Q51, Q53, R11*

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1. Introduction

Today, about 56% of the world's population lives in cities, and it is expected that by 2050, 68% of the population will live in cities. 80% of global GDP is generated in cities, which is promising in terms of increasing productivity, innovation and new ideas of urbanization to achieve sustainable growth (World Bank, 2020). On the other hand, cities are the main drivers of environmental change, i.e., they are responsible for about 75% of global greenhouse gas emissions (UNEP, 2022), consume more than 75% of the planet's material resources, and generate significant amounts of waste, most of which is poorly managed and poses a threat to human health and ecosystems (Venditti, 2022).

75% of the population lives in European cities (Buchholz, 2020), and regardless of the diversity of cities, the European Environment Agency (EEA) identifies some common key factors for improving their sustainability, such as improving air quality, improving nature and biodiversity, reducing noise pollution, improving municipal waste management and improving circular economy, improving water quality and water use efficiency (EEA, 2020).

In order for municipal authorities to carry out measurements and monitoring, i.e., to set targets, assess impacts, and finally make management and decisions on the above-mentioned environmental factors, they need to be guided by a certain framework of indicators. According to Huovila et al. (2019), choosing the most appropriate indicator framework is crucial because as there is a difference between indicators that focus on smartness and standards that are more focused on assessing sustainability.

For this work, the ISO 37120 standards that focus on sustainability are used, i.e., 89% of the ISO 37120 indicators relate to sustainability, while 11% relate to smartness (Huovila et al., 2019) and are applicable to all cities regardless of their size and geography (ISO 37120, 2018).

In order to assess the most important factors affecting the environment in Croatian cities using smart environmental indicators (ISO 37120, 2018), data were collected for the creation of nine smart environmental indicators related to the following: Total electricity consumption per capita, energy consumption of public street lighting, the share of smart electricity meters in the total number of electricity meters, the emission of greenhouse gasses in tons per capita, the concentration of solid particles (particulate matter PM10), the total amount of municipal waste in kg per capita, the share of urban budget expenditure on environmental protection, the share of urban population with drinking water supply, and an active geographic information system (GIS) in each city.

Taking into account the diversity of Croatian cities, especially in terms of their geographical location (coastal and continental), the aim of this analysis is to identify the indicators with the greatest influence on environmental sustainability and group the cities, taking into account the influence of each indicator in 127 cities of the Republic of Croatia.

In the empirical part of the work, after performing the descriptive statistics of the indicators, the normalization of the data was started, followed by the principal component analysis in order to identify the factors or indicators that have the greatest influence on environmental sustainability of all cities in the Republic of Croatia.

After the factor analysis, cluster analysis was performed to divide the cities into homogeneous groups based on common characteristics. Therefore, the basic hypothesis of the paper is that with the help of principal component analysis and cluster analysis it is possible to analytically filter out the cities that will be the subject of regional policy instruments and measures in the field of environmental sustainability. Based on the proposed hypothesis, the following research questions will be answered:

RQ1: What are the most important factors affecting environmental pollution among the nine smart environmental indicators?

RQ2: What are the main characteristics of the clusters extracted based on PCA?

2. Literature review

The smart city dimension, i.e., the smart environment, is related to the protection of the environment and natural heritage, but most smart city dimensions are related to sustainability, providing advanced tools and technologies to monitor, detect, measure, and record all changes that occur in the city's environment, and providing these tools and technologies to ensure sustainability (waste management, wastewater treatment, renewable energy sources, intelligent transportation systems, and the like). This dimension is supported by numerous initiatives and action plans of the European Union, but also of the whole world, which have a common goal, namely the preservation of the planet Earth.

The Smart Environment dimension primarily involves the protection of the environment, i.e., incentives to reduce pollution and the rational use of natural resources, i.e., it relates to the sustainability of the environment, and this primarily relates to the environmental impact of urban growth and development.

It can be traced back to the nineteenth century, when Carl von Clausewitz postulated that we should not cut down more trees than are replaced (von Clausewitz, 2009). This attitude is a fundamental principle of environmental sustainability: using up the earth's resources faster than they are renewed.

Sustainability is increasingly seen in an environmental context, although the environmental domain is not the only pillar of sustainability. The other two pillars - society and economy - are equally important, i.e., the three pillars mentioned above form the basis of sustainability and come into play in all areas of the economy (Ansari and Kant, 2017). It should be noted that sustainability recommends that future needs can be met depending on how balanced they are in terms of social (equity, participation, empowerment,

social mobility, and cultural preservation), economic (services, household needs, industrial growth, agricultural growth, and efficient use of labor), and environmental (biodiversity, natural resources, carrying capacity, ecosystem integrity, clean air and water). Very often, the above needs are incompatible, i.e., industrial growth may conflict with natural resource protection (Hopwood et al., 2005).

Every city needs to consider CO2 emissions, focusing on energy efficiency, renewable energy, and the like (Vinod Kumar and Dahiya, 2017).

The unsustainable use of the earth's resources to satisfy immediate human needs has led to, among other things, an increase in the amount of CO2 in the atmosphere. The increase in atmospheric CO2 in turn leads to a warming of our planet, which increases the risk of floods, droughts, and natural disasters, among others (IPCC, 2018).

A smart city protects its nature, values its natural heritage, unique natural resources, biodiversity and environment, and preserves the ecological system in the urban area, has an integrated system to manage its water resources, water supply systems, wastewater, natural drainage and flood control systems. In the area of waste, it is important that each city has an integrated and efficient management system for the collection, transfer, transportation, treatment, recycling, reuse and disposal of municipal waste, hospital waste, industrial waste and hazardous waste, as well as an efficient pollution control and clean air system, risk reduction system, disaster relief, management and environmental restoration.

According to Bibri and Krogstie (2017), urban sustainability is "a desirable state in which urban society seeks a balance between environmental protection and integration, economic development and regeneration, and social equity and justice within cities as long-term goals through a strategic process of sustainable urban development." This definition is supported in the literature in that sustainable development depends on three components: Economic, Environmental, and Social (Jenks and Jones, 2008; UNECE, 2015).

According to Bawa et al. (2016), a smart environment includes green transportation, i.e., using an environmentally friendly public transportation system, electric or hybrid vehicles, building bike lanes, and promoting cycling by minimizing the use of private vehicles.

In a world where resources are scarce and where cities increasingly base their development and prosperity on tourism and natural resources, cities must ensure the safe and renewable use of their natural heritage. The idea of compactness for future urban growth is a conceptual strength of the smart city strategy, as it supports more sustainable use of natural resources. A smart city should have a large-scale digital environmental monitoring system, such as indoor and outdoor air quality monitoring, noise and pollution measurement, and telemetry. Overall, we divide the elements of smart city environment into environmental sustainability and monitoring systems (Yovanof and Hazapis, 2009).

In the scientific literature, mainly only ecological sustainability and environmental monitoring systems are emphasized. On the contrary, systems with integrated ICT allow to evaluate the natural environment of the city. Such systems measure pollution, such as air quality indices, and quantify the level of pollution.

Smart environment refers to the effective use of ICT for the care of natural resources and planetary culture at the city level (Staffans and Horelli, 2014; Nasrawi et.al. 2015).

The environmental dimension refers to several variables that characterize the quality of the environment and the impact of urban activities. They represent the main environmental challenges that cities face.

2.1. Description of indicators and descriptive statistics

The Smart Environment dimension includes energy, environment, solid waste, and water and provides information on the indicators listed in Table 1.

The total electricity consumption per capita, the energy consumption of public street lighting, the share of smart electricity meters in the total number of electricity meters, the emission of greenhouse gasses in tons per capita, the concentration of solid particles (particulate matter PM10), the total amount of municipal waste in kg per capita, the share of the city budget spending on environmental protection, the share of urban population with drinking water supply, and an active geographic information system (GIS) in each city.

Table 1: Descriptive statistics of the indicators for a smart environment

INDICATORS		**SMART ENVIRONMENT**					
		Valid N	Mean	Median	Min.	Max.	Std. Dev.
x1	Total electricity consumption per capita	127	1 099	862.7	136,1	3676	741
x2	Electricity consumption of public street lighting (million)	127	1.14	0.56	0.042	9.52	1.56
x3	The share of smart electricity meters in the total number of electricity meters	127	16%	12%	2%	74%	13%
x4	Emission of greenhouse gasses measured in tons per capita	127	2	0.10	0.00	45	6
x5	Concentration of solid particles (PM10)	127	5326	0.00	0.00	125 351	16,692
x6	Total amount of municipal waste per capita (kg)	127	373	267	49	1916	285
x7	The share of the city budget spending on environmental protection	127	5%	3%	0%	35%	6%
x8	Proportion of the population connected to the water supply system	127	87%	93%	16%	100%	0%

Geographic Information System (GIS)							
				Frequency	Percent	Valid Percent	Cumulative Percent
x9	GIS	Valid	There is none	98	77%	77%	77%
			Have	29	23%	23%	100%
			Total	127	100%	100%	
		Total		127	100%		

Source: Author

The average electricity consumption per inhabitant is 1,099 kWh, while the average electricity consumption of public street lighting is 1,140,120 kWh. The data on total electricity consumption per inhabitant and electricity consumption of public street lighting were obtained through an official request to Hrvatska elektroprivreda (2020), a national energy company.

In Croatia, environmental pollution is recorded for each local self-government unit in the Register of Environmental Pollution (ROO). It is an information system established, managed and maintained by MINGOR (2021) as a comprehensive IT and network-based solution. It consists of a database with an associated application for entering, reviewing, analyzing, and sharing data, and browsers that allow the public to access the data directly.

ROO is a collection of data on the sources, type, quantity, method, and location of discharge and/or transfer of pollutants to air, water, and/or ocean and land, as well as the wastes generated, collected, and processed. The database contains data on 4,800 operators and 10,600 organizational units from 2008 to calendar year 2019. According to ROO, greenhouse gas emissions, measured in tons per capita, are highest in Našice and Kutina. On average, greenhouse gas emissions in all cities amount to two tons per capita. It should also be mentioned that in 51 cities the value of greenhouse gas emissions is negligible and therefore in these cities the emission is zero kilograms per inhabitant. 40 cities with zero kilogram emissions are located in the Adriatic districts, while the remaining 11 are located in the continental districts.

The concentration of solid particles (PM10) is 5284 kg per inhabitant on average. 71 cities have negligible PM10 concentration, i.e. a value of 0. The city of Kutina has the highest PM10 value. Municipal waste data in kilograms per inhabitant are from the Municipal Waste Report for 2019 (2005 to 2019) published by MINGOR (2020), which records and monitors 317 sites of official landfills, of which 306 sites disposed of municipal waste in the indicated period. The average amount of municipal waste per inhabitant is 373 kg. The average allocation for environmental protection is 5% of the total expenditure of city budgets. The indicator was created through a detailed analysis of urban budgets, calculating the share of funds allocated by cities for environmental protection in the total expenditure of urban budgets) The data for the analysis was taken from the Ministry of Finance website (2020). 87% of the population is connected to the water supply system, and the data were collected through an official request to Hrvatske vode, the legal entity for water management (2020). Only 29 cities, or 23%, have an active GIS (Babić, 2021).

3. Methodology

The objective of the analysis is to classify the cities into homogeneous groups (clusters) in terms of the highest representation of the variables in the calculated factors using the principal component method.

Factor analysis is a multivariate method of data reduction developed by Spearman (1904). The basic idea is to represent a set of variables by a smaller number of factors.

The most commonly used methods of factor analysis are: principal component analysis and common factor method. According to Morrison (1987), when using the results of factor analysis, PCA is recommended, in which the factor scores are calculated and used as input variables for cluster analysis.

For this purpose, nine indicators were selected as input variables for PCA, and the data for their construction are for 2019 and 2020.

Factor analysis can be performed both exploratory and confirmatory. The aim of exploratory analysis is to identify the underlying factors among the observed variables, while confirmatory analysis is an objective test of a particular structural model or theory. The mathematical criterion that must be met in this analysis is that when latent variables are extracted, the number of factors extracted should be as small as possible and that these factors explain as large a percentage of the variance of the manifest variables as possible (maximum variance). It is important that the factors are independent of each other, in the sense that each factor explains something different (Šram, 2014).

According to these two basic objectives, we solve the problem of a large number of interrelated manifest variables through the factor analysis procedure by reducing this large number of manifest variables to a much smaller number of latent variables that explain a large part of the variance of the observed variables.

Before conducting the multivariate analyzes, the values of the selected indicators were standardized using the z-score method.

$$z = \frac{x - \mu}{\sigma}$$

The justification of the use of the selected variables is tested against the correlation matrix of the original variables. If there are high correlations between the manifest variables, factor analysis is justified. Since the results of this analysis are used as input variables in the cluster analysis, factor scores were also calculated.

After standardizing eight indicators, the covariance matrix was calculated using the following formula:

$$cov(\mathrm{X}, \mathrm{Y}) = \frac{\sum_{i=1}^{n} (X_i - \bar{\mathrm{X}})(\mathrm{Y}_I - \bar{\mathrm{Y}})}{(n-1)}$$

Eigenvalues and eigenvectors for the covariance matrix were also calculated.

$$AX = \lambda X$$

The variables used in the factor analysis should be linearly related. Testing the appropriateness of the use of factor analysis for the object of research involves evaluating the correlation and significance of the manifest input variables.

Table 2: Correlation matrix of input variables

	x1	*x2*	*x3*	*x4*	*x5*	*x6*	*x7*	*x8*	*x9*
x1	- 0.05	- 0.11	1.00	*0.20*	- 0.12	- 0.11	*0.69*	- 0.11	*0.47*
x2	*0.22*	0.06	*0.20*	1.00	0.00	0.17	0.03	- 0.12	*0.22*
x3	0.05	1.00	- 0.11	0.06	- 0.03	0.00	- 0.08	- 0.01	0.09
x4	0.07	- 0.03	- 0.12	0.00	1.00	*0.57*	- 0.16	0.01	- 0.09
x5	0.14	0.00	- 0.11	0.17	*0.57*	1.00	- 0.12	- 0.00	- 0.10
x6	- 0.07	- 0.08	*0.69*	0.03	- 0.16	- 0.12	1.00	- 0.00	0.37
x7	*- 0.18*	- 0.01	- 0.11	- 0.12	0.01	- 0.00	- 0.00	1.00	- 0.10
x8	- 0.05	0.09	*0.47*	*0.22*	- 0.09	- 0.10	*0.37*	- 0.10	1.00
x9	1.00	0.05	- 0.05	*0.22*	0.07	0.14	- 0.07	*- 0.18*	- 0.05

Source: Author

Table 2 shows the correlation coefficients that are significant at the 5 percent significance level and the variables that have at least one correlation coefficient with an absolute value greater than 0.3, which is the minimum value suggested by Kinnear and Gray (1994) as a criterion for including variables in the analysis.

The most commonly used and well-known method of component analysis is PCA. Component analysis is used when the goal is to summarize most of the original information (variance) with a minimum number of factors for the purpose of prediction, and when the results of factor analysis are used as input variables for subsequent analyzes. The original variables observed in factor analysis are called manifest variables. Factor analysis and factor models are applicable to those variables that are interdependent, i.e., correlated. Therefore, 8 variables are included in the model because the indicator x3 (share of smart electricity meters in the total number of electricity meters) is not significant and no single correlation coefficient with the absolute value is greater than 0.3.

Akande et al. (2019) used PCA to examine the potential for cities to be smart but unsustainable and vice versa. 129 European Union (EU) cities were included in the analysis, and six variables related to ICT and carbon dioxide (CO2) emissions were used. A cluster analysis was then used to divide the cities into four groups, with most Nordic cities belonging to the smart and sustainable group.

The same method was used by Cantuarias-Villessuzanne et al. (2021)

when they analyzed the smart strategies of 40 European cities by forming clusters of smart cities based on the activities carried out by the cities, with a prior empirical assessment of smart dimensions for 40 European cities and categorization by principal component analysis. Three relevant clusters were formed: Cities that are in the process of developing smart strategies, technology-oriented cities, and cities concerned with improving the quality of life.

In Croatia, a classification of spatial-economic units based on the socio-economic characteristics of cities and municipalities of three Croatian counties was performed in order to provide support and basis for regional development policy. The method of factor and cluster analysis was used to filter out those units of local self-government that will be the subject of regional policy instruments and measures (Rašić Bakarić, 2005).

All analyzes for research purposes were conducted using the program Statistica TIBCO Software Inc.

4. Results of the PCA

With the principal component method, it is possible to determine factor items directly, as opposed to the common factor method, which estimates these items. Table 3 shows the factor loadings before the rotation of the factors.

Table 3: Matrix of factor loadings before factor rotation

Factor Loadings (Unrotated) (Spreadsheet17) Extraction : Principal components (Marked loadings are >,600000)		
Variables	Factor 1	Factor 2
Total electricity consumption per inhabitant	*0.84*	0.23
Electricity consumption of public street lighting	0.22	*0.60*
Emission of greenhouse gases measured in tones per capita - 2019.	- 0.43	*0.60*
Concentration of solid particles (PM10)	- 0.39	*0.70*
Total amount of municipal waste measured in kg per inhabitant	*0.79*	0.07
Proportion of expenditure on environmental protection	0.14	0.33
Proportion of city population with drinking water supply	*- 0.70*	- 0.24
GIS	0.11	- 0.48
Expl.Var	2.23	1.63
Prp. Totl	0.28	0.20

Source: Author

In the nonrotated factorial solution shown in Table 3, the factors are derived according to their importance, so that the first factor contains the variables that have a high loading. In this solution, the first factor explains 28% of the variance, while the second factor explains 20% of the variance. One of the advantages of using principal components instead of the original predictors

is that it is easier to interpret the effect of the principal components on the dependent variable. The main disadvantage of principal components calculated on the basis of the covariance matrix is precisely their sensitivity to units of measurement. For example, if one variable has a much larger variance than other variables, this variable will dominate in the first principal component. In this case, it does not make sense to perform principal component analysis.

To obtain a simpler solution, that is, a simpler structure that is easier to interpret, factor rotation is used because it redistributes the variance from the factors that are first in the order to the factors that are second without changing the total variance. Factor rotation is a method of transforming factor matrices. It involves rotating the coordinate axes around the origin until a different position is reached (Veenman, 2005).

That is, when the solutions of factor analysis are used in further analyzes (Rašić Bakarić, 2005). The theory recommends orthogonal rotation of the factors (varimax rotation), because the angle at which the factor axes close in orthogonal rotation is right (90°), which means that the factors are independent of each other.

Table 4: Matrix of factor loadings after factor rotation

Factor Loadings (Varimax raw) (Spreadsheet17) Extraction: Principal components (Marked loadings are >,600000)			
Variables		Factor 1	Factor 2
x1	Total electricity consumption per inhabitant	*-0.87*	0.07
x2	Electricity consumption of public street lighting	-0.40	-0.47
x3	Emission of greenhouse gases measured in tons per capita	0.21	*-0.70*
x4	Concentration of solid particles (PM10)	0.14	-0.80
x5	Total amount of municipal waste in kg per inhabitant	*-0.77*	0.19
x6	Share of expenditures for environmental protection	-0.24	-0.26
x7	Share of the urban population with drinking water supply service	*0.72*	0.00
x8	GIS	0.05	0.49
	Expl.Var	2.16	1.70
	Prp. Totl	0.27	0.21

Source: Author

Testing the significance of the obtained factors, which are indicators of environmental sustainability in the dimension of smart environment for 127 Croatian cities, is the first step of the analysis, and the lower limit of acceptance is 60% of the variance explained by the obtained factors in social research (Hair, Anderson and Tahtam, 1987).

Varimax rotation of the initial solution obtained by principal component analysis. The first factor has high factor loading with positive sign for variable x7 (proportion of urban population connected to water supply system), which

means that it is positively correlated with these characteristics of cities, and the first factor has high factor loading with negative sign for variables x*1* (total electricity consumption per inhabitant), x*5* (total amount of municipal waste in kg per inhabitant).

The second factor has a high factor loading with negative sign for the indicators x*3* (emission of greenhouse gasses measured in tons per inhabitant) and x*4* (PM10 concentration).

In this part of the work, we obtained an answer to the first research question about the main factors that have an impact on the environment in each of the factors.

5. Cluster analysis

Cluster analysis was developed by RC Tryon (1939) and is derived from classification modeling. It is a method for grouping a set of objects in such a way that the objects in the same group are more similar to each other than those in other groups. The grouping is strictly dependent on the data source and the expected shape of the results. Cluster analysis algorithms are divided into two basic categories: hierarchical and non-hierarchical procedures. Agglomerative methods create a similarity matrix of the classified objects and then group the most similar objects into clusters in the next steps.

The non-hierarchical method has been used to classify objects into clusters, the “k-means” method. The main argument for using this clustering method is that this method is more appropriate for grouping objects into clusters when grouping entities on which certain features (objects) have been measured, rather than grouping these features or variables (Johnson and Wichern, 1992). The decision on the number of clusters is based on analysis of variance (ANOVA).

Characteristic of this method is that the number of clusters is determined in advance and the significance of the obtained solution is tested. In a first step, a significance test was performed for the proposed two clusters. The significance test presented in Table 5 (ANOVA) tests the variability between groups with the variability within groups when testing the hypothesis that the means between groups differ from each other. At a theoretical significance level of 5%, the results of ANOVA for the two (2) proposed clusters are not significant. Namely, since the empirical p-value for both factors is higher than the theoretical one ($p=0.10 > 0.05$ and $p=0.12 > 0.05$), which means that the means are not significantly different between the groups, it is necessary that the observed cities are grouped in more than two clusters.

Table 5: ANOVA - two clusters

	Analysis of Variance (Spreadsheet35)					
Variables	Between	df	Within	df	F	meaning _
Factor 1	0.756435	1	1.235422	6	3.673730	0.103740
Factor 2	0.490592	1	0.927868	6	3.172380	0.125183

Source: Author

Therefore, we move to the next step and perform a significance test in ANOVA for the three clusters listed in Table 6.

With a given significance level of 5 percent and empirical significance levels of 0.03 for the first factor and 0.04 for the second factor, as shown in the table, we can confirm that the means are significantly different between the three proposed clusters.

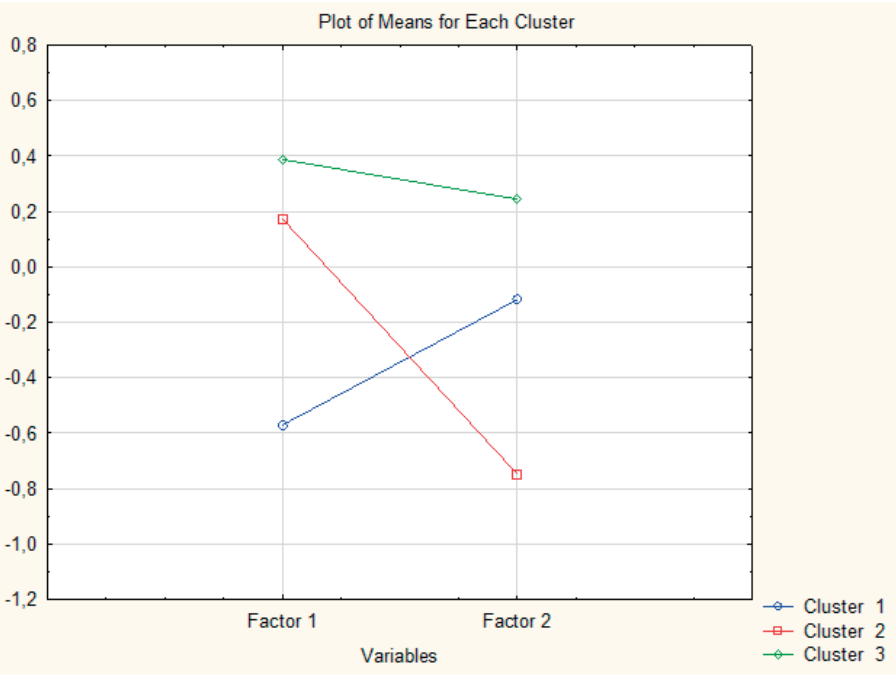
Table 6: ANOVA - three clusters

	Analysis of Variance (Spreadsheet35)					
Variables	Between	df	Within	df	F	meaning _
Factor 1	1.495757	2	0.496100	5	7.537579	0.030958
Factor 2	1.020958	2	0.397502	5	6.421098	0.041572

Source: Author

The results indicating the division of Croatian cities into three different clusters are significant. The goal that should be achieved is that the mean values of each cluster differ significantly in a certain dimension.

Figure 1: Graphic representation of three clusters



Source: Author

Figure 1 shows the differences between the clusters, i.e. the specifics of each cluster. The strongest impact on the sustainability of the cities of the first and second cluster, while the third cluster differs significantly in terms of

the characteristics that affect the sustainability of the environment of Croatian cities.

5.1. The results of the cluster analysis

Table 7 shows the total number of cities in each cluster, as well as the number of continental and coastal cities. It is interesting to note that a certain group of cities predominates in each cluster. To answer the second research question, the most important characteristics of each cluster are listed below.

Table 7: Number of continental and coastal cities in individual clusters

Cluster 1	29	20 continental cities	9 coastal cities
Cluster 2	71	66 continental cities	5 coastal cities
Cluster 3	27	1 continental cities	26 coastal cities

Source: Author

The first cluster includes the most populous Croatian cities and cities with developed industry, which are also the biggest polluters. In the second cluster are cities that pollute the environment the least. These are cities with negligible greenhouse gas emissions and PM10 concentrations. In the third group are small coastal cities that have high electricity consumption and a large amount of municipal waste due to the tourist season.

The first cluster is referred to as the largest polluters and consists of 29 cities (see Table 8), of which 9 are coastal cities and 20 are mainland cities. All the cities listed in Table 8 have conspicuously high scores on the smart environmental indicators, which means that they have the greatest impact on environmental sustainability.

Table 8: Cities of the Cluster 1

Cluster 1	Cities
29 cities	Kutina, Split, Solin, Rijeka, Bjelovar, Mali Lošinj, Lipik, Kaštela, Kraljevica, Crikvenica, Karlovac, Dubrovnik, Bakar, Kutjevo, Čazma, Velika Gorica, Sveta Nedjelja, Križevci, Zabok, Buzet, Sinj, Ivanec, Novska, Pazin , Čakovec, Imotski, Vrlika, Jastrebarsko, Požega.

Source: Author

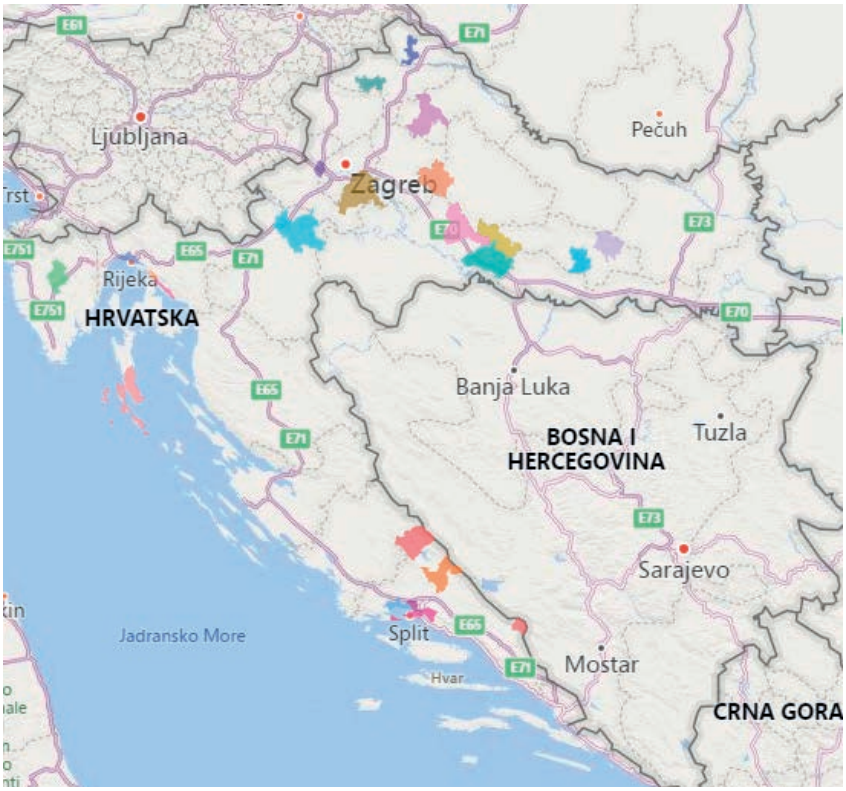
These are Croatian cities that represent industrial, transport and energy centers, i.e. cities with the highest electricity consumption per inhabitant (-0.87) and the highest production of municipal waste per inhabitant (-0.77), so we can say that they are the biggest polluters. In this cluster there are cities where a water supply network has been built and a large part of households are connected to the water supply system (0.72). In this cluster, slightly lower values were obtained for the consumption of electric energy for public street lighting (-0.40) and the emission of greenhouse gasses measured in tons per capita (0.21), while the share of household expenditure on environmental protection is also low (-0.24).

In the continental cities of this cluster, agriculture, fisheries, forestry, food processing and manufacturing industries predominate. According to the study on the socio-economic development of the Republic of Croatia in the period (Institute of Economics, Zagreb, 2018), continental Croatia is characterized by an above-average share of investments in manufacturing (19.4%), in information and communication activities (8.9%), in the financial sector (8.9%) and in primary activities (3.6%).

The nine coastal cities of the first cluster (Split, Solin, Rijeka, Mali Lošinj, Kaštela, Kraljevica, Crikvenica, Dubrovnik and Bakar) are characterized by accommodation, food preparation and services, construction, wholesale and retail trade, transport and storage.

In the Adriatic Croatia region, above-average investments were made in accommodation, food preparation and service (18.3%), water supply, sewage and waste management and environmental remediation (10.4%), transport and storage (10.2%), as well as real estate, construction, mining, quarrying and other economic activities (Institute of Economics, Zagreb, 2018). Figure 2 shows the cities of the first cluster, i.e. nine coastal cities and twenty cities on the mainland.

Figure 2: Geographical presentation of the cities of the Cluster 1



Source: Author

The second cluster is called the smallest polluters and consists of seventy-one (71) cities, of which only 5 are coastal cities. In this group of cities, the largest common factor is the second factor, namely the indicators of greenhouse gas emissions in tons per capita (-0.70) and the concentration of solid particles PM10 (-0.80) in Croatian cities. These are cities with a larger area per km2, as shown in Figure 2, and a smaller number of inhabitants, but also cities where a smaller number of entrepreneurial activities was recorded, i.e. cities where an insignificant amount of GHG emissions and PM10 particulate concentrations was recorded. Apart from the two mentioned indicators, a higher value was recorded for the electricity consumption of public street lighting (-0.47) and for the indicator of active GIS on the municipal website, while the values of the other indicators were insignificant.

Table 9: Cities of the Cluster 2

Cluster 2	Cities
71 cities	Našice, Klanjec, Vrbovec, Osijek, Lepoglava, Glina, Garešnica, Vinkovci, Varaždinske Toplice, Pregrada, Obrovac, Ozalj, Grubišno Polje, Pakrac, Pleternica, Šibenik, Varaždin, Slavonski Brod, Sisak, Novi Marof, Vrbovsko, Vodnjan - Dignano , Đurđevac, Zaprešić, Duga Resa, Metković, Vukovar, Delnice, Drniš, Ilok, Samobor, Omiš, Buje - Buie , Ogulin, Senj, Virovitica, Ploče, Gospić, Županja, Sveti Ivan Zelina, Koprivnica, Nova Gradiška, Oroslavje, Čabar, Belišće, Ivanić-Grad, Otočac, Beli Manastir, Ludbreg, Zlatar, Popovača , Donja Stubica, Benkovac, Prelog, Valpovo, Skradin, Dugo Selo, Slunj, Petrinja, Vrgorac, Hrvatska Kostajnica, Orahovica, Otok, Trilj, Mursko Središće, Krapina , Daruvar, Knin, Donji Miholjac, Slatina, Đakovo.

Source: Author

This cluster recorded a high percentage of cities with an integrated GIS information system (-0.49) for spatial data collection, management, and analysis. GIS analyzes spatial location and organizes information layers into visualizations with maps and 3D views. With this unique capability, GIS enables deeper insights into data, such as patterns, relationships, and situations, and helps users make smarter decisions (Pametni gradovi.eu, 2020).

The Republic of Croatia is at the very bottom of the EU28 in terms of greenhouse gas emissions, ranking 20th. The biggest European polluters are Germany, followed by the United Kingdom, France, and Italy (European Parliament, 2021).

The United Nations Environment Program (UNEP, 2022) estimates that the world should reduce its CO 2 emissions by 7.6% per year over the next decade to prevent a global air temperature increase of more than 1.5 ºC above pre-industrial levels, which is the goal of the 2015 Paris Climate Agreement.

In 2020, greenhouse gas emissions in Croatia were reduced by 5% compared to 2019. The largest decrease in GHG emissions was recorded in the energy sector, especially in the subsectors of transport, whose emissions

were reduced by 12% compared to 2019, and energy conversion (electricity and heat generation, refinery processes and other energy facilities), whose emissions decreased by 7.8%.

Concentrations of nitrogen dioxide (NO2) and particulate matter (PM10 and PM2.5) also decreased, due to the closure measures and the decrease in activities during the isolation (lockdown) and accompanying measures implemented with the aim of stopping the spread of COVID -19 (European Parliament, 2021).

Figure 3: Geographical presentation of the cities of the Cluster 2

Source: Author

The third cluster is called *tourist polluters* and consists of 27 cities, 26 of which are located in the coastal region, as shown in Figure 4.

Table 10: Cities of the Cluster 3

Cluster 3	Cities
27 cities	Novalja, Zadar, Slavonski Brod, Pula - Pola, Nin, Hvar, Vodice, Opatija, Vis, Opuzen, Korčula, Umag - Umag , Komiža, Cres, Rab, Kastav, Labin, Novigrad - Cittanova , Poreč - Parenzo , Pag, Krk , Stari Grad, Rovinj – Rovigno, Makarska, Trogir, Biograd na Moru, Novi Vinodolski.

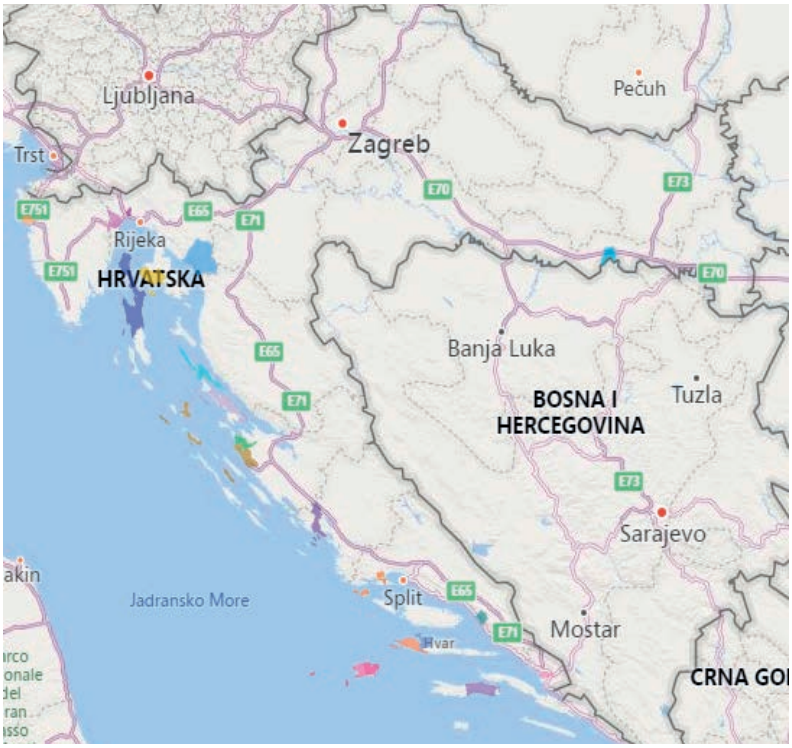
Source: Author

Cities with large numbers of tourists should adopt advanced visitor and destination management models that combine coordination of city, regional, and state institutions, digital tools, and involvement of the population and relevant stakeholders in local development planning.

Dubrovnik, for example, has emphasized sustainable urban mobility, a participatory and multidisciplinary management approach, and active protection of space, cultural heritage, and the natural environment in its integrated action plan.

In Šibenik, on the other hand, three specific objectives were highlighted: raising citizens' awareness of the cultural heritage in the Old Town, supporting economic growth and mapping of space in the Old Town, and improving social inclusion in the Old Town core (URBACT, 2022).

Figure 4: Geographical presentation of the cities of the Cluster 3



Source: Author

In Croatia, a system for monitoring the state of the environment has been established through regular national reports on the state of the environment, on the basis of which decision-makers and the public receive information on whether the policies and measures implemented have contributed to an improvement in the state of the environment. All sectors in the Republic of Croatia have their own strategy and planning documents that define measures and actions to reduce environmental pollution (e.g., nature, water, air, sea, waste) (Ministry of Environmental Protection and Energy, 2019).

To achieve sustainability, it is necessary to reuse expired products and create additional value. Croatia currently fails to do this because it is unable to decouple its economic growth from resource consumption, as measured by resource productivity.

The importance of greater integration of various issues and horizontal measures, greater coordination of economic development planning and environmental protection, and the establishment of an environmental management system in the context of its own needs and sustainable development goals is being recognized. For example, almost all sectors now have strategy and planning documents that define measures and actions to reduce pollution (e.g., nature, water, air, sea, waste) (Ministry of Environmental Protection and Energy, 2019).

The increasing financial resources available to the Republic of Croatia for environmental protection and sustainable development through grants financed by public tenders from various funds represent a great opportunity for the public sector, as well as for the business sector, which can significantly improve its activities in terms of environmental protection and sustainable development.

6. Conclusion

This paper provides an overview of new approaches to classifying space into more homogeneous units for the purpose of formulating environmental protection policies in Croatian cities. With these methods, dimensionality reduction and data interpretation were achieved, where the principal components explain the variability of the data in the most concise way and reveal some hidden connections and interrelationships of the data. The characteristics of each cluster are very specific, as in the first cluster there are Croatian cities representing industrial, transport and energy centers, in the second cluster there are cities where a smaller number of entrepreneurial activities were recorded, i.e. cities where an insignificant amount of GHG emissions and concentrations of PM10 particles were recorded, while in the third cluster there are tourist cities, which due to the tourist season have an increased consumption of electricity and a significantly larger amount of municipal waste compared to other cities.

Regional policies lead to the desired and uniform impacts on an area only if they are implemented in spatial units that are homogeneous in terms of the

characteristics that represent the main components of environmental impacts.

Since the application of factor and cluster analysis methods confirmed the indicators of the main environmental impacts and isolated local self-government units with similar characteristics that are the subject of regional policy instruments and measures, the basic hypothesis of the work was confirmed.

Croatian cities with similar characteristics that will be the subject of regional policy instruments and measures were filtered out. Although there is a regional policy in Croatia, its object is still not clearly defined, and it is composed of a number of uncoordinated measures and initiatives. There are a number of laws that refer to specific areas with similar characteristics, such as the Environmental Protection Act, the Sustainable Development Strategy of the Republic of Croatia, the Nature Protection Act, the Act on the Protection and Preservation of Cultural Property, the Spatial Planning Act, the Landscape Protection Act in the field of environmental protection, the Water Act, the Forestry Act, the Air Pollution Control Act, the Act on Sustainable Waste Management, the Noise Control Act and other laws.

A major limitation in conducting the analysis is the lack of statistics in small Croatian cities when it comes to the availability of data for the creation of indicators, such as the share of total final consumption of energy from renewable sources, noise pollution, the share of urban solid waste processed in waste-to-energy plants, etc.

With a better statistical overview of the availability of data for the creation of indicators, the analysis would be of much higher quality

References

1. Akande, A., Cabral, P., Casteleyn, S. (2019.) “Assessing the Gap between Technology and the Environmental Sustainability of European Cities”, Information Systems Frontiers, Vol. 21, pp. 581–604, doi: https://doi.org/10.1007/s10796-019-09903-3.
2. Al -Nasrawi, S., Adams, C., El -Zaart, A.A. (2015.) “Conceptual Multidimensional Model for Assessing Smart Sustainable Cities” Journal of Information Systems and Technology Management, ISSN online: 1807-1775, DOI: 10.4301/S1807-17752015000300003, Vol. 12, No. 3, pp. 541–558.
3. Ansari, Z.N., Kant, R. (2017.) “A state - of - art literature review reflecting 15 years of focus on sustainable supply chain management. Journal of Cleaner Production”, Vol. 142, pp. 2524–2543, ISSN 0959-6526, doi: https://doi.org/10.1016/j.jclepro.2016.11.023.
4. Babić, A. (2021.) “A Study of the Efficiency of Cities in the Republic of Croatia in Accordance with ISO 37120 and ISO 37122 Standards and the Dimensions of Smart Cities”, PhD thesis, University of Rijeka, Faculty of economics, Available at: https://urn.nsk.hr/urn:nbn:hr:192:584901.

5. Bawa. M., Caganova, D., Szilva, I., Spirkova, D. (2016.) “Importance of Internet of Things and Big Data in Building Smart City and What Would Be Its Challenges” In: Leon-Garcia A. et al. (eds) Smart City 360°, Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, Vol 166, Springer, Cham, doi: https://doi.org/10.1007/978-3-319-33681-7_52.

6. Bibri, S.E., Krogstie, J. (2017.) “Smart sustainable cities of the future: An extensive interdisciplinary literature review”, Sustainable Cities and Society, Vol. 31, pp. 183–212, doi: https://doi.org/10.1016/j.scs.2017.02.016.

7. Buchholz, K. (2020.) “How have you the world‘s urban population changed from 1950 to today?”, Cities and urbanization, World Economic Forum. Available at: https://www.weforum.org/agenda/2020/11/global-continent-urban-population-urbanisation-percent/ [Accessed: June 25, 2022]

8. Cantuarias-Villessuzanne, C., Weigel, R., Blain, J. (2021.) “Clustering of European Smart Cities to Understand the Cities Sustainability Strategies”, Sustainability, Vol. 13, No 2, pp. 513, doi: https://doi.org/10.3390/su13020513.

9. European Environment Agency (EEA) (2021.) “The Green City Accord: a new EU initiative for greener, healthier cities”. Available at: https://eurocities.eu/latest/the-green-city-accord-a-new-eu-initiative-for-greener-healthier-cities/ [Accessed: August 25, 2022]

10. European Parliament (2021.) “Infographic: Greenhouse gas emissions by country and sector”. Available at: https://www.europarl.europa.eu/news/hr/headlines/society/20180301STO98928/infografika-emisije-staklenickih-plinova-po-zemlji-i-sektoru. [Accessed: August 25, 2022]

11. Hair, F.J., Anderson, E.R., Tahtam, L.R. (1987.) “Multivariate Data Analysis,” New York: Macmillan Publishing Company.

12. Hopwood, B., Mellor, M., O‘Brien, G. (2005.) “Sustainable development: Mapping different approaches”, Sustainable Development, Vol. 13, pp. 38–52.

13. Hrvatska elektroprivreda dd., official request. [Accessed: March 15, 2020]

14. Hrvatske vode, official request. [Accessed: February 25, 2020]

15. Huovila, A., Bosch, P., Airaksinen, M. (2019.) “Comparative analysis of standardized indicators for Smart sustainable cities: What indicators and standards to use and when? “, Cities, Vol. 89, pp. 141-153, ISSN 0264-2751, doi: https://doi.org/10.1016/j.cities.2019.01.029.

16. Institute of Economics, Zagreb (2018.) “Socio-economic development of the Republic of Croatia in the period 2013-2017: situation, trends, challenges and opportunities for spatial development”, Professional background for the preparation of the Report on the situation in the area of the Republic of Croatia 2013-2017. Available at: https://mpgi.gov.hr/UserDocsImages/Zavod/Publikacije/EIZG_StrPodloga_Gospodarstvo.pdf [Accessed: August 28, 2022]

17. Intergovernmental Panel on Climate Change - IPCC (2018.) “Global Warming of 1.5°C, an IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change” Incheon. Available at: http://www.ipcc.ch/report/sr15/ [Accessed: June 10, 2022]

18. International Organization for Standardization (2018.) “ISO 37120 2018 - Sustainable cities and communities - Indicators for cities services and quality of life”, International Organization for Standardization. Available at: https://www.iso.org/obp/ui/#iso:std:iso:37120:ed-2:v1:en. [Accessed: May 15, 2022]

19. Jenks, M., Jones, C. (2008.) “Dimensions of the sustainable city”, M. Jenks and C. Jones, Eds., Vol. 2, New York: Springer international publishing, doi: https://doi.org/10.1007/978-1-4020-8647-2.

20. Johnson, A.R., Wichern, W.D. (1992.) “Applied Multivariate Statistics Analysis. 3rd Ed. New York, Upper Saddle River: Prentice Hall.

21. Kinnear, P., Gray, C.D. (1994.) “SPSS/PC + Made Simple”, Journal of the Royal Statistical Society: Series D (The Statistician), Vol. 44, Iss. 4, doi: 10.2307/2348152.

22. Ministry of Economy and Sustainable Development of the Republic Croatia (MINGOR), (2020.), “Report on Municipal Waste 2019”. Available at: https://www.haop.hr/sites/default/files/uploads/inline-files/OTP_Izvje%C5%A1%C4%87e%20o%20komunalnom%20otpadu%20za%202019_5.pdf [Accessed: September 15, 2021]

23. Ministry of Economy and Sustainable Development of the Republic Croatia (2021.) Register of environmental pollution ROO. Browser of the environmental pollution register. Available at: http://roo.azo.hr/rpt.html# [Accessed: September 25, 2021]

24. Ministry of Environmental Protection and Energy (2019.) “Environmental protection plan of the Republic of Croatia for the period up to 2020” Available at: https://mingor.gov.hr/UserDocsImages/KLIMA/SZOR/Plan-za%C5%A1tite-okoli%C5%A1a-srpanj-2019.pdf [Accessed: August 22, 2022]

25. Ministry of Finance (2020.) “Financial statements of JLP (R)S” Available at: https://mfin.gov.hr/istaknute-teme/lokalna-samouprava/financijski-izvjestaji-jlp-rs/pr-ras-i-ras-funkc-za-razdoblje-2014-2019/3107 [Accessed: November 22, 2020]

26. Morrison, F.D. (1987.) “Multivariate Statistics Methods”, New York: McGraw-Hill, Book. G Co.

27. Rašić Bakarić, I. (2005.) “Application of factor and cluster analysis in the detection of regional inequalities”, Economic trends and economic policy, Vol. 15, No. 105, pp. 52-76. Available at: https://hrcak.srce.hr/18399 [Accessed: May 19, 2022]

28. Smart city.eu. (2020.) “The use and applications of GIS”. Available at: https://pametni-gradovi.eu/pametne-tehnologije/pametna-rjesenja-i-tehnologije/primjene-i-aplikacije-gis-a/ [Accessed: June 20, 2022]

29. Spearman, C. (1904.) “General Intelligence, Objectively Determined and Measured” The American Journal of Psychology, University of Illinois Press, Vol. 15, No. 22, pp. 1-29.

30. Šram, Z. (2014.) “Exploratory and confirmatory factor analysis of the nationalist syndrome scale (sns-1). Political perspectives”, Vol. 4, No. 1, pp. 7-30. Available at: https://hrcak.srce.hr/145800 [Accessed: June 21, 2022].

31. Staffans, A., Horelli, L. (2014.) “Expanded Urban Planning as a Vehicle for Understanding and Shaping Smart, Liveable Cities”, The Journal of Community Informatics Special Issue: Community Informatics and Urban Planning, Vol. 10, No. 3.

32. Tryon, R.C. (1939.) “Cluster Analysis”, Edwards Bros.: Ann Arbor.

33. United Nations Economic Commission for Europe - UNECE (2015.) “The UNECE-ITU smart sustainable cities indicators”, Geneva. Available at: http://www.unece.org/fileadmin/DAM/hlm/projects/SMART_CITIES/ECE_HBP_2015_4.pdf [Accessed: June 25, 2022]

34. United Nations Environment Programs - UNEP (2022.) “Cities and climate change”. Available at: https://www.unep.org/explore-topics/resource-efficiency/what-we-do/cities/cities-and-climate-change [Accessed: August 21, 2022]

35. URBACT (2022.) “Different models of city management to sustainable urban tourism!” Available at: https://urbact.eu/urbact-web-razgovor-druga%C4%8Dijim-modelima-upravljanja-gradova-do-odr%C5%BEivog-urbanog-turizma [Accessed: August 19, 2022]

36. Veenman, M.V.J. (2005.) “Thurstone›s Scales of Primary Abilities, Encyclopedia of Social Measurement” Editor(s): Kimberly Kempf-Leonard, Elsevier, pp. 811-815. ISBN 9780123693983, doi: https://doi.org/10.1016/B0-12-369398-5/00105-5.

37. Venditti, B. (2022.) “Visualizing the Material Impact of Global Urbanization”, Cities and urbanization, World Economic Forum. Available at: https://www.weforum.org/agenda/2022/04/global-urbanization-material-consumption/ [Accessed: August 21, 2022]

38. Vinod Kumar, T. M., Dahiya. B. (2017.) „Smart economy in smart cities“, Smart economy in smart cities international collaborative research: Ottawa, St. Louis, Stuttgart, Bologna, Cape Town, Nairobi, Dakar, Lagos, New Delhi, Varanasi, Vijayawada, Kozhikode, Hong Kong. Singapore: Springer, pp. 3–76.

39. World Bank (2020.) “Urban Development”. Available at: https://www.worldbank.org/en/topic/urbandevelopment/overview#:~:text=Today%2C%20some%2056%25%20of%20the,world%20will%20live%20in%20cities [Accessed: June 25, 2022]

40. Yovanof, G.S., Hazapis, G.N. (2009.) “An Architectural Framework and Enabling Wireless Technologies for Digital Cities & Intelligent Urban Environments”, Wireless Pers Commun 49, pp. 445–463, doi: https://doi.org/10.1007/s11277-009-9693-4.

CHAPTER 7

Good policy takes time. The acyclical nature of mainstreaming processes in conditions of uncertainty

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ABSTRACT

Time doesn't come back, except in the most popular representations of policy processes. The paper re-evaluates time and uncertainty as key influencing factors of public policies, and proposes alternative visualizations to the all-too-familiar (and almost orphan) policy making cycle. To highlight the complexity, but also the time dependency, of 'real' or 'realistic' policy models, the concrete case of mainstreaming of Interreg MED programme results is proposed. To capture the influence of uncertainty and the cause-effect relationships between key input and output variables, the advantages of using Oriented Bayesian Nets as tools for model visualisation are presented and discussed.

Keywords: *Policy Mainstreaming, Oriented Bayesian Nets, Policy Process Visualisation*

JEL classification: *C11; D78*

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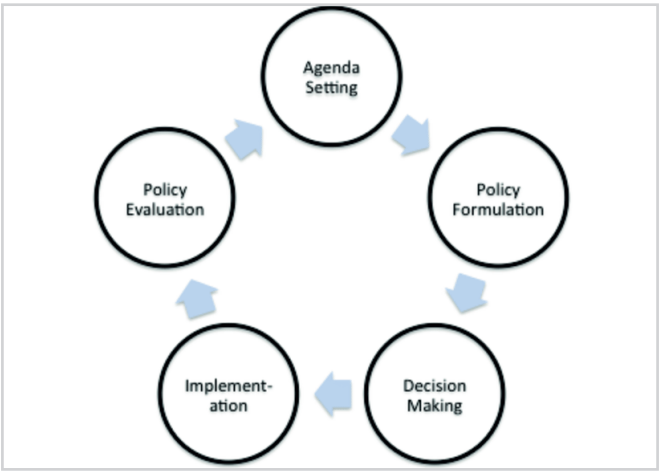
1. Introduction and need

The term policy cycle refers to the pattern shown by the steps of the process that ultimately leads to the creation of a public policy4. The typical visualisation of a policy cycle is reproduced in Figure 1 below. As one can see, process the loop is closed for the main reason that after prioritizing the decision items (Agenda Setting), designing a suitable scheme (Policy Formulation), adopting it as a piece of legislation or regulation or other initiative (Decision Making), realizing it in practice (Implementation) and assessing its results (Policy Evaluation), a government body or agency is said to have gained precious knowledge and information to revise the original list of priorities first, and then eventually replicate the above steps on an improved basis, and probably with different approaches, methods or contents.

Figure 1: Representing policy as a cycle



However, it is fairly well known and agreed among political scientists – and practitioners – that the above representation is misleading. As Sabatier (2007, p. 7) points out in his overview of major existing theories of the policy process, "*the assumption that there is a single policy cycle focused on a major piece of legislation oversimplifies the usual process of multiple, interacting cycles involving numerous policy proposals and statutes at multiple levels of government. For example, abortion activists are currently involved in litigation in the federal courts and most state courts, in new policy proposals in Washington and most of the states, in the implementation of other proposals at the federal and state levels, and in the evaluation of all sorts of programs and proposed programs. They're also continually trying to affect the conceptualization of the problem. In such a situation—which is common—focusing on 'a policy cycle' makes very little sense*".

4 *See for example the definition in www.dictionnaire.enap.ca*

Another important critique is about the time and logical sequencing of steps. In the reality of policy making, they are often compressed, skipped, or change order entirely. For example, policy formulation can sometimes precede agenda setting, as a "*solution seeking problems*" to which it can be applied (Howlett and Giest, 2015). More generally, we can safely state that the temporal dimension is almost completely neglected – apart from the lip service paid to it, whenever the initial agenda of priorities is revised after the evidence gathered during the evaluation of a previous cycle of policy results.

In essence, 'time matters' not only to mark the need for revision, but more evidently because the whole set of contextual and environmental conditions which a given policy is embedded in continuously change across time, in such a way that the outcomes of implementation are made conditional to, or at least are influenced by, that set of changing elements. Therefore, as it is well known to every practitioner, the specific contents of a policy may never be the same if they are implemented in different points of time, even in a same location.

Finally, the process steps represented in Figure 1 are defined at such a high level that the specificities of possible alternative interventions, which may fall under the same header, are obscured. For example, in a popular description of the S3 (Smart Specialisation Strategy) cycle5, the step entitled "*Strategy Formulation*" is correctly represented as consisting of "*expert analyses, dialogue and interactions with regional stakeholders to assess future development paths for the region*". As (Howlett and Giest, 2015, p. 288) note, this level of abstraction "*does not answer several key questions such as the actual substance of policy, the number and type of relevant actors involved in the process, the exact manner and sequence in which actual policy development processes occur, and whether there exist basic patterns of development in different issue areas, sectors, or jurisdictions*". This also has to do with the temporal dimension: trivially, climate change related policies have a different time span than policies aimed to incentivise consumption or investment.

Another controversial aspect, putting the above representation at the very margins of realism, is the lack of consideration for the issue of taking decisions under conditions of uncertainty. The relevance of such an issue has been highlighted during the Covid-19 crisis. The UK Cabinet originally designed a strategy of building herd immunity without imposing restrictions on the population, but then reversed it when the likely toll from this strategy was estimated at 250,000 deaths. The Chinese government locked down the city of Wuhan to reduce the infection rate – but this has put enormous pressure on its inhabitants and caused a significant economic downturn. Ideally, public decision makers should be exposed to the likely consequences of the implementation of alternative strategies, including, rather than excluding, the influence of external factors the manifestation of which is not secure.

For these and other reasons, alternative representations of policy interventions have started to emerge, the most prominent of which are those

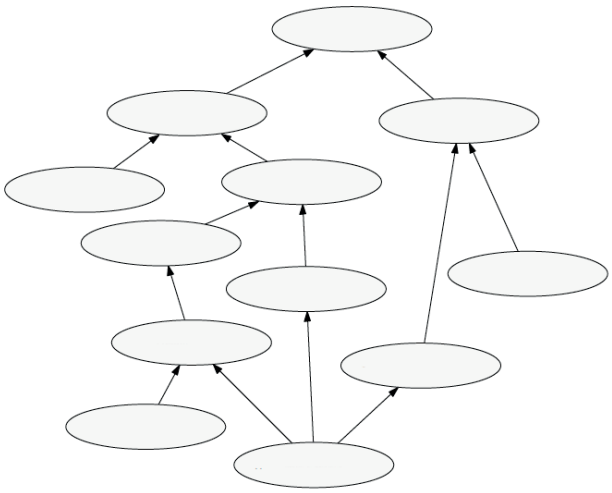
5 See http://www.s3platform.eu/how-to-form-ris3/

based on a peculiar methodological framework known as Theory of Change6. This is essentially a description of how and why policies are expected to bring a specific change in a given socio-economic context and particularly in a given temporal framework. Having stated the goals of an intervention, a structured mapping is provided by the Theory (and also visualised, using state of the art tools, such as logic models and cause-and-effect diagrams) of the concrete mechanisms leading to the fulfilment of those goals in a given context and of the policy actions through which such mechanisms may be ignited and/or supported. Then those policy actions are put under the responsibility of key people or organisations, and their progress over time is monitored and measured by different means/KPIs (Key Performance Indicators), without any intention to reiterate a loop.

2. Aim and background

This paper proposes an alternative approach to representing policy processes across time and in conditions of uncertainty, which captures the cause-effect relationships between key input and output variables, and visualises the alternative transition pathways from the current to a future state the policy maker may be interested in achieving. This approach is based on the use of Oriented Bayesian Nets (OBNs) that are visual representations of probabilistic models, i.e. models that involve uncertainty, which gained popularity in the industrial manufacturing context more than two decades ago. In these representations, the nodes stand for (uncertain) variables and the edges connecting them are causal or influential links between variables, as shown in Figure 2 below. If two nodes are not connected by an edge, this means they are independent, which helps simplify the structure of that model.

Figure 2: A generic OBN structure



6 https://www.theoryofchange.org/what-is-theory-of-change/

Source: adapted from Fenton and Neil, 2000

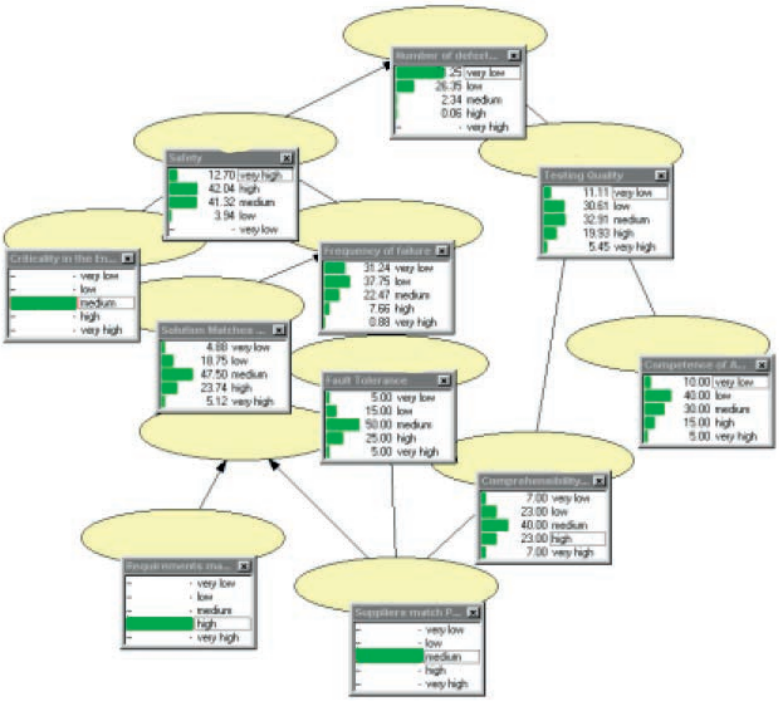
The resulting graphical structure resembles that of a social network, with the important addition of a precise orientation: in other words, the edges between nodes cannot be navigated either way, but only in a single direction, which is indicated by an arrow. This makes an OBN more similar to a cause-and-effect diagram and therefore suitable to explain the time and logical dependencies between the steps of a policy process.

But there is more: another, quite evident characteristic of an OBN – which explains the use of the term Bayesian7 – is that each node is associated to a distribution of probabilities, highlighting the level of uncertainty regarding the model's variable represented by that node. Imagine that each node is an event, the occurrence of which is not certain: then we could say that the set of probabilities associated to each event is like a collection of "predictions" concerning the specific likelihood and way of appearance of that event (e.g. rain= 50% likely, storm = 5%, cloudy = 35%, sunshine = 10% - and the sum must always be 100%). What is important to bear in mind is that given the connections established between variables, the probabilities in question are not only estimated but also conditional, in the sense that the probability of a child node to take on a certain value depends on the combination of values of all its parent nodes.

Figure 3 below reproduces the same OBN as in Figure 2 but associating sets of probabilities to the respective nodes. It is possible to notice that three variables have a probability of 100% to occur (therefore, they are not uncertain). Those three and another node on the right-hand side of the graph are also without parents, which means their probabilities of occurrence are not conditional. Finally, all the remaining are indeed children nodes and thus have conditional sets of probabilities associated to them.

7 Strictly speaking, the term is not used correctly. In fact, the Bayesian Confidence Updating Method is other than what is being described in this sentence. See e.g. McCann (2020).

Figure 3: An OBN with its associated sets of probabilities



Source: adapted from Fenton and Neil, 2000

An important side note to Figure 3 is that the probability distribution associated to each node is expressed in qualitative terms, via a Likert scale (from “very low” to “very high”). This approach is compatible with both a subjective attribution of probabilities – i.e. resulting from the OBN designer’s personal estimates of the likelihood of future events – or an objective one, like in the example of rain and sunshine mentioned above, supposing that the concrete probabilities are communicated by the Weather Forecast service.

The remainder of the paper is aimed to showcase the potential of OBNs as alternative policy representations. It is composed of the following sections: 3 (Definitions and problem setting) introduces the notion of mainstreaming and the case study we have selected to make the discussion clearer and informative. The case comes from the Interreg MED programme 2014-2020 and, in particular, from the publications of a governance project named PanoraMED the authors are quite familiar with despite not having been personally involved in. Then follows section 4 (Conceptualisation and analytical model), which presents a descriptive schema and model for mainstreaming based on 3 concurrent dimensions: Coordination Mode, Stakeholder Engagement and Process Structure. In section 5 (Problem solving and implementation) the mainstreaming process is visualised by the help of OBNs adding the three dimensions one by one. Section 6 (Discussion)

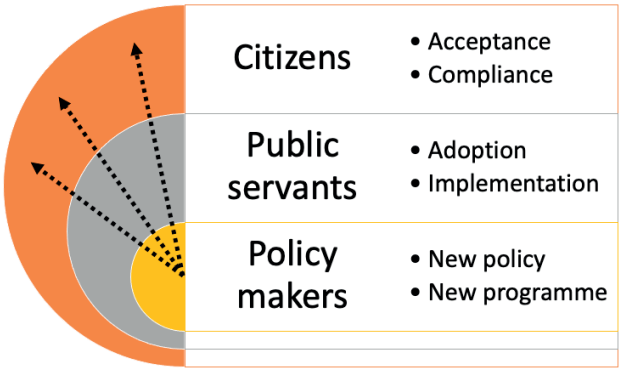
analyses the PanoraMED case in light of the knowledge gained by the use of OBNs. Section 7 (Conclusions and way forward) summarizes the results obtained and outlined the next steps.

3. Definitions and problem setting

According to the Cambridge Dictionary8, mainstreaming is "*the process of making something start to be considered normal*". Examples range from vegetarianism and healthy lifestyles (on the positive side) to light drugs consumption becoming more and more commonly accepted in society (on the negative side). When referred to policy, mainstreaming seems to capture well the alternative, more business-oriented definition offered by Cambridge, namely "*the process of becoming accepted as normal by most people*". Which people? Not only the citizens, as in the above examples, but also the members of public administration, both elected and career officials, who are normally the first to be influenced by (the intention to undertake or push) mainstreaming of a certain policy or programme. This twin target audience is what characterises policy mainstreaming, as distinct from mainstreaming in general, which is not so specialised in terms of expected influence.

As exemplified in Figure 4 below, the process of policy mainstreaming cuts across three main layers of targeted audience, starting from the core (where the new policy of programme is first designed and defined) up to the middle (where public servants first adopt and then implement the new policy or programme) and finally to the outer layer (which is where society as a whole, including citizens and other stakeholders, accepts the new policy or programme and become compliant with its provisions).

Figure 4: An idealistic representation of mainstreaming



8 https://dictionary.cambridge.org/dictionary/english/mainstreaming

Again, examples of policy mainstreaming abound from history, as well as chronicle; they include, with a higher or lower degree of success in their achievements: gender equality, integration of the disabled in education or workforce, ROMA minorities, LGBT rights etc. All these examples have in common an initial impulse from the policy making level, usually accompanied by changes in the legislation, and therefore expecting obeyance, more than an immediate sharing of the underlying principles. Other examples of policy mainstreaming can rely more heavily on the cultural adherence and proactive behaviour of citizens (and businesses), above and beyond the rigid formalism of law provisions. These include e.g. saving energy, respecting the environment, differentiating waste, reducing carbon dioxide emissions, or wearing face masks when meeting other people because during the Covid19 pandemic. However, all these and other examples follow the same threads exemplified, with dotted lines, in Figure 4 above.

During the programming period 2014-2020, the Interreg MED programme website9 proposed the following definition of mainstreaming: "*Also called 'transfer process', it is the process of integrating new knowledge and good practices into Regional, National or European policy-making levels*". The focus was obviously set on the knowledge and practices generated by the MED-funded projects during the same period.

During the same period and particularly between 2019 and 2020 the PanoraMED project consortium, led by the Region SUD Provence Alpes Côte d'Azur10, run six pilot experiments of mainstreaming in collaboration with the following Regional and National public authorities from the MED area:

1. France: Region SUD Provence-Alpes-Côte d'Azur, European Affairs Directorate;
2. Greece: Ministry of Maritime Affairs and Insular Policy, Special service of EU Funds Management;
3. Italy: Regional government of Emilia Romagna, the Department in charge of EU programmes coordination;
4. Italy: Apulia Region, in cooperation with Albanian and Montenegrin Authorities;
5. Spain: Government of Valencia Region, Directorate General for EU Funds;
6. Slovenia: Government Office, Unit in charge of EU programmes, Cohesion policy division.

The mainstreaming approach followed by PanoraMED11 was based on the identification of two main stakeholder categories: the "*givers*" (representatives of past and current MED projects having relevant outputs to be subject to mainstreaming) and the "*takers*" (national or regional or local institutions receiving and using the outputs produced by the MED projects).

Then, a few specific activities were carried out, including:

9 https://interreg-med.eu/no-cache/documents-tools/glossary/lexique/M/
10 https://governance.interreg-med.eu/
11 The approach was derived from a pre-existing methodology for evidence-based policy making designed at the Emilia-Romagna Region / ERVET.

a. An overview of the responsibilities and legal competences of local, regional and national institutions in the different Member States in the selected fields of maritime surveillance and coastal and maritime tourism;
b. An initial analysis of MED project outputs, aimed at identifying those most suitable for mainstreaming into policies, which was done through some 'ad hoc' thematic working groups;
c. The elaboration and use of a set of methodological tools in support to mainstreaming, such as:
    - Diagnosis notes,
    - Roadmaps,
    - Transfer plans, and
    - Logbooks;
d. The procurement of initial contacts between "takers" and "givers" and the organisation of meetings to finalise the operational transfer of outputs from the latter to the former stakeholders;
e. The set up and running of a monitoring and evaluation process, which was actualised in two final reports, made available on the project's website.

Based on the main findings and results of the above exercise, the definition originally provided by the programme was updated, after the realisation that transferring project outputs is other than doing mainstreaming. This is confirmed by the crucial statement – contained in the March 2020 update of the PanoraMED Mainstreaming Report – that it is difficult "*to influence a public policy with the results of one single project. Stakeholders should make the distinction between a 'transfer process' (from one project or one institution to another) and a 'mainstreaming process' (from one project or one institution to a public policy)*".

Another important conclusion of the PanoraMED evaluation is that mainstreaming takes time: in fact, it is "*a long-term process going beyond the timing of an ETC [MED] project. Even for projects containing a mainstreaming activity, additional time might be needed after the end of the project to generate real added value with project outputs*".

This leads in our opinion, to three important consequences:

a. Capitalisation (of MED project results) temporally and logically precedes, rather than follow, mainstreaming into policy-making;
b. Other mechanisms than a mere transfer of project outputs, or the interplay between "takers" and "givers", are to be put in place to support "*the process of integrating new knowledge and good practices into Regional, National or European policy-making levels*";
c. Both previous points introduce the fundamental dimension of time in the capitalisation of past project results and their integration into MED policy-making, ultimately leading to mainstreaming.

4. Conceptualisation and analytical model

We take stock from the background and lessons learnt of the PanoraMED project described in the previous section to propose the following conceptualisation of policy mainstreaming in the form of a model.

A model is an abstract representation of reality, which serves to highlight some key aspects that people need to bear in mind to improve their knowledge and understanding of what is being represented. Usually, the model acts as a proxy, since the underlying phenomenon may be hard to define otherwise, if visible and interpretable at all. Models can be descriptive – limiting themselves to clarify the way of functioning and/or the antecedents and consequences (causes and effects) of a certain phenomenon. Or they can be prescriptive (or normative), thus helping the user to identify the most appropriate pathways to follow, or decisions to be taken, in accordance with some varying conditions. Finally, models can also be predictive, i.e. offering the anticipation of certain results (outputs), based on what has been introduced beforehand (inputs) into their predefined structures.

The reality we would like to conceptualise with this model is obviously the mainstreaming process of MED project results. Based on the previous discussion, we argue that this process is not equivalent to – should not be confused with – a mere transfer of knowledge assets from a "*giver*" to a "*taker*". Even the definition of mainstreaming provided by the MED programme speaks about integration (or as we might paraphrase, embedment) of those assets into policy making at local/regional, national and/or EU levels, thus shifting the focus on appropriation by and diffusion within a huge number of government bodies and agencies, rather than one-time exposure to some project results.

However, as the experience from PanoraMED clearly documented, not only does the process take time, but it also goes through a few stages, which we may roughly distinguish as follows:

- From project results to potential applications: this stage in EU funded projects 'jargon' is sometimes named exploitation – meaning to conceptualise, abstract and streamline a number of potential uses for the newly developed innovation. The fact that we are talking here about material or immaterial assets potentially relevant for policy making does not change the terms of this discourse so much. Based on the unique competencies grown within the partnership during a project lifetime, we can expect them to deliver a collection of (more or less convincing) narratives, explaining in which policy contexts a certain result can become useful and the conditions for its take-up. Ideally, a SWOT and a benchmarking analysis (analysing the features of the proposed solution and comparing them with other existing alternatives) should be part of this activity.
- From potential applications to real or realistic configurations of possible solutions: we might call this stage adoption, stressing the connotations of this term that point at the 'precariousness' – i.e. experimental or tentative

nature – of such endeavour. In fact, any innovation matures and becomes widespread after several steps of refinement, which often include testing and validation sessions in real-life or simulated conditions. This is what we have in mind for this activity.

- From tested applications to permanent configurations of the new solutions; we call this stage implementation, to characterise its conditions of 'stability' – as opposed to the 'precariousness' of the previous stage – and also speculate that if that innovation has been permanently established, it may also have started to ignite transformative (or simply improving) effects on the underlying policy actors, processes and services.

On the other hand, mainstreaming itself is a complex concept, which does not only entail the transformation of a single organisation (public body or agency) but aims to involve the entire governance system that organisation belongs to. As a matter of fact, if we think of analogies of (more or less successful) mainstreaming – from gender parity to integration of the disabled in education or workforce – it seems quite evident that the expected or desired transformation does not only include the behaviour of individual organisations, or members therein, but needs to extend to society as a whole.

Along this same thread, we make a distinction among three different levels of engagement of policy stakeholders and therefore behavioural transformation of people and organisations, as a result of mainstreaming:

- Strategic. This involves the definition of new policies or programmes and therefore sees policy makers and particularly top managers of the public sector and elected officials as protagonists of change;
- Operational. This refers to participation in the mainstreaming process of civil servants and employees within the (public or private) agencies belonging to the "whole of government" in a predefined domain;
- Diffused. This explicitly looks at a broad involvement of citizens and other stakeholders (such as academics, entrepreneurs, etc.) in the required tasks and behavioural changes to make the innovation really widespread in society (or in the business community, or other relevant environments.

Combining the two aspects just commented – the three stages of mainstreaming, and the three levels of stakeholder engagement – we obtain the following schema, mirroring our vision of the process and therefore constituting a preliminary instantiation of our proposed model. At the intersection between rows and columns, in each of the nine cells of the Table, we mention the target group of the mainstreaming process and the specific aim of the related activities we should expect to find relevant for that group's engagement in the process.

Table 1: Schematic representation of mainstreaming (source: the authors)

Stages → **↓ Levels**	**Exploitation**	**Adoption**	**Implementation**
Strategic	Target group: policy makers Aim: feasibility study of a policy innovation	Target group: policy makers Aim: definition of a proof of concept or trial	Target group: policy makers Aim: approval of a new policy or programme
Operational	Target group: civil servants, public agents Aim: co-design or validation of feasibility analysis	Target group: civil servants, public agents Aim: execution and evaluation of practical experimentation	Target group: civil servants, public agents Aim: utilisation of the innovation in normal practice
Diffused	Target group: business community, society as a whole Aim: communication and sharing of value and potential	Target group: business community, society as a whole Aim: inclusion in the experimentation and crowdsourcing of ideas	Target group: business community, society as a whole Aim: the innovation gets genuinely widespread and provides its effects

Loosely speaking, the mainstreaming process finds its origin in the top left cell of the table and finds its realisation in the bottom right one. However, different pathways can be followed to move from the beginning to the end of the story, in dependence from several conditions, which include:

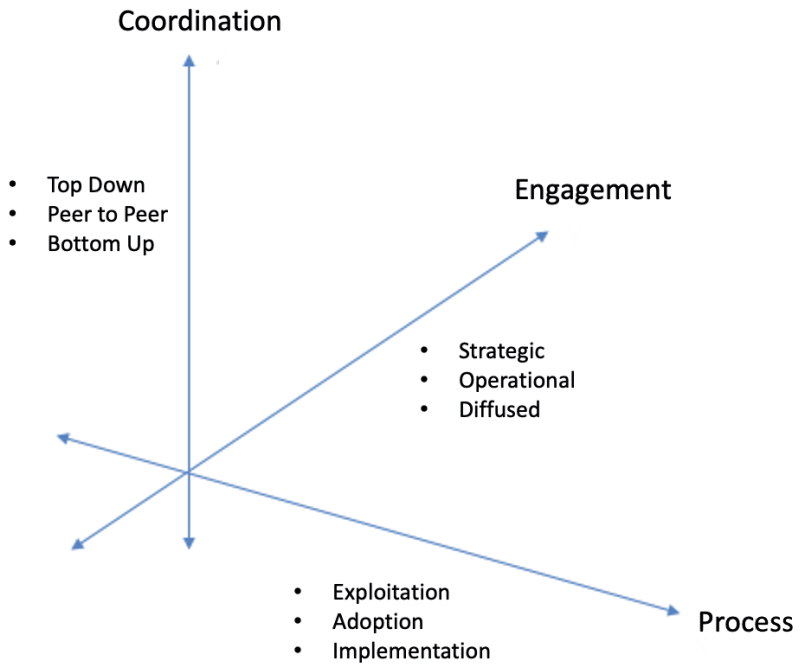
- The nature of project result: for instance, it is quite likely that a legislative or regulatory innovation finding its origin in the top left cell will 'jump' (if successfully taken up) into the top right cell without further mediation. Procedural or instrumental innovations that affect the 'making' of government may start at the operational level in the exploitation stage and never go beyond adoption (if the trial was unsuccessful) or maybe shift to the below level if the need was felt to engage a broader set of stakeholders. Etc.
- The nature of policy domain: for instance, in Maritime Surveillance a key role is played by public and especially military agencies (owning data, doing field activities etc.), but when it comes to sea operations, e.g. in relation to emergency rescue, civil society gives a contribution that is often as important as that of government. Therefore, both the adoption and the implementation stages should include NGOs alongside public actors if the innovation so demands.
- The nature of governance system: Examples here range from centralised and unitary to distributed and autonomous (or self-regulated) systems. Broadly speaking, we can think of coordination of governance system actors as a third dimension with respect to those outlined in Table 1, and the following Figure 5 helps clarify this. As a tentative overview of possibilities, coordination can materialise in three main ways:

A. Top-down, i.e. with a ‘Principal’ (e.g. a national or local government body) sending directives to one or more ‘Agents’ (other bodies or agencies belonging to its direct sphere of influence). In this case, mainstreaming usually follows the command-and-control way of coordination, although more inclusive patterns of engagement (e.g. of public sector staff) may also occur. Related pathways start from row 1 and go down to row 2 (and there they stop, as there is no other way to exercise influence outside this perimeter, except for totalitarian governments).

B. Bottom-up, i.e. by an influential impulse coming from the bottom of the pyramid (e.g. from local public administration, or the constituency, or the free press) and going to the top of it (e.g. to the national government or parliament in charge of taking a legislative or regulatory action). In this case, mainstreaming takes more the shape of a cultural revolution, supported by media, social movements, or even the internal pressure of self-organised sectors of public administration. Related pathways can start from row 3 or 2 and then go upwards.

C. As the result of a Peer-to-Peer negotiation (like normally happens e.g. between EU Member States and the Commission, or Ministries of a same Government). In this case, mainstreaming occurs as in the experimentation carried out within the PanoraMED Project: an initial output can be adjusted because of a deeper inspection of needs, constraints, barriers etc. In terms of pathways, the transition is certainly from column 1 to 2 and 3, but it could also be internal to a single cell (for example, when more than just one government body or agency must be involved in adoption or trialling of an innovation).

Figure 5: The dimension of coordination added to the mainstreaming schema



A side comment to finalise this discussion is that whatever coordination approach is selected, Communication is also part of it. This holds especially true for the Top-down approach, but also for the Peer-to-Peer one: a mix of activities and channels must be identified (for instance, by a MED project consortium willing to undertake mainstreaming activities) in order to best address its target groups and achieve its exploitation plan objectives, thanks to the messages being sent and reaching their audience.

Another side comment is that, differently from the dimensions of Engagement and Process, the prevalent direction of which is from the top to the bottom and/or from the left to the right cells in Table 1, Coordination (and therefore Communication) may change its approaches and styles when moving from a cell to another. For instance, while some peer-to-peer negotiation between a certain MED project partnership and the average target group is probably required to ensure first-time adoption of a certain innovation, after the successful end of a project trial it may well be the case that news on it becomes widespread, thanks to good communication and (at least to some extent) word of mouth. Therefore, other government bodies and agencies may decide to replicate the trial, or directly go to the implementation, based on their acquired knowledge of the successful outcome.

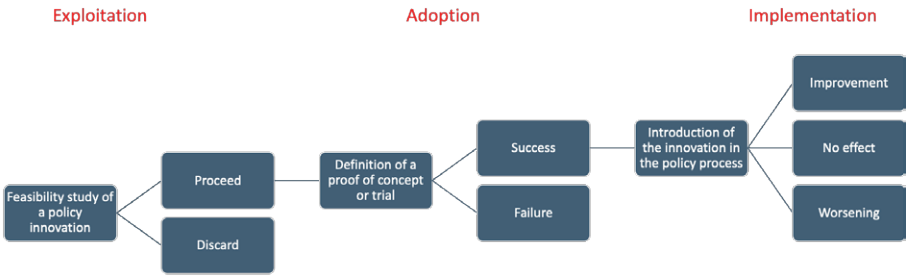
5. Problem solving and implementation

Having introduced the reader to our mainstreaming model, in this section we will demonstrate the use the OBNs to represent visually how mainstreaming is or can be practically carried out.

Figure 6 describes what we have called Strategic mainstreaming. This is the simplest possible version of such a process, grounded on the ideal type of an 'absolute monarch' willing to take the advice of some domain experts and introduce an innovation in previously conduced policy or policies – for instance, a new 'constitution' or (out of metaphor) a specific regulation in a new and previously unregulated domain, such as (in our modern times) cryptocurrency markets.

Within this scenario, it seems quite reasonable to realise a feasibility study for pre-assessing the terms and conditions of such a policy innovation, and then, based on its results, go for a small scale, limited size, or limited in scope, introduction of some regulatory elements in real or realistic, targeted or related, environments. This is what we call a proof of concept or a trial, carried out in controlled conditions, and the results of which will certainly influence the final decision of proceeding towards the planned reform or not. Ultimately this reform may have no effect, improve or worsen the situation as it stood before implementing it.

Figure 6: The process of strategic level mainstreaming, disentangled



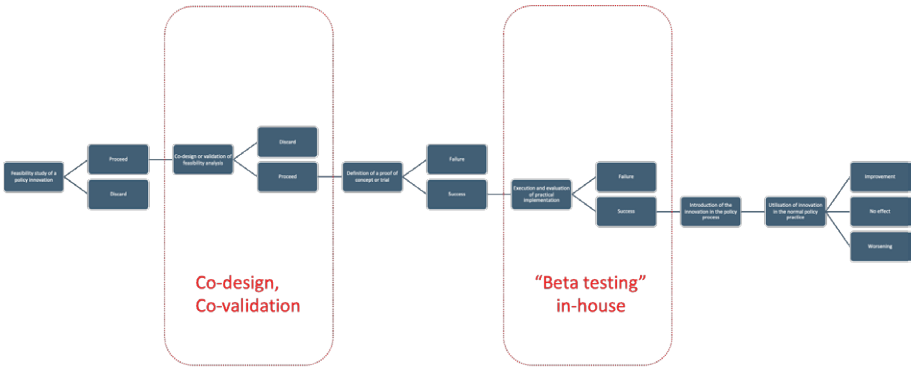
Looking at the details of the process, as represented by an OBN in the Figure, we understand two things: first, Strategic mainstreaming is definitely linear, if we project it across time, and has no feedback loops. Of course, there could be revisions of either the feasibility study or the proof of concept or trial definition, but they would only slow the pace, not change the direction of the process. Second, each node (event) of the OBN is associated with a set of probabilities, which have to be assessed or measured to respond to the fundamental question: "What are the chances that the innovation creates benefits to the targeted domain?". As shown in the Figure, these chances are conditional on: a) the probability of proceeding further after looking at the feasibility study results, b) the probability of success of the proof of concept or

trial, and c) the subjectively attributed chances that after its implementation, the reform will work as expected.

Estimating these three probabilities is a subjective exercise of the 'absolute monarch', which may lead to different outcomes and certainly needs to be grounded with evidence. However, in this representation the linearity of the process across time, and the dependency of the same on the existing amount of uncertainty, are the two key aspects of the mainstreaming process that are highlighted by the use of an OBN instead of a cyclical representation.

Figure 7 below adds to the previous process what we have named Operational mainstreaming. This consists of three main integrations: first, between the outcome of a feasibility study and the definition of a proof of concept or trial, it makes sense to involve the executive staff who will most likely be engaged in the next step, to co-design it and/or co-validate the initial study results based on their practical experience and knowledge of the domain. Second, between the end of the proof of concept or trial and the beginning of actual implementation, it would also make sense to realise a sort of in-house 'beta testing', still with the involvement of civil servants and public managers, to further explore (actually, to foresee) the likely consequences of making innovation part of the policy practice. This distinction between 'theory' and 'practice' may be useful to consider, and this is the third integration to the process, because it is never granted if and/or how an innovation proposed in principle is taken up in fact to the required extent by the people who are supposed to adopt it. The hiatus between 'introduction' and 'utilisation' of the innovation is evident from the duplication of the previously single node on the right-hand side of the graph. While the probability of introducing can be set at 100% by default, it is its use in the normal practice that will affect the current situation in either direction.

Figure 7: Integration of operational level mainstreaming

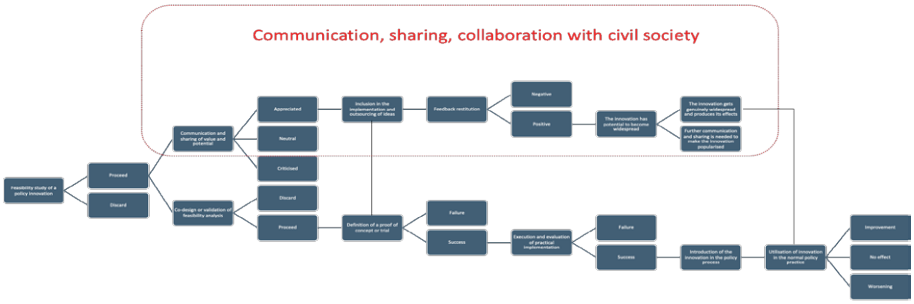


Integrating the operational aspects makes perfect sense when talking about mainstreaming, as the previous Figure 4 had already shown. Without the full engagement and collaboration of the civil servants and public managers, no reform can be easily adopted or streamlined, particularly if its implementation is discretionary, rather than compulsory. For example, more than 35 years

after gender balance has become an issue, with the 1985 Nairobi World Conference on Women followed by the 1995 Beijing Platform for Action adopted at the 4th UN World Conference on Women[12], it is still problematic to reckon that a gender equality perspective is incorporated in all policies at all levels and at all stages, by the actors normally involved in policy-making. The proposal done in Figure 7 is to increase the engagement of all these actors by appropriate means in order to increase the level of 'utilisation'. Then of course, the probability of improving the current situation could most likely, at least in this case, be set at 100% or very close to it, with very few exceptions pertaining to e.g. the physical limitations of women doing certain manual works.

Finally, Figure 8 focuses on the involvement of civil society in what we have named Diffused mainstreaming. Basically, as shown, a second and parallel process is juxtaposed to the previous one, which includes communication, sharing of results, collection of feedback and diffusion of the policy innovation (in the sense of Rogers 1962 theory).

Figure 8: Integration of diffused level mainstreaming



Finally, Figure 8 focuses on the involvement of civil society in what we have named Diffused mainstreaming. Basically, as shown, a second and parallel process is juxtaposed to the previous one, which includes dissemination of results, collection of feedback from the grassroots and ultimately a widespread diffusion of the policy innovation (in the sense of Rogers 1962 theory). More in detail, after the initial decision to proceed taken by the 'absolute monarch' following a convincing feasibility study of a certain policy innovation, a new activity of external relevance is carried out, engaging civil society alongside government staff members, which we entitled 'Communication and sharing of value and potential' (of the proposed innovation). Based on the quality of this communication, there will be a certain likelihood for the majority of people to appreciate, criticise, or be agnostic about that possible reform. Depending of that likelihood, an 'enlightened' policy maker will include civil society representatives in a parent activity having the definition of a proof of concept or trial as child: an activity akin to idea crowdfunding or codesign/co-validation, which will allow the collection and restitution of precious feedback on the proof of concept or trial results.

12 https://www.coe.int/en/web/genderequality/what-is-gender-mainstreaming

Apart from the improvement of the quality of those results, thanks to this extended (or external) 'beta testing' seeing the active participation of civil society and other stakeholders instead of civil servants and public managers only, the chances will also be increased of the proposed innovation to become really widespread as a cultural or mindset transformation, as the concept of mainstreaming obviously requires. This adds substance to the already examined concept of 'utilisation' of that specific innovation in the current policy practice.

6. Discussion

In research and practice, over the past 20 years or so, OBNs have been used for a variety of modelling purposes; initially only in industrial domains, but then more and more opening up to structure and visualise any kind of reasoning, forecasting and decision-making problems in conditions of uncertainty.

As argued in the decision tree represented in Figure 9 below, the key advantages of using OBNs in generic or standard applications are that they:

- Can handle both qualitative and quantitative data to formulate predictions of the future or to take decisions under condition of uncertainty13;
- Function well even in the case knowledge about the underlying model is partially known or incompletely described;
- Put emphasis on linear, cause-effect relationships or evolving states across time, rather than on the existence of feedback loops in the observed variables.

13 This is practically done by navigating the graph from beginning to end and taking the (distribution of) probability of a single node as the cumulative (or chained) result of all its parent nodes individual (and chained) attributions.

Figure 9: Decision tree for selecting OBNs against alternatives

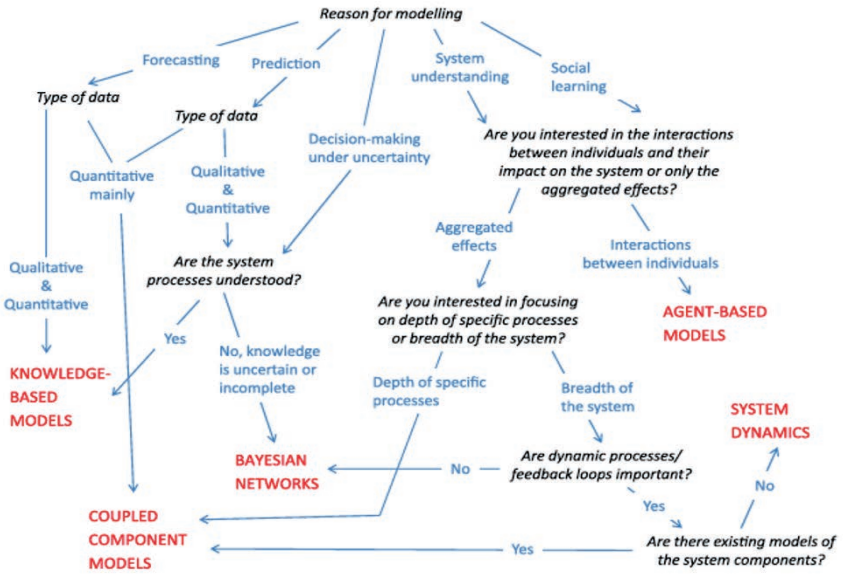


Fig. 1. Decision tree for selecting the most appropriate integrated modelling approach under standard application.

Source: Kelly et al., 2013

The second feature of the above list – one can use OBNs to describe scenarios that are only partially known – nicely complies with the requirements of policy modelling, where the level of prior information doesn't need to be complete and exhaustive; in fact, quite often a policy, especially if new, draws and ignites a process of transformation that results from a political compromise or the convergence of very diverse interests, instead of being based on data and evidence.

As pointed out by Giffoni et al. (2018, p. 139), the use of OBNs to represent policies can validly complement what they call TBE – Theory Based Evaluation – or "*a fine-grained analysis of the different steps and underlying assumptions that lead from inputs to intermediate and ultimate outcomes*". Key advantages of OBNs as complements to TBE include:

1. Good management of a general condition of uncertainty and specific lack of knowledge regarding the effectiveness of a policy to solve problems, also because of the continuous changes in the external environment induced by the progress of time;

2. Visual representation of the cause-effect relationships between variables constituting relevant instruments or targets for policy-making, which can be validated empirically14;

14 In a related research strand, the authors are examining the possibility of using OBNs to visualise the 'hidden' connections between data series, defined by the use of special Artificial

3. Possibility of estimating the conditional probability distribution of each key variable in the model and "navigating" the network structure in two alternative directions:
   - Top down, i.e. starting from a parent node towards its children, to simulate which values are taken by the latter depending on alternative value of the former;
   - Bottom up, i.e. starting from a child node towards its parents, which can not only be assessed for their relevance (if they appear or not), but also their reciprocal weight in influencing the variable under observation.

The OBN used in the previous section to depict a policy mainstreaming process has been made more and more complicated by adding several dimensions to an initial configuration of it. As there are no limits to the size of an OBN, but only rules of grammar and syntaxis to build it (such as the acyclical nature and the association of nodes with probability sets), a recommended design approach could be to 'start small' and 'learn' or 'evolve' from initial/basic structures to eventual/more complex configurations15.

7. Conclusion and way forward

In this paper we have proposed to use OBNs as support tools to policy modelling and design, with specific reference to mainstreaming processes. The problem we started from was set out by the Interreg MED programme and particularly the project named PanoraMED: how can we mainstream the results of funded projects and transform local/regional/national policies by the use of (some of) them? On the one hand, we have the exploitation plans of those projects that describe the 'use potentials' of developed tools in and for policy making; on the other hand, we know there can be some policy makers willing to adopt some tools in a specific policy context.

The 'PanoraMED approach' – based on the Givers and Takers metaphor – has been effective to identify the Givers and to some extent the potential Takers of a certain tool, but then proved ineffective to 'force' the decision of using a certain tool in a real or realistic environment.

The approach proposed in this paper – based on a broader definition of mainstreaming, which includes additional communities of prospective users of the tools and the civil society – starts from a feasibility study and complements it with codesign, co-validation and collaboration activities.

OBNs can be supportive to such endeavour in two main ways:

- By visualising the transmission mechanisms of a certain public policy, highlighting the dependencies between variables and noting their variations, if they occur, before and after an intervention – which may

Intelligence algorithms.

15 A variant of the schema, named OOBN (Object Oriented Bayesian Net), emphasizes this stepwise construction process by allowing the definition of 'embedded OBNs' in the main nodes and then only focus on the connections between these nodes. See Liu et al. (2016).

also consist in the adoption of a specific tool derived from the Interreg MED programme experience;

- By integrating external data sources (and processes) into the main policy workflow with attribution of probabilities to the occurrence of significant events and relationships that are predicted to exist between some variables.

Next steps will be to create a knowledge base of policy model visualisations16 via OBNs and to validate them with 'real' policy makers as counterparts.

Acknowledgments

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References

1. Fenton, N., Neil, M. (2000) *Making Decisions: Using Bayesian Nets and MCDA*, Computer Science Department. Queen Mary and Westfield College, London, and Agena Ltd., Caldecote, Cambridge (UK).
2. Giffoni, F., Salini, S., Sirtori, E. (2018) "Evaluating business support measures: The Bayesian Network approach", *Evaluation* Vol. 24 (Issue 2), pp. 133–152.
3. Howlett, M., Giest, S. (2015) "Policy Cycle", in J.D. Wright (editor-in-chief), *International Encyclopedia of the Social & Behavioral Sciences*, 2nd edition, Vol. 18, Oxford: Elsevier. pp. 288–292. ISBN: 9780080970868.
4. Kelly (Letcher), R.A. et al. (2013) "Selecting among five common modelling approaches for integrated environmental assessment and management", *Environmental Modelling & Software*, Vol. 47 (September Issue), pp. 159-181.
5. Liu, Q., Tchangani, A., Pérès, F. (2016) "Modelling complex large scale systems using object oriented Bayesian networks (OOBN)", *IFAC-PapersOnLine*, Vol. 49, Issue 12, pp. 127-132.
6. McCann, B.T. (2020) "Using Bayesian Updating to Improve Decisions under Uncertainty", *California Management Review*, Vol. 63, Issue 1, pp. 26-40.

16 An online repository constituting a first step in that direction can be retrieved at http://themis-4policy.eu/

7. PanoraMED project (2020) *Mainstreaming Experimentations Final Report*. Interreg MED 2014-2020 website. Retrieved online in May 2022 at the URL: https://governance.interreg-med.eu/fileadmin/user_upload/Sites/Governance/horizontal_project/PANORAMED_Mainstreaming_Report_April_2020_Update__Final_.pdf
8. Sabatier, P.A. (Ed.) (2007) *Theories of the Policy Process*, Boulder, Colorado (US), Westview Press Books. ISBN-13: 978-0-8133-4359-4.

CHAPTER 8

Overview of Collaborative Digital Transformation in Indonesian Local Government

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ABSTRACT

The purpose of this article is to provide an overview of the implementation of digital transformation in Indonesia. This article uses case studies and a systematic literature review to explore how collaboration can play an important role in the implementation of digital transformation in local governments in Indonesia, more specifically in West Java Province which has a special institution in implementing digital transformation, namely Jabar Digital Services (JDS). The presence of JDS is a strategic step taken in realizing digital-based local government. Preliminary findings show that JDS does not originate from the purity of the bureaucracy, but rather an institution that was formed specifically according to regional needs in dealing with the acceleration of digital transformation. This means that not all local governments in Indonesia have these digital-based institutions, so the digital transformation gap in Indonesia is still wide open. This article will provide an overview of how the Province of West Java, Indonesia implements digital-based policies through joint decision-making (collaborative governance) with stakeholders to develop public policies for effective and lasting solutions to public problems.

Key words: *Digital government, collaborative governance, local government, public policies.*

JEL classification: *JEL_Code1, JEL_Code 2, JEL_Code 3, JEL_Code 4, JEL_Code 5*

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1. Introduction

Digital transformation in the public sector means new ways of collaborating with stakeholders, building new frameworks of service delivery, and creating new forms of relationships(Misuraca et al., 2020). A successful digital transformation will enable public sectors to operate efficiently and effectively in the digital environment, and to deliver public services that are simpler and more effective policies (Greenway et al., 2021). However, fully realising this digital transformation requires a paradigm shift from e-government to digital government (OECD, 2014). Digital government approaches favour the use of ICTs for improved collaboration with stakeholders at different stages of the policy and service lifecycle, based on Government as a platform and user-driven policy environment for efficiency improvement and customized service development based on shared ownership and shared responsibility with civil society (OECD, 2020). Moreover, bringing citizens actively on board through collaboration in the design and implementation of policies and services further increases their legitimacy and effectiveness, and creates a feeling of ownership to their government.

The rapid development, deployment, and proliferation of the new and emerging ICTs through digital government create new opportunities for growth and development in countries around the world, including Indonesia. Government fungtions in Indonesia are classified into absolute and concurrent tasks. It is only the central government that manages absolute tasks, which include foreign policy, defence, security, the monetary system, the judiciary, and religion. The local government, including provincial and district governments, concurrently manage the other tasks, which include public works, health, education, culture, agriculture, communication, industry, trade, investment, environment, land, cooperation, and labour. In the overall distribution of tasks, the role of local government is to conduct the most needed public policy, providing services delivery, which usually includes education, health, and basic physical infrastructure, including ICTs. In addition, there is a principle of “money follows function”, which means that the transfer of tasks to local governments is then followed by a transfer of financial resources needed to execute them(Sutiyo & Maharjan, 2017)

Governments are seeking to harness the potential offered by these modern technologies to create new dimensions of economic and social progress. In recent years, governments around the world, including Indonesia, have tried to take advantage of information and communication technology (ICTs) to improve the quality of government administration and the quality of communication with citizens. Digital Government is not only about modernising public administration through ICTs, but it is a key enabler in the building of citizen-oriented, cooperative, and modern governance.

For local government in Indonesia, the concept of digital government transformation emerges as a strategy to address problems associated with its population and teritory. In this article, the author will focus on one of the biggest local governments in Indonesia, West Java Province. With a population of more than 49 million people, equivalent to 20 percent of the

total population of Indonesia. The expanse of area with an area of 3.7 million hectares is also one of the largest in Indonesia, West Java Province consists of 18 regencies, 9 cities, 5,312 villages, and 645 sub-districts. (Pemprov Jabar, 2022).

As one of the largest provinces in Indonesia, West Java experiences the most rapid population growth for ages. In line with high quality of human resources that have encouraged the social-economic development, made West Java one of the most productive and economically competitive province in the world. But like other big local government in Indonesia, West Java have had to deal with many recent problems in this digital era. This has presented local governments with challenges on delivering public policies and public services like education, public transport, and health services with equal access for everyone.

To accelerate digital transformation in West Java, Governor of West Java, Ridwan Kamil established Jabar Digital Service (JDS) as a government institution based on information technology innovation to assist efficiency in governance, policy making, accountability, community participation and the development of innovative and responsive public services. Jabar Digital Service (JDS), or the Center for Digital, Data, and Geospatial Information Services for West Java Province, aspires to realize the vision of the West Java Government as a digital province that is based on data and technology, supports community services and responsive, adaptive, and innovative policy making (Jabar Digital Service, 2021).

This unit is under the coordination of the West Java Province Communication and Information Office, JDS has a mission to realize data-based policy making, accelerate government digital transformation, and simplify people's lives with digital technology. As one of the agencies that assist the West Java provincial government in developing the province of West Java based on data, aspirations or complaints which are a form of feedback, it can be used to help improve the quality of public services or improve public service infrastructure. One of the visions of Governor Ridwan Kamil in his government is to make West Java a digital province. JDS as a form of solution to overcome the problem of the digital divide between villages and cities, increasing efficiency and accuracy of policy making based on data and technology for the realization of West Java as a digital province based on data and technology, in supporting services and decision making. responsive, adaptive, and innovative public policies.

2. Literature review

2.1. Collaboration to pave the way for Digital Transformation

The collaborative process according to Ansell & Gash is a series of components that run to form a cycle, influence each other, and in essence is a collactive decision-making process (Ansell & Gash, 2008) Including the following:

1. Interface dialogue (face-to-face dialogue). Communication is crucial in the collaboration process, because of the orientation of consensus formation. Communication is often formed through direct discussions (face to face). Open communication then affects the formation of trust between actors.
2. Build trust (trust building). Activities that are continuously carried out and need to be improved. Building trust is a condition for building solid collaboration. Building trust is a time-consuming process and requires a long-term commitment to achieve collaborative outcomes.
3. Commitment to the collaboration process (commitment to the process). Commitment is an important component as well as a major challenge in the collaboration process. Commitment is influenced by the previous component (build trust). Meanwhile, the influencing factors (in terms of components) are mutual recognition and joint appreciation between actors. In addition, the ownership of the process (a sense of ownership of the process) which is manifested by the influence of each actor in making decisions is a driving force for commitment, but has a dilemma, due to differences and complexity in collaboration.
4. Shared understanding. In another sense, they are common mission (general mission), common purpose (general purpose), common objectives (general objectivity), and shared vision (shared vision). The existence of a common understanding is a necessary condition during the collaboration process, so that common goals can be realized. The understanding in question is the unification of goals, defining the problem together, so as to minimize the occurrence of mutual misunderstanding or misunderstanding.
5. Temporary impacts (intermediate ourcomes). The impact in question is that which occurs during the collaboration process, so there is the word “temporary” in it. This temporary impact generates feedback. More positive impacts are expected, as a booster and guard to keep collaboration on track, so they are called “small wins” or small wins.

2.2. Collaborative Outcomes

The definition of outcomes according to Emerson et all (Emerson & Nabatchi, 2015) is “the third-order effect of the result on the ground”, or the third form of development of the effects produced by collaboration in the field. Outcomes have the characteristics (1) there are desired outcomes, and (2) undesirable outcomes. This definition explains that outcomes occur from the continued development of effects, which have the characteristics of (1) having a desired outcome, and (2) an undesirable one. The two outcomes refer to positive and negative things. Impacts can be physical, environmental, social, economic, and/or political. The resulting impacts include added values resulting from collaboration so as to form a better society, or technological innovation, as stated by Emerson et all (Emerson & Nabatchi, 2015) namely: “…may also include the added value of a new social good or technological innovation developed by collaborative action”.

2.3. Digital Government

The digital transformation shifts from e-government towards digital government (Vlahović & Vracic, 2015) require the introduction of the initiatives needed to make deeper changes in the provision of online services through government portals, into a broader government business. New, 'transformed' technology-based systems must not only be consumer-friendly, strategy driven, and capable of providing a better experience for those who interact with government, but more importantly, must also improve the way government operates (Barcevičius et al., 2019) within the framework of the \"European Location Interoperability Solutions for eGovernment (ELISE. Additionally, the shift shall allow governments to simultaneously satisfy the needs of the public sector itself; address the challenges of public sector employees and policy makers; and benefit all citizens. Janowski et al. (2018) view this shift as empowering citizens and other stakeholders to contribute to or lead the creation of public value, often recognised as one key feature of digital government transformation. Therefore, digital transformation towards digital government potentially transforms citizen-to-government interactions in two ways: by improving policy and service delivery, and by improving relations between citizens and government (Fountain, 2004). The government as a policy maker carries out thinking ahead, thinking again, and thinking across in detail, coherently, and consistently (Rahmatunnisa, 2019).

Based on the explanations above, the emergence of information and communication technology (ICT) in the field of public administration has been understood as a central part of the process of modernizing public administration. In a broader sense, the concept of digital transformation, digital government and e-government has been used as an administrative reform strategy in the last two decades. This concept also resulted in an increase in the volume of research literature in the field of public administration and ICT, which has created multi-disciplinary knowledge and interesting research analysis and is relevant for the future development of public administration.

This article will thoroughly look at the steps to accelerate digital transformation carried out by the West Java Provincial Government, especially the pentahelix collaborative approach and the factors that influence the process. It is important to note that, although it is not possible to separate government processes from the technologies used in those processes, technology still occupies a limited place in the theoretical understanding of the public sector. The outcome of this article intends to contribute as a new reference for academics in the field of public administration and government studies and promote a model for the development of digital government transformation focusing on collaborative process in public policies.

3. Methodology

This paper uses case study methodology to understand why and how a social phenomenon of interest occurs through data. Case study methodology is an appropriate approach to conducting this exploratory research (Yin, 2017). This study is also inductive so that it contributes to building new

understanding. Case studies in local government are rare, and often tend to cover only certain practical issues in public policy and administration. Such practical matters could address a range of issues: from dealing with problems associated with reforming and restructuring ICT management in a local government setting (Nam & Pardo, 2011). This paper expands that research by exploring the ways in which collaborative governance affects digital government transformation in the Indonesian local government, and its relation to public trust through legal documents such as national and local regulation, written legacy, especially in the form of archives, and including books, official documents, government website, and statistics related to the problems that occur.

4. Results and discussion

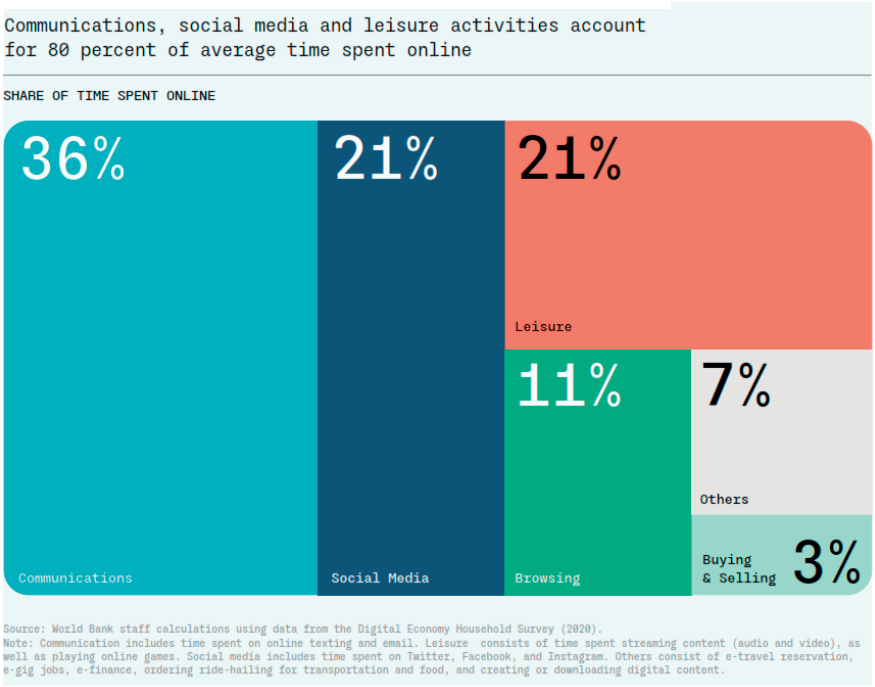
4.1. The objective condition of digital transformation in Indonesia in general

Indonesia has experienced significant economic growth in recent years and is transforming from an upper-middle-income developing country to one with an inclusive, modern, and respected economy on the international stage. One of the growth factors is rapid industrialisation, which can encourage national economic growth. Indonesia's real Gross Domestic Product (GDP) has more than doubled from USD 0.5 trillion in 2009 to USD 1.1 trillion in 2019. However, this condition is not in line with the level of innovation development that accompanies GDP growth. It can be seen on the 2019 Global innovation index (GII) that Indonesia's GII value is below Brunei Darussalam, the Philippines, Thailand, Vietnam, Malaysia, and Singapore. Indonesia's ranking in 2019 was 85, or the second lowest position compared to other countries in ASEAN (katadata.co.id, 2019).

Recognising the enormous benefits of digital transformation, President Joko Widodo, at the Limited Meeting on Planning for Digital Transformation, delivered five directives focusing on accelerating the national digital transformation agenda through five steps, namely: accelerating the development of digital infrastructure and the provision of internet services, preparing a digital transformation roadmap in strategic sectors, accelerating the integration of national data centres, developing human resources and digital talents, and preparing various regulations and financing schemes to support the digital ecosystem (Setkab, 2020). The five steps to accelerate digital transformation launched by President Joko Widodo are the foundation for the development of the Digital Indonesia roadmap. Digital Indonesia has set six strategic directives to realise its vision. The six directives aim to direct Indonesia towards an innovation-based economy with world-class technological capabilities, skilled Human Resources (HR), and a society with a digital culture that is ready to face the future. In addition, the 2021 Draft State Revenue and Expenditure Budget (RAPBN) mandates some spending focuses to realise digital transformation in Indonesia. The Indonesian government has budgeted IDR 30.5 trillion in 2021 for ICT development, which is focused on several aspects (Setkab, 2020):

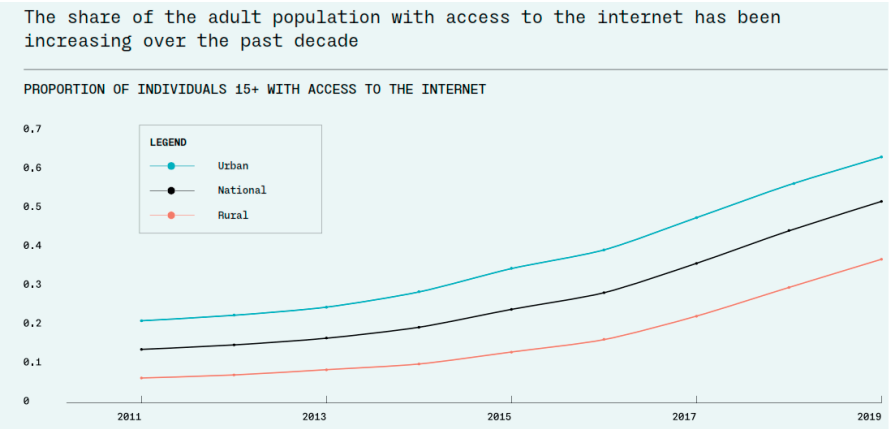
1. Acceleration of digital transformation for the administration of central and local government.
2. Realising efficient and fast public services, especially in the fields of education, health, and government.
3. Consolidation and optimisation of infrastructure, especially those used with cross-sectoral institutions.
4. Realising community inclusion in developing priority areas and promoting equality with additional internet access in 4000 villages and sub-districts.

Digital infrastructure, the acceleration of digital transformation, and increasing human resource productivity through economic knowledge, are the focus of government spending in 2021. The development of digital infrastructure such as the internet is indeed needed, considering that there is still inequality in internet access in Indonesia. The average percentage of households with internet access in urban and rural homes in West Java Province reached 31.65%, while in Papua Province it was only 10.06%, East Nusa Tenggara Province 13.73% and Maluku Province 20.26%. Inclusive internet access is a necessity to realise digital transformation, but it is not the only determining factor. Other key factors include research and development (R&D) capabilities, production innovation capabilities, and talent capabilities. Unfortunately, Indonesia's capabilities in these various indicators have not shown encouraging results (katadata.co.id, 2019).



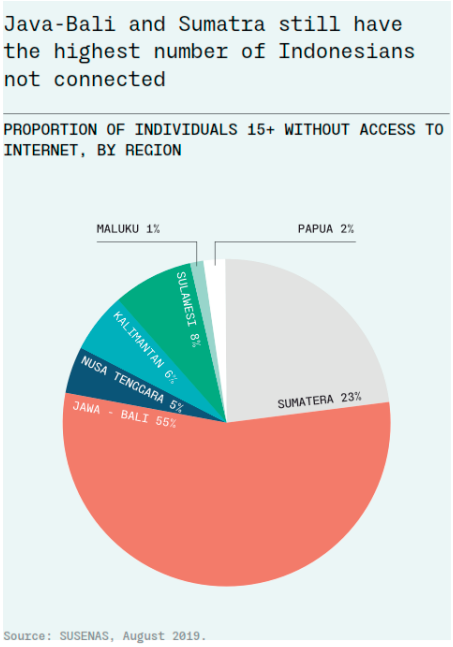
Source : Beyond Unicorns Report, the World Bank (World Bank, 2021)

Indonesia has maintained steady growth in internet connectivity, mainly driven by rapid investment in network infrastructure by the private sector. The share of the adult population connected to the internet has almost quadrupled, from 13 percent in 2011 to 51 percent in 2019. Despite this impressive growth, 49 percent of Indonesian adults are still not connected to the internet and a significant digital divide remains. across various spatial, economic and social dimensions. For example, the urban-rural connectivity gap is large and appears to have increased over the years. In 2019, 62 percent of Indonesian adults in urban areas were connected compared to only 36 percent in rural areas. Urban and rural internet connectivity was 20 and 6 percent, respectively, in 2011.



Source : Beyond Unicorns Report, the World Bank (World Bank, 2021)

Likewise, there are also sharp generation, education and gender gaps. Younger adults were significantly more likely to connect, as were better educated adults. Men are 8 percentage points more likely to be connected than women, indicating possible inequality in household device ownership. On the other hand, the number of internet users in Indonesia released by We Are Social has touched 175.4 million users. There was an increase of 17% and if calculated, the number of internet users was 25 million, an increase compared to 2019 (World Bank, 2021) The Ministry of Communication and Information Technology of the Republic of Indonesia in 2017 conducted a survey and obtained the results that 66.3% of Indonesians own a smartphone (Indonesiabaik.id, 2018). The increasing need for gadgets every year gives a positive signal for public service innovation.

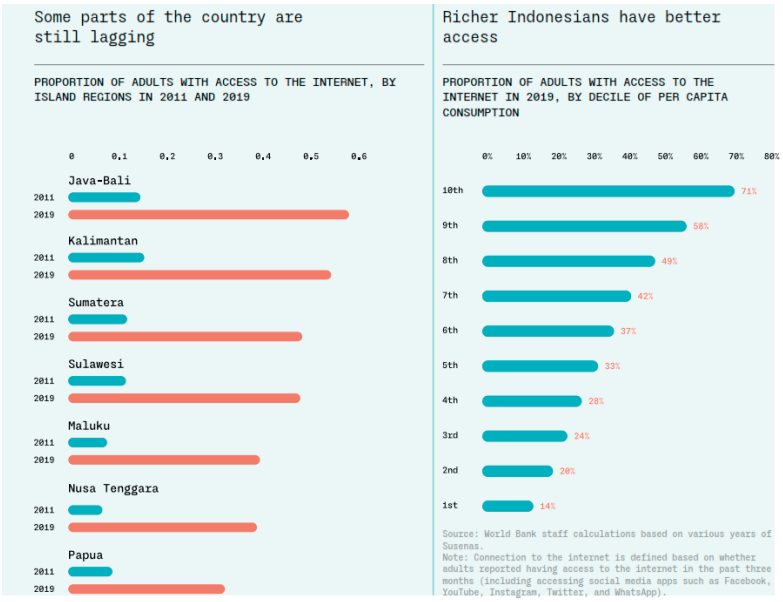


Source : Beyond Unicorns Report, the World Bank (World Bank, 2021)

Indonesia itself has great potential in utilising and developing digitalisation opportunities. As stated in the National Medium Term Development Plan (RPJMN) 2020-2024, the assumption of the digital economy's contribution in 2020 is 3.17%, and in 2024 it is forecast to be 4.66%. GDP growth for information and telecommunications in 2020 is predicted to be 7.12%-7.54%, while in 2024 GDP growth will be 7.54%-8.78%. In addition, the contribution of the Indonesian Ministry of Communications and Information Technology's digital program to Non-Tax State Revenue (PNBP) continues to increase. As of the end of 2020, Kemkominfo's PNBP reached Rp106.1 trillion. In the 2015-2019 period, Kemkominfo's PNBP grew an average of 3 percent per year. The government itself has allocated infrastructure funds both through the APBN and PPPs to build a strong and inclusive digital infrastructure.

However, Indonesia is considered not ready to take full advantage of this potential. In the Network Readiness Index (2020), which measures readiness to innovate in the face of the digital revolution, Indonesia is still ranked 73 out of 139 countries. Meanwhile, according to data from the World Digital Competitiveness Ranking (2020), digital transformation in Indonesia is far from countries in ASEAN. Indonesia is ranked 56th out of 63 countries, while Thailand is in 40th position, Malaysia is in 26th position, and Singapore is in second position. According to the World Economic Forum (2015), a 10% increase in internet access correlates with a 1.2% increase in economic growth in developing countries. Meanwhile, the addition of cellular subscribers up to 10% will increase GDP by 0.4%.

The Indonesian government has made great efforts to close the digital divide, especially with the implementation of the Palapa Ring project, which aims to expand the country's fiber optic backbone infrastructure to the eastern outer islands. With the completion of the Palapa Ring project in 2019, all 514 cities/ regencies in Indonesia are now connected to the national backbone. This has led to a tremendous increase in the proportion of adults connected to the internet in all areas of the country's main island. But there are still sizeable gaps across the region. For example, Based on the Beyond Unicorns Report, the World Bank only about a third of the adult population in Papua is connected, compared to about 55 percent in Java-Bali. At the same time, the fact that almost half of the population, even in areas with relatively better infrastructure, remain without internet access points poses a major challenge in the middle and last mile connectivity segments. The income gap in access is also very large. Adults in families (World Bank, 2021) internet than adults in the poorest decile, only 14 percent of whom are connected. This sharp income gradient suggests possible affordability constraints in access to the internet.

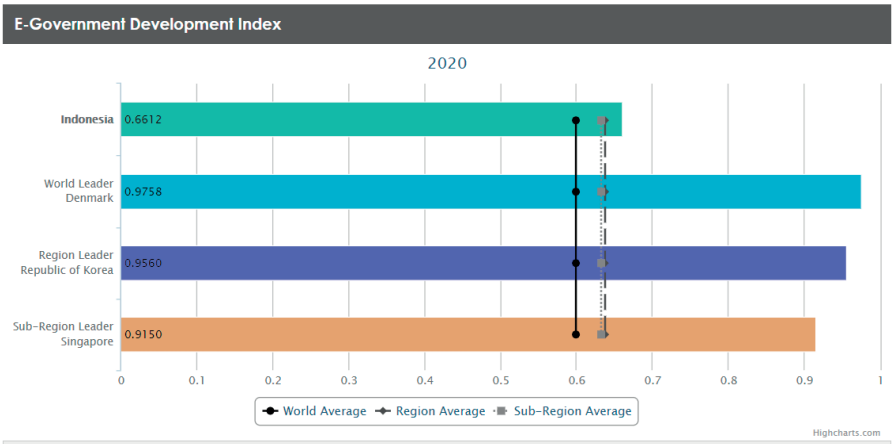


Source : Beyond Unicorns Report, the World Bank (World Bank, 2021)

However, In the latest developments, there are several positive points that can be turning points in digital transformation in Indonesia. It can be seen from the collaboration at the level of policy making, fiscal support and infrastructure. The provision of an electronic-based government system in Indonesia (SPBE) involves cross-sectoral government agencies; the Ministry of State Apparatus and Bureaucratic Reform, the Ministry of Communication and Information, the Ministry of National Planning, the Ministry of Finance, the Ministry of Home Affairs, the Agency for the Assessment and Application of Technology (BPPT), and the National Cyber and Crypto Agency (BSSN).

Collaboration in governance has the implication that all parties involved have the same responsibility for decisions taken, therefore collaboration requires that the parties involved must sit at the same table and have the same power in decision making (Maulana, 2020).

The United Nations (UN) e-Government Survey 2020, with the theme Digital Government in the Decade of Action for Sustainable Development, predicts countries that get more than 0.75 points as very high EGDI, 0.50 to 0.75 as High EGDI, 0.25 to 0.75 points. 0.50 as middle rank EGDI, and less than 0.25 as Low EGDI. In this survey, Indonesia is ranked 88th in the development and implementation of e-government or an electronic-based government system (SPBE). Indonesia received an increase of 19 ranks compared to 2018, which was at 107th, and 116th in 2016. (UN, 2020). Overall, Indonesia got a score of 0.6612 in the High e-Government Development Index (EGDI) group in the UN e-Government Survey 2020, a result which put Indonesia back in the top 100 world rankings at position 88 out of 193 countries.



E-Government Development Index	2020	2018	2016	2014	2012	2010	2008	2005	2004	2003
Indonesia (Rank)	88	107	116	106	97	109	106	96	85	70
Indonesia (Value)	0.66120	0.52580	0.44784	0.44874	0.49486	0.40264	0.41070	0.38186	0.39090	0.42243

Source: UN e-Government Survey 2020 (UN, 2020).

The challenge of digital transformation in Indonesia today is uneven infrastructure, as the condition of Indonesia's ICT infrastructure is still not evenly distributed throughout Indonesia. This is shown by the fact that there are still 12,548 villages/sub-districts that have not been reached by 4G services, 9,113 villages/sub-districts in the 3T (Underdeveloped, Frontier and Outermost) areas, and 3,435 villages/sub-districts in non-3T areas. Internet access in Indonesia is also still quite low. Based on Speedtest Global Index 2020 data, Indonesia's internet access speed is ranked 120th in the world, while for fixed broadband speed, Indonesia is ranked 115th in the world (indonesia.go.id, 2022).

From the explanation above, it can be said that various efforts and initiatives have been carried out by the Indonesian government since the issuance of

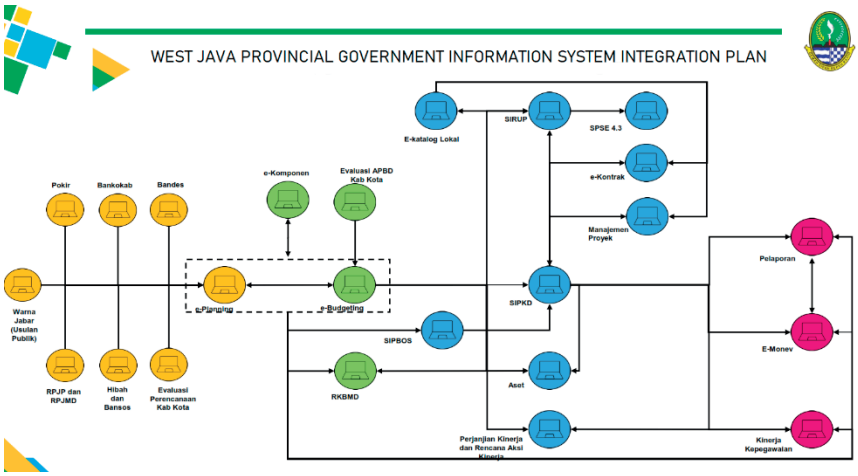
Presidential Regulation No. 95/2018 on e-Government for optimising digital government in Indonesia, but they are still not optimal and even far from what is expected by the regulations, although it is undeniable that there are several regions that show good performance in developing digital government. Based on some of the existing literature, there are many factors that can hinder and challenge the implementation of digital government in Indonesia (Alryalat et al., 2017; Maulana, 2020; Schwertner, 2017)as follows:

1. There is no clear standardisation regarding the implementation of digital government and the lack of socialisation on how to implement ICTs in a real and ideal way for collaborations in local government, which is related to the sustainability of the policy innovations.
2. The unavailability of adequate human resources to manage the business processes of digital government, which causes a gap between the government's internal bureaucracy.
3. The infrastructure network for technology and information is not evenly distributed to the regions (local government).
4. Lack of community engagement and digital literacy related to the use of ICTs because the majority of the population is in the lower and middle-class group.
5. Lack of commitment from top level policy makers in local government to support digital government implementations, which has hampered collaboration with stakeholders, including citizens.
6. Organisational culture that is less supportive of change, and a low culture of sharing knowledge and information, especially between government agencies.

4.2. Pentahelix's Collaborative Approach in West Java Province

Through the concept of digital government, West Java Provincial Government intends to make the government come to the people - not the other way around. This option is realized by cooperating with the provincial government on third parties so that the public can get public services online (jabarprov.go.id, 2019a). The acceleration of digital transformation in West Java is in line with the regional medium-term development plan (RPJMD) for 2019-2023. The elaboration of the vision and mission on the RPJMD is carried out through innovation and collaboration, The West Java Province Vision Statement 2018-2023 with the terminology "Innovation" means that development carried out in various sectors and regions is supported by innovation aimed at improving public services, quality of life and sustainable development. "Collaboration" means that the realization of the vision is carried out by collaboration between levels of government, between regions and between development actors to take advantage of potentials and opportunities and to answer development problems and challenges.

Image: West Java Provincial Government IS Integration Plan



Source: (jabarprov.go.id, 2019b)

The RPJMD document introduces a new approach to development in West Java, one of which is the Pentahelix collaborative approach, represent collaboration with development stakeholders better known as ABCGM (Academic, Business, Community, Government, and Media). The implementation of development is expected not only to be limited to the process or method that has been carried out so far, but also to be accompanied by various forms of reform in the administration of regional government. Likewise, it is hoped that intensive collaboration will be established between the West Java Provincial Government and the central government as well as with district/city local governments, the private sector, NGOs, the media, and the public in general. Therefore, of significant steps are needed to harmonise the digital government with the collaboration process, strategies in public engagement, the provision of policy and public delivery. According to Denis Anderson et al. (Anderson et al., 2015), the government's effort to be able to provide public services in a way that is fair, effective, inclusively centered on citizens, and a public sector that has the capacity to provide services, needs to be strengthened at the central and regional levels. This means that effort is needed to strengthen the four main dimensions in the public sectors: (1) public institutions - especially at the regional level, to provide services; (2) leadership capacity and human resources - needed to provide services in a transparent, fair, efficient and accountable manner; (3) processes and mechanisms - that support citizen participation in service design and delivery; and (4) organisational culture - so as to create space for continuous improvement and innovation in service delivery to the community.

The achievement of indicators in the fifth mission in the West Java PRJMD related to collaboration is shown by 2 (two) regional performance indicators, namely the bureaucratic reform index and the level of effectiveness of regional cooperation. The achievement of the bureaucratic reform index was recorded in the BB category in 2019. This index can be interpreted that

the results of the evaluation of the Ministry of Administrative Reform and Bureaucratic Reform of the Republic of Indonesia represent significant results on bureaucratic reform in the Regional Government of West Java Province. As for the achievement of the effectiveness of regional cooperation, it was recorded at 71.33 percent of the target of 54 percent. This condition can be interpreted that the cooperation agreement which is followed up until the results of the cooperation can be realized and shows a positive improvement. As a result, according to the 2018 maladministration perception survey, West Java Province was ranked second after NTT in terms of the quality of public services. This is much better than North Sumatra, Jakarta, Jambi, and the other five provinces surveyed. The West Java Provincial Government, in this case, is able to run a 3.0 government based on community dynamics and technological developments. This model is much more advanced than the performance-based government model and the rule-based government model (jabarprov.go.id, 2019a).

From the explanation above, collaborative efforts have been institutionalized into the development planning system, especially maximizing the role of multi-stakeholders in helping the government achieve its goals. From the government aspect, of course, the acceleration of digital transformation efforts in this government cannot be separated from the desire to create an organization that is able to manage collaboration, in line with one of the goals of the Governor of West Java, Ridwan Kamil in his administration, is to realize West Java as a Digital Province. This concern stems from the high disparity between rural and urban areas in technology. The lack of supporting infrastructure in rural areas makes it difficult for villagers to enjoy the benefits offered by digital technology. This is what gave birth to the idea of forming the West Java Digital Service (JDS) or Regional Technical Implementation Unit for the Center for Digital, Data and Geospatial Information — a unit under the West Java Province Communication and Information Office which is aspired to be able to narrow the digital divide, help efficiency and accuracy. decision making based on data and technology, as well as revolutionizing the use of technology in people's lives and government in West Java.

JDS's vision is to create a data and technology-based West Java to support responsive, adaptive, and innovative community services and policy making. JDS has 3 visions, namely: 1) Data for Decision Support - System Realizing policy making based on data. 2) Government Digital Transformation -Accelerate the digital transformation of government. 3) Improving Citizens Digital Experience - Easing people's lives with digital technology.

Image: Pentahelix collaboration in West Java Digital Village Program

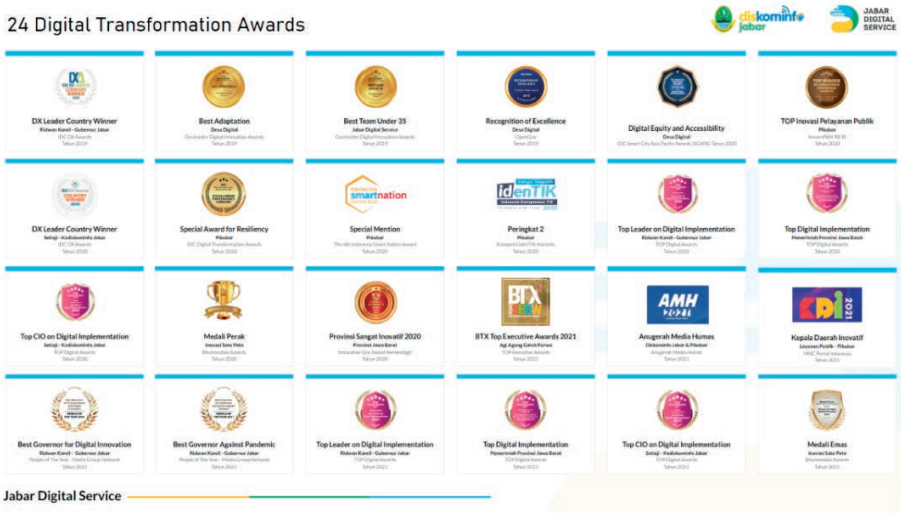
Source: (Jabar Digital Service, 2021)

This is what the West Java Provincial Government has done with JDS. In order to adapt to community needs while keeping pace with the times, the West Java Provincial Government initiated several innovations, including the application of the Penthahelix concept and the implementation of the Digital Village program (jabarprov.go.id, 2019b). In the context of equitable village development, we optimize the Digital Village program with the pentahelix approach. In 2021, this program comes with a new thematic in line with the agenda of The 2021 United Nations Climate Change Conference (COP26), namely integrated waste management (waste management) and the production of environmentally friendly (biodegradable) packaging accompanying other initiatives in the fields of agriculture, animal husbandry, fisheries, health and multimedia. It was recorded that 1904 villages became beneficiaries for the Digital Village program.

The implementation of the Digital Village program is an effort by the West Java Provincial Government to improve the residents' economy by maximizing the village's potential through collaboration with various partners. In 2021, Digital Village will continue to pursue the procurement of digital infrastructure to stimulate village economic growth. It was noted that until March 2021, a total of 353 VSATs (Very Small Aperture Terminals) had been installed and replication of digital wi-fi villages had been carried out. Not only that, with digital access, the provision of digital literacy through assistance with partners and the community is also improved. 141 villages have received digital literacy training. A digital literacy webinar with the concept of Training of Trainers was also held to increase digital literacy and awareness of hoax information, through cadre representatives from each region. Utilization of village potential through the digital economy has also been implemented in several village points in West Java.

In collaboration with Tokopedia and Shopee to launch the Village Digital Center (Talesa), now 35 villages have utilized technology to support the potential for economic development of their villages. Of the 24 villages targeted for the expansion of Digital Villages, it turns out that this year we have succeeded in implementing thematic digital villages many times over. This achievement has made village independence through digital innovation implemented in a total of 460 villages in West Java.

Image : The award received by the West Java Provincial Government in an effort to accelerate digital transformation



Source: (Jabar Digital Service, 2021)

5. Conclusions

Digital Government is a holistic effort to modernise public policy through the adoption of digital technologies and new ways of collaborating with stakeholders, building new frameworks of service delivery, and creating new forms of collaboration. Massive technological developments provide opportunities for the government to serve citizens and increase its participation and cooperation in creating better policies. The involvement of citizens in the process of creating a two-way public policy will change the expectations of the relationship between citizens and the government, with the outcomes of building public trust in the government through the help of ICTs. The government's paradigm towards public services has shifted from a citizen-centric approach to adapting to the business needs of the community through partnerships with the government. For this reason, it is necessary to ensure that digital government is not only limited to digitising public services, but also must be integrated with processes in the development of public policies that involve many parties, including the private sector and the public in general.

The presence of Jabar Digital Services (JDS) or the Regional Technical Implementation Unit of the Center for Digital Services, Geospatial Data and Information in West Java Province, is a tangible form of digital transformation efforts in local government. Judging from the pentahelic collaboration approach, the adaptation of digital policy implementation becomes more patterned, integrated and comes from one clear source. This integration is very helpful for policy makers, in this case the Governor of West Java to decide matters relating to public services or policies that are sporadic such as the COVID-19 pandemic. The digital gap is still a big homework for local governments in Indonesia, not only from the support aspect such as infrastructure, but also from the accelerated adaptation of digital literacy for the public. Another note is that the provision of adequate regulations at the central and local government levels, integration, and sustainability are the emphasis in keeping the digital transformation trend on a directed path. The leadership factor must be reduced so that institutional funding does not depend on personal abilities.

Reference

1. Andhika, L.R., 2017. *Perbandingan Konsep Tata Kelola Pemerintah: Sound Governance, Dynamic Governance, dan Open Government*, Jurnal Ekonomi & Kebijakan Publik, Vol. 8, No. 2, December 2017, hal. 87–102
2. Ansell Christ and Gash Alison, 2008, Collaborative Governance in Theory and Practice*, Journal of Public Administration Research and Theory: J-PART*, Vol. 18, No. pp. 543-571
3. Badan Keahlian DPR RI. 2021. Politik dan Keamanan Budget Issue Brief Vol 01, Ed 1, February 2021.
4. Becker, J., Niehaves, B., Bergener, P., Räckers, M. 2008. Digital Divide in eGovernment: The eInclusion Gap Model. In: M.A. Wimmer, H.J. Scholl, and E. Ferro (Eds.): EGOV 2008, LNCS 5184, pp. 231–242. Springer-Verlag, Heidelberg.
5. Chen, H. 2002. Digital Government: Technologies and Practices. *Decision Support Systems, 34*, 223-227.
6. Denhardt, R.B.; Denhardt, J.V., 2007; The New Public Service: Serving, Not Steering; Armonk, New York/London, England; M.E. Sharpe
7. Dennis Anderson, Robert Wu, June-Suh Cho, Katja Schroeder. 2015. *E-Government Strategy, ICT and Innovation for Citizen Engagement*. Springer: New York Pg. 14-15
8. Emerson K. and Nabatchi T. 2015. Collaborative Governance Regimes. Washington DC: Georgetown University Press.
9. Emerson K., Nabatchi T. and Balogh S. 2012. An Integrative Framework for Collaborative Governance. *Journal of Public Administration Research and Theory* 22(1): 1–29.

10. European Commission. 2019. “The Digital Economy and Society Index (DESI)”

11. Eom, Seok Jin, and Jun Houng Kim. 2014. “The Adoption of Public Smartphone Applications in Korea: Empirical Analysis on Maturity Level and Influential Factors.” *Government Information Quarterly* 31(SUPPL.1). http://dx.doi.org/10.1016/j.giq.2014.01.005.

12. Ferro, E., Gil-Garcia, J.R., Helbig, N. 2007. The Digital Divide Metaphor: Understanding Paths to IT Literacy. In: Wimmer, M.A., Scholl, J., Grönlund, Å. (eds.) EGOV. LNCS, vol. 4656, pp. 265–280. Springer-Verlag, Heidelberg

13. Gray B. 2004. Strong Opposition: Frame-based Resistance to Collaboration. *Journal of Community & Applied Social Psychology.* 14: 166–176.

14. Grönlund, A., Andersson, A., dan Hedström, K. 2005. *NextStep E-Government in Developing Countries*. Sweden: Örebro University

15. Heather Getha-Taylor, Misty J. Grayer, Robin J. Kempf, and Rosemary O’Leary 2019. Collaborating in the Absence of Trust? What Collaborative Governance Theory and Practice Can Learn From the Literatures of Conflict Resolution, Psychology, and Law. *American Review of Public Administration*. 2019, Vol. 49(1) 51–64. SAGE.

16. Heeks, R. 2003. *Most eGovernment-for- Development Project Fail: How Can Risks be Reduced?* (No. 14). Manchester: Institute for Development Policy and Management

17. Helsper, Ellen. 2008. *Digital inclusion: an analysis of social disadvantage and the information society.* Department for Communities and Local Government, London, UK. ISBN 9781409806141.

18. Innes dan Booher, 2003, Collaborative policymaking: Governance through dialogue. In Deliberative policy analysis: Understanding governance in the network society, ed. M.A. Hajer and H. Wagenaar, 33–59. Cambridge: Cambridge Univ. Press

19. Katadata., 2019. Indeks Inovasi indonesia Peringkat Kedua Terbawah di ASEAN. Diakses pada 29 July 2020

20. Katadata., 2019. Indonesia Targetkan Jadi Negara Maju pada 2045, Berapa PDB per Kapitanya? Diakses pada 29 July 2020

21. Katadata., 2020. Pandemi Covid-19 Pacu UMKM Gunakan Media Digital. Diakses pada 29 July 2020

22. Keeping America Informed. 2012. The U.S. Government Printing Office, Washington DC

23. Kumar, R., dan Best, M. L. 2006. Impact and Sustainability of E-Government Services in Developing Countries: Lessons Learned from Tamil Nadu, India. *The Information Society, 22*(1), 1-12.

24. Kumar, et al., 2007, “Factors for successful e-government adoption: a conceptual framework”, The Electronic Journal of e-Government, Vol. 5, Issue 1, pp. 133–122

25. Lathrop, Daniel dan Ruma, Laurel. 2010. *Open Government: Collaboration, Transparency, and Participation in Practice*, California: O’Reilly Media.

26. Maulana, R.Y. 2020. Collaborative governance in the implementation of e-government-based public services inclusion in Jambi Province, Indonesia. Journal of Governance, 5(1), 91–104. https://doi.org/10.31506/jog.v5i1.7317

27. Maulana, R.Y. 2020. Provision of Access to Information Services Based on E-Government in the Village Government. Proceedings of the Tarumanagara International Conference on the Applications of Social Sciences and Humanities (TICASH 2019). Atlantis Press. Advances in Social Science, Education and Humanities Research, volume 439. https://doi.org/10.2991/assehr.k.200515.037

28. Mayer, R.C., Davis, J. H., & Schoor, D.F. 1995. An Integrative Model of Organizational Trust. *The Academy of Management Review, Vol. 20, No. 3*, 709-734.

29. Meijer, A.J., Curtin, D. and Hillebrandt, M. 2012, “Open government: connecting vision and voice”, International Review of Administrative Sciences, Vol. 78 No. 1, pp. 10-29.

30. Meijer, A. 2014. From hero-innovators to distributed heroism: An in-depth analysis of the role of individuals in public sector innovation. Public Management Review, 16(2), 199–216 Nam, Taewoo & Pardo, Theresa. 2014. The changing face of a city government: A case study of Philly311. Government Information Quarterly. 31. 10.1016/j.giq.2014.01.002.

31. Niehaves, B., Becker, J. 2008. The Age-Divide in e-Government – Data, Interpretations, Theory Fragments. In: Oya, M., Uda, R., Yasunobu, C. (eds): IFIP International Federation for Information Processing, Volume 286, Towards Sustainable Society on Ubiquitous Networks, pp. 279–287. Springer-Verlag, Boston.

32. Niehaves, B., Gorbacheva, E., Plattfaut, R. 2013. The Digital Divide vs. the e-Government Divide: Do Socio-Demographic Variables (Still) Impact E-Government Use among Onliners? In: Gil-Garcia, J. Ramon (eds): e-Government Success Factors and Measures: Theories, Concepts, and Methodologies, pp. 52-65. IGI Global

33. Nurdin. 2012. Benchmarking Indonesian Local e-Government. *PACIS Conference in Ho Chi Minh Vietnam*, paper 61

34. OECD. 2016. *Kajian Open Government Indonesia: Hal-Hal Pokok*

35. O'Leary Rosemary, Beth Gazley, Michael McGuire, and Lisa Blomgern Bingham, 2008, Public Managers in Collaboration in The Collaborative Public Manager; New Ideas for the twenty-first century, ed Rosemary O'Leary and Lisa Blomgern Bingham, Washington DC; Georgetown University Press.

36. O'Leary Rosemary, David M Van Slyke ed Sohne Kim, 2010, The Future of Public Administration around the world, Washington DC; Georgetown University Press.

37. Osborne, S. (ed.), 2010. The New Public Governance; London & New York: Routledge

38. Ostrom E. 2007. Institutional Rational Choice: An Assessment of the Institutional Analysis and Development Framework. In Sabatier P. A. (ed.), Theories of the Policy Process. Boulder, CO: Westview Press, 21–64.

39. Oyekunle, R., Akanbi-Ademolake, H.B. 2016. An Overview of e-Government Technological Divide in Developing Countries.

40. Papadopoulou, P., Nikolaidou, M., & Martakos, D. 2010. What Is Trust in E-Government? A Proposed Typology. *Proceedings of the 43rd Hawaii International Conference on System Science.* Hawaii: IEEE Computer Society.

41. Morse R.S. and Stephens, John B. 2012. Teaching Collaborative Governance: Phases, Competencies, and Case-Based Learning, Journal of Public Affairs Education.

42. Rousseau, D.M., Sitkin, S.B., Burt, R.S., Camerer, C. 1998. Not so different after all: A cross-discipline view of trust. Academy of Management Review, 23, 393-404.

43. Sahraoui, S. 2007. e-Inclusion as a Further Stage of e-Government? Transforming Government People Process and Policy 1(1), pp. 44-58

44. Scholl, H.J. (2010) e-Government: Information, Technology and Transformation. In: H.J. Scholl (ed.) Electronic Government: A Study Domain Past its Infancy, pp. 11-32. Armonk, NY: M.E. Sharpe

45. Schwester, R., 2009. "Examining the Barrier to e-government Adoption", Electronic Journal of e-Government, Vol. 7 Issue 1 2009 (113-122)

46. Seifert, J.W., dan Bonham, G. M. 2003. The Transformative Potential of E-Government in Transitional Democracies. *Proceedings of The International Conference on Public Administration in the 21st Century: Concepts, Methods,* Technologies, School of Public Administration, Lomonosov Moscow State University.

47. Setkab., 2020. Antisipasi Perubahan, Presiden Berikan 5 Arahan Soal Perencanaan Transformasi Digital. Diakses pada 29 July 2020

48. Setneg., 2020. Pidato Presiden RI pada Penyampaian Keterangan Pemerintah Atas RUU Tentang APBN TA 2021 Beserta Nota Keuangannya di Depan Rapat Paripurna DPR RI. Diakses pada 2 September.

49. Singh, S., Castelnovo, W.: e-Government: A Time for Critical Reflection and More? In: Singh, S., Castelnovo, W. (eds.). 2015. Leading issues in e-Government Research vol. 2., pp. vii-xv. Academic Conferences and Publishing International Limited Reading, United Kingdom Smith, M. (2010), Building institutional trust through e-government trustworthiness cues. Information Technology and People, 23(3), 222-246.

50. Stoker, G. 2004. Designing institutions for governance in complex environments: Normative rational choice and cultural institutional theories explored and contrasted. Economic and Social Research Council Fellowship, Paper No. 1.

51. Sutiyo, Sutiyo & Maharjan, Keshav. 2017. Decentralization and Rural Development in Indonesia. 10.1007/978-981-10-3208-0.

52. United Nations. 2006. Innovation in Public Governance: Replicating What Works

53. United Nations. 2016. e-Government Survey 2016: E-Government in Support of Sustainable Development. Department of Economic and Social Affairs UN, New York

54. Van de Ven, A. 1986. Central problems in the management of innovation. *Management Science, 32*, 590–607.

55. Wahid, Fathul. 2004. Lesson from e-Government Initiatives in Indonesia. *Media Informatika*: Vol. 2, No. 2, December 2004, 13-21.

56. World Bank. 2001. Issue Note: E-Government and the World Bank.

57. Yin, R.K. 2009. *Case study research: Design and methods* (4th ed.). Thousand Oaks: Sage.

58. Yunita, N.P., Aprianto, R.D., 2018. Kondisi Terkini Perkembangan Pelaksanaan E-Government Di Indonesia: Analisis Website. Seminar Nasional Teknologi Informasi dan Komunikasi 2018 (SENTIKA 2018) ISSN: 2089-9815 Yogyakarta, 23-24 March 2018.

CHAPTER 9

Economy in colours: Blue Economy in the EU and the position of Croatia[1]

Pavle Jakovac[2], Mario Pečarić[3], Tino Kusanović[4]

ABSTRACT

The Blue Economy is an economic arena that depends on the benefits and values realized from the coastal and marine environment. In terms of the entire EU, and according to the most recent figures, the established sectors of the EU Blue Economy directly employed close to 4.5 million people and generated around €667 billion in turnover and €184 billion in gross value added. The aim of paper is to analyze the scope and size of the Blue Economy in the EU and Croatia as the last admitted Member State. Following the theoretical overview, the analyses in this paper cover the period 2009-2019 for the whole EU and for Croatia, respectively. In addition, the established blue sectors (by fostering their green potential) can also play an integral part in mitigating the economic setback caused by the COVID-19 crisis, leading to new growth opportunities and new jobs. Therefore, the overall aim of this paper is to provide data, information, support (and inspiration) to policymakers and stakeholders (mostly in Croatia) on the path of COVID-19 recovery while preparing Blue Economy for leading part in EU green transition.

Key words: *Blue Economy, EU, facts and figures, Croatia*

JEL classification: *A10, E20, O40, Q50*

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1. Introduction

Seas and oceans cover more than 70% of Earth's surface. They hold 97% of all water and sustain 80% of all life forms on the planet. These vast ecosystems are amongst the world's largest carbon sinks (they absorb 30% of carbon dioxide emissions and 90% of the excess heat trapped by greenhouse gases), produce half of the oxygen we breathe and are the primary source of proteins for more than 3 billion people worldwide. They serve as the highway for some 90% of internationally traded goods, via the shipping sector. In addition, they are the source of hundreds of millions of jobs, in fisheries, aquaculture, shipping, tourism, energy production and other sectors and they are the source of some 30% of the world's oil and gas resources (UNDP, 2018).

The blue economy model, in general, aims for improvement of human wellbeing and social equity, while significantly reducing environmental risks and ecological scarcities. It provides for an inclusive model in which coastal states (which sometimes lack the capacity to manage their rich ocean/sea resources) can begin to extend the benefit of those resources to all. Realising the full potential of the blue economy means inclusion and participation of all affected social groups and sectors. The blue economy is not just about market opportunities. It also provides for the protection and development of more intangible "blue" resources such as traditional ways of life, carbon sequestration, and coastal resilience to help vulnerable states mitigate the often devastating effects of climate change (Spalding, 2021).

In the mid-20th century, new agricultural technologies including controlled irrigation, pesticides and chemical fertilisers became commonplace, and helped usher in the Green Revolution, which was instrumental in providing for the world's growing population. Despite its critical role in the story of human development, there is little disagreement that the Green Revolution has also inflicted substantial harm on the world's biodiversity, necessitated rampant deforestation and has been predicated upon a drastic increase in GHG emissions caused by the agricultural industry. New economic models of production and extraction are needed to limit the degenerative human impact on our terrestrial ecosystems, and to fully take advantage of the resources and ecological services available to us. As a system that would be able to accomplish both these targets and more, the Blue Economy may be the next page in humanity's story of economic development (Jouffray et al., 2020).

The Blue Economy paradigm is a natural next step in the overall conceptualization and realization of sustainable human development - it is the utilization of ocean/sea resources for human benefit in a manner that sustains the overall ocean/sea resource base into perpetuity. This paradigm is therefore closely interconnected with the Green Economy in terms that climate changes should be tackled via low-carbon and resource-efficient shipping, fishing, marine tourism, and marine renewable energy industries (UNEP, 2012).

In terms of most recent figures, the established sectors of the EU Blue Economy directly employed close to 4.5 million people and generated around €667 billion in turnover and €184 billion in gross value added. The Croatian Blue Economy employed 162 260 people and generated around €3.6 billion in GVA in 2019. The Blue Economy in Croatia contributes 8% to the national economy in terms of GVA and 9.9% in terms of jobs. Therefore, this paper is focused on interpreting the data on the state of play of the Blue Economy in the EU and Croatia. The analyses in this paper cover the period 2009-2019. For the purposes of the analysis, current scientific and professional papers, studies and reports were also used. The term and the theoretical background of the Blue Economy will be described in this paper, following by the statistical overview of the Blue Economy in the EU and Croatia. The idea behind the analysis is to explain the importance of Blue Economy and to set recommendations for future research, especially in the empirical/econometric part of the analysis.

The paper is organized in the following manner. Section 2 provides the overview of definition(s) and concept of the Blue Economy in general, Section 3 presents facts and figures regarding EU's position of the Blue Economy while Section 4 describes the blue growth / economy in Croatia. The final section closes with conclusions.

2. Blue Economy – definition(s) and concept

Since the 21st century, the concept of the Blue Economy has become increasingly popular (Wenhai et al., 2019). The Blue Economy is an emerging concept that has been heralded as a new approach to ocean/sea governance, and refers to a broad set of policies aiming to support ocean/sea-based economic activities that provide simultaneous improvements for economic, social, and environmental outcomes (Silver et al., 2015; Sakhuja, 2015). International society believes that Blue Economy covers three economic forms: 1) economy coping with global water crisis (McGlade et al., 2012); 2) innovative development economy (Pauli, 2009) and 3) development of marine economy (Behnam, 2012).

According to the World Bank (2017a) the Blue Economy is the sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystem. The European Commission (2018) defines it as all economic activities related to oceans, seas and coasts. The Commonwealth of Nations (2021) considers it as an emerging concept which encourages better stewardship of our ocean or blue resources. On the other hand, Bertazzo (2018) adds that Blue Economy also includes economic benefits that may not be marketed, such as carbon storage, coastal protection, cultural values and biodiversity. World Wildlife Fund-WWF (2015b) begins its report entitled "Principles for a Sustainable Blue Economy" with two senses given to this term: "For some, Blue Economy means the use of the sea and its resources for sustainable economic development. For others, it simply refers to any economic activity in the maritime sector, whether sustainable or not." As the WWF (2015b) reveals, there is still no widely accepted definition of the

term Blue Economy despite increasing high-level adoption of it as a concept and as a goal of policy-making and investment.

A related term of Blue Economy is Ocean Economy and we can see the usage of the two terms interchangeably (Ponce de Leon, 2019). However, these two terms represent different concepts. Ocean Economy simply deals with the use of ocean resources and is strictly aimed at empowering the economic system of the oceans (Jain, 2018). Blue Economy goes beyond viewing the ocean economy solely as a mechanism for economic growth. It focuses on the sustainability of ocean for economic growth. Therefore, Blue Economy encompasses ecological aspects of the ocean along with economic aspects (The Commonwealth of Nations, 2021). Due to ecological aspect(s), Blue Economy is a part of the Green Economy5, which can be defined as an economy that aims at reducing environmental risks, and that aims for sustainable development without degrading the environment (WWF, 2015a). A related term is also Blue Growth, which means support to the growth of the maritime sector in a sustainable way (European Commission, 2014). This term was adopted by the EU as an integrated maritime policy to achieve the goals of the Europe 2020 strategy. Another term related to Blue Economy is the Blue Justice, which stands for a critical approach examining how coastal communities and small-scale fisheries are affected by Blue Economy and Blue Growth initiatives undertaken by institutions and governments globally to promote sustainable ocean development (Isaacs, 2019). Blue Justice acknowledges the historical rights of small-scale fishing communities to marine and inland resources and coastal space. Thus, as a concept, Blue Justice seeks to investigate pressures on small-scale fisheries from other ocean uses promoted in Blue Economy and Blue Growth agendas, including industrial fisheries, coastal and marine tourism, aquaculture, and energy production, and how they may compromise the rights and the well-being of small-scale fisheries and their communities (Bennett et al., 2021).

Blue Economy is a term in economics relating to the exploitation, preservation and regeneration of the marine environment. The term is generally used in the scope of international development when describing a sustainable development approach to coastal resources. This can include a wide range of economic sectors from the more conventional like fisheries, tourism (i.e., coastal, marine and maritime) and maritime transport, to more emergent activities such as offshore renewable energy, aquaculture, seabed extractive activities and marine biotechnology and bioprospecting (Sharafuddin and Madhavan, 2020).

The term Blue Economy is understood as comprising the range of economic sectors and related policies that together determine whether the use of oceanic/sea resources is sustainable. An important challenge of the Blue Economy is thus to understand and better manage the many aspects of oceanic/sea sustainability, ranging from sustainable fisheries to ecosystem

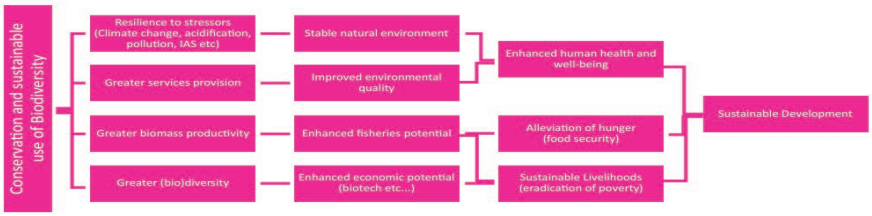
5 Business and economic-growth focused interpretations of the Blue Economy, often propagated by economically powerful states and industry, emphasize innovation, entrepreneurship, and close collaboration with the private sector, paralleling approaches common in its terrestrial counterpart, the Green Economy (Schutter et al., 2021).

health to pollution. A second significant issue is the realization that the sustainable management of ocean/sea resources requires collaboration across nation-states and across the public-private sectors, and on a scale that has not been previously achieved (Pauli, 2010; 2015; 2017).

The natural world made up of the physical environment, its mineral components and biodiversity at all three levels (i.e., genetic, species, ecosystem) is intrinsically interconnected and the more diverse and productive the natural system, the greater the degree of interconnectivity. A case in point is the precursory role that the conservation and sustainable use of biodiversity has in enabling the establishment of a Blue Economy, broader sustainable development and poverty eradication. To this end, the ecosystem approach must underpin all aspects of the Blue Economy incorporating interrelationships, knock-on effects, externalities and the true costs and benefits of activities in terms of the so-called natural blue capital.

The Blue Economy concept (see Figure 1) seeks to promote economic growth, social inclusion, and the preservation or improvement of livelihoods while at the same time ensuring environmental sustainability of the oceans/seas and coastal areas. At its core, it refers to the decoupling of socioeconomic development through oceans/sea-related sectors and activities from environmental and ecosystems degradation. It draws from scientific findings that ocean/sea resources are limited and that the health of the oceans/seas has drastically declined due to anthropogenic activities. These changes are already being profoundly felt, affecting human well-being and societies, and the impacts are likely to be amplified in the future, especially in view of projected population growth (UNCTAD, 2014a; 2014b).

Figure 1: The concept of Blue Economy



Source: UNCSD (2012)

The mix of oceanic/sea activities varies in each country, depending on their unique national circumstances and the national vision adopted to reflect its own conception of the Blue Economy. In order to qualify as components of a Blue Economy, activities need to (The Commonwealth of Nations, 2021):

a. provide social and economic benefits for current and future generations;

b. restore, protect, and maintain the diversity, productivity, resilience, core functions, and intrinsic value of marine ecosystems;

c. be based on clean technologies, renewable energy, and circular material flows that will reduce waste and promote recycling of materials.

The Blue Economy aims to move beyond business-as-usual and to consider economic development and ocean/sea health as compatible propositions. A Blue Economy approach must fully anticipate and incorporate the impacts of climate change on marine and coastal ecosystems. It is generally understood to be a long-term strategy aimed at supporting sustainable and equitable economic growth through oceans/sea-related sectors and activities. In order to become actionable, the Blue Economy concept must be supported by a trusted and diversified knowledge base, and complemented with management and development resources that help inspire and support innovation (World Bank, 2017b).

Several worldwide facts stress the importance of the blue economy (UNCSD, 2012). For example:

a. the worldwide ocean/sea economy is valued at around US$2.5 trillion per year;

b. 80% of global trade by volume is carried by sea and handled by ports worldwide;

c. 350 million jobs worldwide are linked to marine fisheries (with 90% of fishers living in developing countries);

d. aquaculture is the fastest growing food sector and provides about 50% of fish for human consumption;

e. by 2025 it is estimated that 34% of crude oil production will come from offshore fields and higher subsequently, as almost half the remaining recoverable conventional oil is estimated to be in offshore fields - a quarter of that in deep water.6

The potential benefits of developing the Blue Economy are enormous. It offers the possibility of improved efficiency in land and ocean/sea management, better treatment and governance of marine ecosystems, a more equitable model of global health standards and socio-economic growth, reduced emissions and resilience against climate change. If governments can transition even a part of their economic focus from land-based extraction and production, the Blue Economy concept may well be the future of sustainable development.

3. EU's context regarding Blue Economy – facts and figures

Regarding the EU's context, in the previous decade, the EU focused its activities entirely on small and medium-sized enterprises (SMEs), which account for 99.8% of the total number of European companies, generate 66.6% of total employment and participate in the realization of 56.4% of the total European added value. In the context of globalization, SMEs are

6 Deep water oil drilling is not new, but market pressures are making the exploration for and tapping of evermore remote reserves cost effective, bringing the most isolated areas under consideration. Methane hydrates, a potentially enormous source of hydrocarbons, are now also being explored and tapped from the seabed.

increasingly faced with demands in terms of constant investment in research and development (R&D) and the promotion of education and training, with the ultimate goal of increasing innovation, productivity and achieving international competitiveness (European Commission, 2019).

Nevertheless, SMEs face a number of problems and challenges, such as providing funds for starting and maintaining the business. The SMEs related to the Blue Economy are, due to the specificity of the sector and the environment, even more sensitive to global challenges and changes. As previously mentioned, the Blue Economy includes all activities related to oceans, seas or coastal areas with a goal of stimulating economic growth and development, increasing employment and improving the environment while at the same time preserving the ecosystem(s).

According to the most recent figures presented in Table 1, the established (seven large) sectors of the EU Blue Economy (i.e., marine living resources, marine non-living resources, marine renewable energy, port activities, shipbuilding and repair, maritime transport, coastal tourism) directly employed close to 4.45 million people and generated around €667.2 billion in turnover and €183.9 billion in gross value added.

Table 1: Blue economy sector(s) in the EU – main indicators for 2019

Indicator	EU Blue Economy 2019
Turnover	€667.2 billion
Gross value added (GVA)	€183.9 billion
Gross profit	€72.9 billion
Employment	4.45 million
Net investment in tangible goods	€6.1 billion
Net investment ration	3.3%
Average annual salary	€24 739

Source: European Commission (2022a)

If compared to 2009, all of the indicators mentioned in Table 1 show an increase over the course of 11 years. Therefore, the seven established sectors of the EU Blue Economy generated GVA of €183.9 billion in 2019 which is a 20% increase compared to 2009. Gross operating surplus (profit) at €72.9 billion was 22% higher than in 2009, while total turnover at €667.2 billion, increased by 15% (€578 billion in 2009). These established sectors, as previously mentioned, directly employed almost 4.45 million people in 2019. Although this figure is just 0.5 % more than in 2009, it means that the number of jobs in the EU Blue Economy is nowadays higher than before the economic crisis. The increase is largely driven by coastal tourism that employs 63% of the total EU Blue Economy jobs (see Table 2).

Table 2: Blue Economy in EU (employment and GVA) for the period 2009-2019

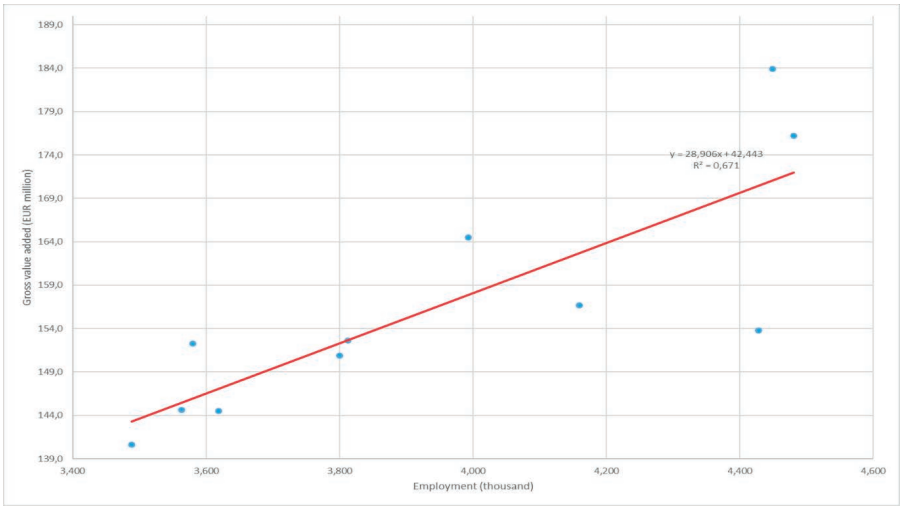
Persons employed *(thousand)*	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Living resources	528.9	527.6	508.5	536.7	520.7	518.5	521.7	529.7	527.8	539.9	538.7
Non-living resources	34.4	31.6	29.8	30.4	27.7	28.1	27.5	17.9	12.5	11.1	10.1
Ocean energy	0.4	0.6	0.9	1.0	1.2	1.7	4.0	5.1	7.0	8.3	10.6
Port activities	381.6	372.5	359.5	367.4	363.6	403.9	414.0	418.1	414.9	385.1	382.6
Shipbuilding and repair	306.8	74.7	236.4	255.5	256.6	258.8	263.9	269.1	274.5	292.7	299.1
Maritime transport	357.5	354.5	363.1	356.3	356.4	375.9	383.1	367.5	384.5	398.1	403.0
Coastal tourism	2,818.2	2,597.0	2,286.7	1,904.5	2,036.6	2,032.4	1,965.5	2,192.3	2,371.6	2,845.8	2,804.6
Blue Economy jobs	4,427.7	4,158.5	3,812.1	3,487.7	3,562.9	3,619.4	3,579.6	3,799.8	3,992.9	4,481.0	4,448.7
National employment	184,570	182,166	182,277	181,282	180,464	181,981	184,044	186,964	189,678	191,831	193,604
Blue Economy *(% of national jobs)*	2.4%	2.3%	2.1%	1.9%	2.0%	2.0%	1.9%	2.0%	2.1%	2.3%	2.3%
GVA *(€ million)*	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Living resources	14,812	15,326	15,889	15,955	15,501	15,938	16,932	18,189	18,395	19,196	19,332
Non-living resources	11,190	11,325	11,935	11,237	9,684	8,215	8,422	4,688	3,911	4,257	4,671
Ocean energy	41	115	168	191	298	397	723	991	1,300	1,398	1,925
Port activities	23,184	23,364	26,858	23,944	24,233	25,413	26,406	27,174	27,407	26,542	27,937
Shipbuilding and repair	11,263	11,814	11,747	10,911	11,060	11,606	11,251	12,385	13,515	14,727	15,647
Maritime transport	26,930	30,020	27,123	27,435	29,065	28,748	32,486	27,094	31,184	30,109	34,309
Coastal tourism	66,393	64,720	58,887	50,925	54,714	54,174	56,032	60,352	68,750	79,979	80,109
Blue Economy GVA	153,813	156,683	152,607	140,599	144,554	144,491	152,253	150,873	164,462	176,207	183,930
National GVA	9,532,263	9,848,639	10,145,776	10,205,623	10,320,481	10,555,602	10,936,678	11,231,243	11,664,797	12,046,015	12,476,809
Blue Economy *(% of national GVA)*	1.6%	1.6%	1.5%	1.4%	1.4%	1.4%	1.4%	1.3%	1.4%	1.5%	1.5%

Source: European Commission (2022a; 2022b)

The GVA data show an acceleration in the growth of all established sectors from 2013 onwards except for non-living resources (i.e., oil, gas and minerals extraction). The GVA generated by coastal tourism, the largest Blue Economy sector in the EU, increased by 21% compared to 2009, while maritime transport and port activities increased by 27% and 21%, respectively. Other sectors that contributed to growth were living resources (+31%) – including fisheries and aquaculture – as well as shipbuilding and repair (+39%). On the other hand, non-living resources dropped by 68%. Employment is recovering since 2013. With respect to 2009, overall, 2019 figures are remarkably similar. The highest relative expansion was observed, in maritime transport (+13%). In shipbuilding and repair, employment has grown with respect to the minimum observed in 2010, but it has not yet recovered to 2009 levels. In non-living resources, a significant declining trend is seen. The outbreak of the COVID-19 pandemic in February 2020 represented a major shock for the global and EU economies, with severe socio-economic consequences in 2020 and 2021. All the established sectors suffered severely from the COVID-19 crisis. The coastal tourism sector was the sector most impacted by the COVID-19 pandemic with a reduction of its turnover almost by half, being one of the economic activities hit harder in the whole economy. Given the importance of coastal tourism in the EU Blue Economy (i.e., it represents the 44% of the GVA and 63% of the employment, it is expected that the EU Blue Economy will be more affected by the crisis than the overall EU economy (European Commission 2021; 2022a; 2022b).

Furthermore, we consider the impact of EU's Blue Economy employment on the sector's GVA, where it is assumed that the increase in employment will lead to a higher GVA. The scatterplot (see Graph 1) with the estimated regression line indicates just the above mentioned - the positive slope of the estimated regression line shows a positive relationship between the mentioned variables.

Graph 1: Relationship between employment and GVA in the EU's Blue Economy sector



Source: authors' own calculation based on data from European Commission (2022a; 2022b)

Additional calculations, for example, indicate that the Pearson correlation coefficient was 0.82 (indicating strong correlation), the adjuster R2 was 0.63 and the effect of those employed in EU's Blue Economy on the GVA generated in that same sector was positive (t-stat 4.28; p-value 0.002). Since $p<0.05$, the estimated coefficient ß is statistically significant meaning that there is a statistically significant linear relationship between Blue Economy's employment and GVA in the EU. The estimated coefficient ß equals to 28,91 meaning that increase in employment for additional thousand will, in average, increase the GVA for €28.91 million.7 To some extent these results could be explained by the capital/labour intensity of the Blue Economy sectors. As previously mentioned, coastal tourism is the largest Blue Economy sector in the EU. It is also labour-intensive, and often run by small or medium-sized local or family businesses that are widespread along the entire EU coastline. This, in turn, is reflected in the sector making the greatest contribution to the EU Blue Economy in terms of employment and GVA and with its share increasing over time.

In addition, the EU projections point to twice as fast growth of the Blue Economy than other economic activities by 2030, which will bring about significant benefits for the European economy. In such a situation, it is necessary to encourage the innovation capacities of the SMEs related to the Blue Economy using alternative financing methods (especially crowdfunding) and include representatives of local government through organized educational, training and other targeted activities (European Commission, 2022a).

7 The detailed calculations are available from the authors upon request. Limitations and possible shortcomings of using a bivariate model have to be taken into consideration.

4. Blue growth in Croatia: where are we at?

4.1. Blue Economy sectors in Croatia – what is our forte?

From the broader geographical point of view, Croatia (together with Albania, Bosnia and Herzegovina, Italy, Montenegro and Slovenia) has its coat on the Adriatic Sea. The Adriatic is a semi-enclosed sea, intensively used by various maritime activities. The basin is also characterised by a rich marine biodiversity and furthermore, it is home to significant world heritage treasures. The Adriatic Sea is part of the eastern basin of the Mediterranean and extends northward between Italy and the Balkans, communicating with the eastern Mediterranean basin through the Strait of Otranto. It has a surface area of 138,600 km^2, a volume of 33,000 km^3 and its shape can be approximated as a rectangle extending north-northwest, about 800 km long and 200 km wide. In total, more than 3.5 million people live on the Adriatic coasts (Ramieri et al., 2014).

Croatia has by far the longest coastline of the six aforementioned Adriatic countries. Including more than 1,000 islands, the Croatian coastline amounts to almost 6,000 km (30.5% mainland and 69.5% islands), which is approximately 75% of the total length of the Adriatic coastline. In ecological terms, Croatia has very clean and clear water, which sometimes reaches visibility of up to 50 m. It is considered the cleanest in the Mediterranean and the 12th according to purity in the world (Bach, 2015).

Several important ports are located in the north of the Adriatic (e.g. Venice, Trieste, Koper, Rijeka), implying intense maritime traffic in the area. In Croatia alone there are about 350 ports and docks, and the ports of Pula, Rijeka, Zadar, Šibenik, Split, Ploče and Dubrovnik are involved in international trade. In terms of strategic position and harbour traffic, the afore-mentioned Port of Rijeka stands out. Other significant activities taking place at the Adriatic are fishing, gas extraction and (especially for Croatia) coastal and marine tourism (Randone, 2016).

According to the European Commission (2022a), the Croatian Blue Economy (i.e., established sectors) employed 162 260 people and generated around €3.6 billion in GVA in 2019. The Blue Economy contributes 8% to the national economy in terms of GVA and 9.9% in terms of jobs. Overall, Blue Economy GVA in Croatia increased 29% compared to 2009 due solely to coastal tourism and marine living resources. Sectors such as shipbuilding and repair, port activities, and marine non-living resources all saw decreases compared to 2009. Conversely, Blue Economy jobs decreased 10% compared to 2009, increasing only in marine living resources and maritime transport. On the other hand, marine non-living resources and shipbuilding have lost a significant amount of jobs compared to 2009 (98% and 54%, respectively). The Blue Economy in Croatia is clearly dominated by coastal tourism, which contributed with 79% to jobs and 81% of GVA in 2019. Marine living resources (7%), maritime transport as well as shipbuilding and repair8 (both with 5%)

8 Although in decline, the shipbuilding sector continues to be one of the most important industrial sectors in Croatia. The current Croatian shipbuilding industry is almost negligible in the

are also important contributors in term of Blue Economy jobs (see Table 3).9

Table 3: Blue Economy in Croatia (employment and GVA) for the period 2009-2019

Persons employed *(thousand)*	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Living resources	9.3	9.1	8.8	9.2	9.5	9.7	9.2	11.6	11.4	11.4	11.6
Non-living resources	7.5	5.6	4.9	6.5	5.7	6.4	6.6	1.3	1.2	1.2	0.2
Ocean energy	-	-	-	-	-	-	-	-	-	-	-
Port activities	5.5	5.2	5.9	5.5	5.5	5.3	5.3	5.22	4.8	4.7	5.1
Shipbuilding and repair	17.7	16.6	15.4	13.8	14.7	9.6	9.9	10.2	10.8	10.4	8.1
Maritime transport	6.9	7.1	7.3	7.1	6.8	6.8	6.9	7.1	7.5	7.3	8.6
Coastal tourism	133.9	193.0	149.6	127.9	112.0	123.0	102.3	98.7	125.3	124.3	129.7
Blue Economy jobs	180.8	236.6	191.9	170.0	154.2	160.8	140.1	134.1	161.0	159.4	163.3
National employment	1,708	1,649	1,584	1,528	1,494	1,542	1,559	1,567	1,603	1,630	1,650
Blue Economy *(% of national jobs)*	10.6%	14.3%	12.1%	11.1%	10.3%	10.4%	9.0%	8.6%	10.0%	9.8%	9.9%
GVA *(€ million)*	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Living resources	54	59	64	67	85	56	125	120	164	159	155
Non-living resources	101	75	66	88	78	86	94	83	44	52	13
Ocean energy	-	-	-	-	-	-	-	-	-	-	-
Port activities	147	124	124	117	117	121	120	131	114	110	132
Shipbuilding and repair	227	292	237	157	117	103	139	103	148	89	140
Maritime transport	217	197	193	169	197	172	235	185	202	213	233
Coastal tourism	2,002	2,974	2,326	2,072	2,161	2,297	2,080	2,176	2,769	2,862	2,926
Blue Economy GVA	2,797	3,721	3,009	2,670	2,755	2,836	2,792	2,798	3,442	3,484	3,599
National GVA	38,560	38,297	38,242	37,009	36,447	36,200	36,968	36,633	40,551	42,448	44,770
Blue Economy *(% of national GVA)*	7.3%	9.7%	7.9%	7.2%	7.6%	7.8%	7.6%	7.2%	8.5%	8.2%	8.0%

Source. European Commission (2022b)

When it comes to (coastal) tourism, Croatia cannot compare with major tourism powers such as France, Spain, Italy or Greece in terms of the number of tourist arrivals, but with around 20 million tourist arrivals in 2019 and a trend of increasing numbers for many years, Croatia has certainly become one of

context of global shipbuilding. However, it has a significant role within the national economy. Production portfolio consists of new buildings of various size(s), repair, conversion and off-shore constructions (Bodul and Jakovac, 2020). Currently however, several important shipyards are facing severe financial problems and an uncertain future (European Commission, 2022b)

9 The authors also conducted the same analysis as they did in the third part of this paper but now they used Croatia as an example. This time, all the potential shortcomings of the bivariate model came to the spotlight. Indeed, the omitted variable bias and the usage of the bivariate model proved that a single independent variable cannot be the only factor influencing the dependent variable. For example, the Pearson correlation coefficient was (only) 0.49, the adjuster R2 was 0.15 and the effect of those employed in Croatia's Blue Economy on the GVA generated in that same sector was positive but statistically insignificant (t-stat 1.66; p-value 0.13). The detailed calculations are available from the authors upon request. Allowing for additional independent variables, the end result of the analysis might have been different, but certainly more methodologically correct (Lütkepohl, 1982; Stern, 1993; Ghali and El-Sakka, 2004; Wilms et al., 2021). Needless to say, this must be taken into consideration in future research of this particular topic.

the most popular countries on the Mediterranean.10 Since 2000, the number of tourist overnights has doubled. This is also reflected in some indicators that have been happening over the past decade, such as: the "discovery" of Croatia in an increasing number of articles in leading world magazines and other media praising its natural and cultural attractions, the obvious rise in the number of tourist arrivals from a growing number of generating countries, the significant share of tourism in the total GDP of Croatia (25%), the rise in the number of objects of protected tangible and non-tangible cultural heritage, the increase in investment in tourism and auxiliary infrastructure, the increasing variety of what is on offer for tourists (European Commission, 2021).

Tourism is certainly a most lucrative activity, especially in the coastal areas in the summer. Here, there is a generally accepted division of all economic activities into "in season" and "out of season" ones. The summer tourist season, which mainly lasts from the beginning of June to the end of September, is the main stimulus for the development of this, the most attractive area for tourists, where 84.1 million tourist overnights were recorded in 2021. According to the Croatian National Tourist Board-CNTB (2022), of the total number of overnights in 2021, 85.5% were by foreign visitors. Most foreign tourist overnights (23.5 million) were spent in the County of Istria (where tourism is the most developed in terms of infrastructure), Split-Dalmatia County (15.5 million) and Primorsko-goranska County (15.3 million). Followed by Zadar County (12.7 million overnight stays), Šibenik-Knin County (5.9 million) and Dubrovnik-Neretva County (5.4 million). The destinations that attracted the most visitors were Zagreb (638,000 arrivals), Rovinj (549,000), Dubrovnik (543,000), Split (529,000) and Poreč (431,000 arrivals).

Regarding sheer economic figures on coastal tourism in Croatia, the numbers for the last available year (2019) show that value added generated by the sector amounted to €2.9 billion. Almost 130 000 people were directly employed in the sector and the personnel cost reached €1.6 billion (European Commission, 2022a; 2022b).

4.2. A look at the bigger picture – EU's tourism industry

Within the EU's framework, coastal tourism is the biggest sector across the Blue Economy in terms of GVA and employment.[11] The GVA generated by the sector in 2019 amounted to slightly more than €80 billion, a 21% rise compared to 2009. Gross operating surplus was valued at €27.4 billion (+42% compared to 2009). Turnover amounted to almost €230 billion, 20% more than in 2009. More than 2.8 million people were directly employed in the sector in 2019 (up by 45% compared to 2015) and personnel costs reached

10 The figures for the last two years, especially for 2020, were not so assuring for the tourism industry due to the COVID-19 crisis when compared with the previous years. However, Croatia achieved the best tourist traffic in the Mediterranean. According to the Croatian Bureau of Statistics-CBS (2021), due to the impact of the coronavirus outbreak, tourist arrivals at accommodation establishments in Croatia dropped down to just 7 million in 2020. The numbers increased at almost 14 million tourists arrivals in 2021.

11 Overall, coastal tourism accounted for 63% of the jobs, 44% of the GVA and 38% of the profits in the EU Blue Economy in 2019 (European Commission, 2022a).

€52.7 billion (up from €46.9 billion in 2009), amounting to an average wage of about €18 800 in 2019, a 13% increase from €16 640 in 2009.

The sector was impacted by the global economic and financial crisis of 2008-09, which saw a gradual decrease in all economic indicators, including employment over the period 2009 to 2015. However, in the period 2016 to 2019 a strong recovery can be observed. Personnel costs have followed a similar trend. In general, Spain leads coastal tourism with 25% of the jobs and 30% of the GVA, followed by Greece, Italy and France. As described in the EU's Blue Growth strategy, coastal and maritime tourism bears large potential to promote a smart, sustainable and inclusive Europe (European Commission, 2021).

Europe is the most-visited continent, welcoming half of the world's international tourist arrivals. The EU alone accounts for almost 40% of the world's international arrivals. Coastal areas and islands tend to be major tourism hotspots. These areas have always been sought for their unique characteristics making them ideal places for leisure and tourism activities to take roll. In recent years, the increasing number of tourists has led to concerns around the environmental impacts of tourism on marine ecosystems and the sustainable development of coastal areas, especially those characterised by high-density building and expanding environmental footprints. Over half of the EU's tourist accommodation establishments are located in coastal areas. Visitors to coastal areas are typically more numerous in southern EU Member States, which are generally more conducive to beach holidays due to their latitude and climatic conditions. In 2019, coastal areas accounted for more than three quarters of the total nights spent in tourist accommodation across Malta, Cyprus, Greece, Spain, Croatia, Denmark, Portugal, Latvia and Estonia. The two most popular tourist destinations in the EU in 2019, all located in coastal areas, were the Canary Islands in Spain and the Adriatic coastal region of Jadranska Hrvatska in Croatia (European Commission, 2022a).

Tourism plays an important role in many EU Member States' economies, with wide ranging impact on economic growth, employment and social development. Tourism is particularly important for countries in Southern Europe, like Spain, Portugal, Italy, Malta and Greece, but also in other coastal countries namely Croatia, Bulgaria, Romania and the Netherlands. For many of the countries that offer "sun, sea and sand" (3S) tourism, beach tourism accounts for a significant amount of their total national revenue (see Table 4).

Table 4: EU Member States most dependent on tourism (% of GDP)

EU Member States	% of GDP
Croatia (HR)	25%
Cyprus (CY)	22%
Greece (EL)	21%
Portugal (PT)	19%
Spain (ES)	15%
Estonia (EE)	15%
Austria (AT)	15%
Italy (IT)	13%
Slovenia (SI)	12%
Bulgaria (BG)	12%
Malta (MT)	11%
France (FR)	10%
Germany (DE)	9%

Source: European Commission (2021)

The tourism industry represents 10% of the EU's GDP, encompassing 2.4 million businesses (of which 90% are SMEs). Around 40% of all international arrivals take place in the EU, making it the global leader. Most Europeans (85%) spend their summer holidays in the EU whereas for every €1 generated in the tourism sector €0.56 added value is created. The industry encompasses 23 million direct and indirect jobs accounting for 12% of EU employment whereas 37% of tourism workers are under 35 years old (Santander, 2020; European Commission, 2022a).

Nevertheless, the sector suffered greatly from the COVID-19 crisis. According to the UN World Tourism Organization-UNWTO (2021), among the most affected sectors is travel and tourism. Global travel restrictions, with periods of fully closed borders to contain the virus, have led to a substantial reduction of international demand since 2020. Indeed, the outbreak of COVID-19 in Europe in February 2020 has put the EU tourism industry under unprecedented pressure. With the absence of tourists as well as cancellations of cultural, sporting and business events, the tourism sector is one of the most affected with an estimated drop of 60-80% of tourism activity.

It is estimated that 6 million employees lost their job (out of 23 million). Moreover, there is a significant estimated loss of revenue: 85% hotels and restaurants, 85% tour operators, 85% long distance rail and 90% cruises and airlines. The impact of the COVID-19 crisis particularly affected countries heavily relying on coastal tourism: Greece (-12% in overall GDP), Croatia (-10%), Malta and Spain (both -9%). Due to strong reliance on air travel, these countries registered a decline in coastal tourism whereas countries such as Denmark, Germany, France, the Netherlands and Poland registered expected activity or exceeded it. This holds particularly true concerning domestic

tourism. Looking at the COVID-19 impact for the EU as a whole, recovery is bound to lag behind for an extended period of time until restrictions on travel and leisure activities are (completely) lifted (European Commission, 2021).

4.3. Challenges and perspectives for Croatia

In total, and just through the prism of coastal tourism, the entrepreneurial potential of the Blue Economy for Croatia is enormous. At present, Blue Economy as the newest development concept is becoming an important driving force for achieving sustainable blue development. Today, focus on the Blue Economy in Croatia needs more responsibilities, in the way to connect all stakeholders who are involved in blue sectors that are of Croatia's utmost importance. On the EU level, the Blue Economy aims to stimulate sustainable economic development, create business opportunities and open jobs in the Blue Economy sectors of the EU countries. Therefore, Croatia must not be an exception.

Regarding interactions with the environment, the natural resources and beauty of coastal areas have made them popular destinations for visitors. A healthy natural environment is a huge asset but tourism generates many pressures on local environment and ecosystems, such as higher water use, increased waste generation and accumulated emissions from air, road and sea transport in peak seasons. In addition, coastal areas are especially prone to a number of climate change related impacts, such as flooding, erosion, saltwater intrusion, increase in temperatures and periods of drought. These can have severe direct and indirect effects on coastal and maritime tourism. Coastal defence is of prime importance to counter coastal erosion and flooding and maintain tourism facilities and activities (European Commission, 2021).

The coastal part of Croatia is traditionally facing the sea, which is of great economic importance for regions in that part of Croatia, but also for the entire Croatian economy. Croatia's coast and sea are key national assets that contribute significantly to the country's economy and give Croatia a competitive edge as an attractive tourism destination. Increased use of marine and coastal space, especially for fisheries, maritime transport, tourism and construction have all increased the pressure on these ecosystems (i.e., pollution, inadequate management of waste, marine litter and plastics, overfishing, and construction). According to the World Bank (2021), the loss of ecosystem services (i.e., the benefits to human society derived from natural resources, including the values of the annual loss of timber and other services provided by forests, the sequestration of carbon, water supply for hydropower, and pollination) is estimated at €90 million.

Ecosystems in Croatia provide vital services and are the foundation for economic growth, including the development of the tourism industry. Furthermore, marine litter is an illustrative example of the costs associated with environmental degradation. The World Bank (2021) estimates the annual cost of marine litter in Croatia at €21 million for sectors such as tourism, fisheries and aquaculture, and maritime transport. The strong seasonality

of tourism tends to place increased pressure on the local environment and public infrastructure. Major tourist destinations, especially on smaller islands, are faced with challenges related to ecosystem service losses, and with pressure on local water sources, wastewater and waste treatment capacities. Overall, the cost of environmental degradation related to tourism is estimated at about €55 million, equivalent to about 0.6% of tourism-generated GDP.

Therefore, sustainable management of marine and coastal resources is needed and it requires collaboration across industries, public and private sectors, and nations. To ensure sustainable use of previously mentioned resources, an ecosystem-based approach is required, using the concepts of the Integrated Coastal Zone Management (ICZM)12 and Maritime Spatial Planning (MSP)13. Both legal frameworks rely on cross-border cooperation, as well as the cooperation of stakeholders in various activities in the coastal and maritime sectors and have the potential to integrate ecosystem services and Blue Growth opportunities in a sustainable way. These frameworks can also be used as a tool for increasing investor confidence by introducing transparency and predictability. Also, these can be a catalyst for investment in innovation and developing blue technologies (Alempijević and Kovačić, 2019).

In terms of greening the Blue Economy (as an incentive to sustainable development) and in addition to these frameworks it is worth mentioning a paper by Denona Bogović and Šverko Grdić (2020) where the authors analysed the possible effects of transition on the green economy for the Croatian economy.14 The authors concluded that the increase in investment has a positive impact on GDP and the employment rate, but also that it has a negative impact on the amount of harmful emissions. Therefore, future investments financed by EU grants will need to be energy efficient, with low or reduced negative environmental impacts, with as few harmful emissions and negative effects on the climate as possible. Croatia faces the challenge of planning and developing green-blue projects and taking advantage of the incentives offered for the most successful transition to a green economy, and for the benefit of various economic sectors and society in general. Given the available financial resources, this is a really crucial period which, if the funds are invested wisely, can significantly contribute to the blue-green development, but also, can be a significant missed opportunity for a generational step forward (Kovačić, Perinić and Kerčević, 2021).

12 Integrated coastal zone management (ICZM) is a process that attempts to resolve coastal conflicts, promote the sustainability of resources, and enhance economic benefits to coastal communities (Godschalk, 2009; McLachlan and Brown, 2006).

13 Maritime spatial planning (MSP) is the tool to manage the use of our seas and oceans coherently and to ensure that human activities take place in an efficient, safe and sustainable way (Schaefer and Barale, 2011).

14 Economic indicators such as total number of employees, GDP and gross investment, but also environmental indicators, values of pollutant emissions in wastewater and emissions of sulfur dioxide (SO2), carbon monoxide (CO) and nitrogen dioxide (NO2) were taken into account. Also, two hypotheses were set: that the size (amount) of investments affects the growth of GDP and employment, and that the same investments affect the above environmental indicators, and the data for the period from 1996 to 2017 were considered.

5. Conclusion

On a global level, challenges regarding the implementation of the Blue Economy are present since not all countries have access to the same resources as European countries. These challenges are related to finance (i.e., stable economy and long-term financial plans), social justice (i.e., equity between land/resources and interests of communities' dependent on the ocean/sea) and science and innovation (i.e., technological capacity, intersectoral experts and stakeholders).

Regarding the EU, maritime spatial planning has an important role together introduction of digital and green technologies for marine activities with the aim of generating both economic, social and environmental benefits. In addition, favourable and predictable innovation and investment environment, with streamlined administrative procedures and certainty in regulatory and financial conditions needs to be provided. Also, cooperation between policymakers at all levels: between the EU and Member States, between Member States in various regions, and between different policy fields such as industry, fisheries, trade, transport, energy, employment and the environment.

And finally, Croatia, which is in the group of countries with the largest contribution of the blue economy to the overall national economy, with coastal tourism being the most important sector in terms of GVA and employment. Sustainable maritime spatial planning and management of the marine and coastal area, as well as the sustainable development of blue sectors (among them especially tourism) is a constant challenge and subject of discussion at the national level. From practical point of view, several concrete measures and recommendations (for reaching the goals of blue development) can be mentioned, for example: improvement of the efficiency of public administration by reducing administrative barriers and procedures; establishment of SMEs in the sector to fill the market gaps and use the full potential; encouragement and development of innovative /emerging sectors of the Blue Economy; encouragement of the development of selective forms of tourism (especially by determining the limits of sustainable reception capacity of the regions in correlation with the daily life of the domicile population); raise of the awareness of all stakeholders on the wealth and economic power of the blue resource; reducement of the negative effects of climate change and reducing environmental pollution through responsible policies and planning in all sectors of the Blue Economy.

From an empirical aspect, in order to avoid shortcomings that occurred in this paper, new approaches are recommended. For instance, longer time series and other (different) independent variables (i.e., multivariate framework depending on the data availability and reliability) such as capital stock, R&D on blue technologies, government effectiveness etc. In future research, potential structural break(s) should be addressed by introducing dummy variable(s). In order for the results to be more robust, cointegration and causality analysis should be performed. When dealing with small samples, econometric approaches such as the leveraged bootstrap technique should be utilized or panel approach (since it provides more informative data, more variability,

less collinearity among the variables, more degrees of freedom and greater efficiency in econometric estimates). Until present and future researchers get sound, robust, uniformed and non-conflicting empirical results, governments have to be careful in implementing the appropriate policies.

Until then, Blue Economy can be seen as a policy, a project, a framework, a system and an idea. It has the potential to become one of the most viral ideas, spanning from the business applications all the way to cultural and environmental extensions. It is an idea that can also become a way of thinking, a way of acting and a way of designing a better future for the generations to come and the planet they will live on. A pivot from governments and firms to focus on innovation and expansion of the Blue Economy could bring about a productive boom akin to that of the Green Revolution. If done sustainably and with equity in mind, a so-called Blue Revolution could provide a clear pathway towards a more sustainable and resilient future.

References

1. Alempijević, A., Kovačić, M. (2019) "Nautical Tourism and Small Shipbuilding as Significant part of Blue Economy Development", Pomorski zbornik 57: 97-110.
2. Bach, S. (2015) "Ecological issues – green and blue – as a niche for Croatia", Međunarodne studije 15(4): 29-41
3. Behnam, A. (2012) "Building a blue economy: strategy, opportunities and partnerships in the Seas of East Asia", The East Asian Seas Congress 2012, Changwon.
4. Bennett, N.J., Blythe, J., White, C.S., Campero, C. (2021) "Blue growth and blue justice: Ten risks and solutions for the ocean economy", Marine Policy 125: 104387, pp. 1-12.
5. Bertazzo, S. (2018) "What on Earth is the 'blue economy'?", Available at: https://www.conservation.org/blog/what-on-earth-is-the-blue-economy (Accessed July 12th, 2021).
6. Bodul, D., Jakovac, P. (2020) "Shipyard Bankruptcy Policy: A Solution in Search of a Problem", Pomorstvo 34 (1): 48-58, doi.org/10.31217/p.34.1.6
7. Croatian Bureau of Statistics-CBS (2021) "Statistical Information", CBS, Zagreb.
8. Croatian National Tourist Board-CNTB (2022) "In 2021, nearly 14 million tourists visited Croatia", Available at: https://www.htz.hr/en-GB/press/press-releases/2021-nearly-14-million-tourists-visited-croatia (Accessed June 29th, 2022).
9. Denona Bogović, N., Šverko Grdić, Z. (2020) "Transitioning to a Green Economy-Possible Effects on the Croatian Economy", Sustainability, 12(22): 1-19, doi: 10.3390/su12229342

10. Godschalk, D.R. (2009) “Coastal Zone Management”, In Steele, J.H. (Ed.), Encyclopedia of Ocean Sciences, Second Edition, Elsevier Ltd., Amsterdam, pp. 599-605.

11. European Commission (2014) “Blue growth”, Available at: https://ec.europa.eu/assets/mare/infographics/ (Accessed July 11th, 2021).

12. European Commission (2018) “The EU Blue Economy Report 2018”, Directorate General for Maritime Affairs and Fisheries and the Joint Research Centre, Publications Office of the European Union. Luxembourg.

13. European Commission (2019) “2019 SBA Fact Sheet & Scoreboard”, Available at: https://ec.europa.eu/docsroom/documents/38662/attachments/1/translations/en/renditions/native (Accessed July 11th, 2022).

14. European Commission (2021) “The EU Blue Economy Report 2021”, Directorate General for Maritime Affairs and Fisheries and the Joint Research Centre, Publications Office of the European Union. Luxembourg.

15. European Commission (2022a) “The EU Blue Economy Report 2022”, Directorate General for Maritime Affairs and Fisheries and the Joint Research Centre, Publications Office of the European Union. Luxembourg.

16. European Commission (2022b) “The EU Blue Economy Report 2022 Annexes”, Directorate General for Maritime Affairs and Fisheries and the Joint Research Centre, Publications Office of the European Union. Luxembourg.

17. Ghali, K.H., El-Sakka, M.I.T. (2004) “Energy use and output in Canada: a multivariate cointegration analysis, Energy Economics, 26: 225-238.

18. Isaacs, M. (2019) “Blue Justice for small-scale fisheries”, Available at: https://www.plaas.org.za/blue-justice-for-small-scale-fisheries/ (Accessed July 11th, 2021).

19. Jain, M. (2018) “Blue Economy versus Ocean Economy”, Available at: https://www.examrace.com/Current-Affairs/NEWS-Blue-Economy-Versus-Ocean-Economy.htm (Accessed July 11th, 2021).

20. Jouffray, JB., Blasiak, R., Norström, A.V., Österblom, H., Nyström, M. (2020) “The blue acceleration: the trajectory of human expansion into the ocean”, One Earth, 2(1): 43-54, doi.org/10.1016/j.oneear.2019.12.016

21. Kovačić, M., Perinić, L., Kerčević, S. (2021) “Greening the Blue Economy as an Incentive to Sustainable Development of Primorje-Gorski Kotar County”, Scientific Journal of Maritime Research 35: 159-169, doi.org/10.31217/p.35.1.17

22. Lütkepohl, H. (1982) “Non-causality due to omitted variables”, Journal of Econometrics, 19: 367-378.

23. McGlade, J., Werner, B., Young, M., Matlock, M., Jefferies, D., Sonnemann, G. (2012) “Measuring Water Use in a Green Economy”, A Report of the Working Group on Water Efficiency to the International Resource Panel. Nairobi: UNEP.

24. McLachlan, A., Brown, A.C. (2006) “The Ecology of Sandy Shores”, Second Edition, Elsevier Ltd., Amsterdam.

25. Pauli, G. (2009) “The Blue Economy”, A Report to the Club of Rome. Nairobi: UNEP.

26. Pauli, G. (2010) “Blue Economy: 10 Years, 100 Innovations, 100 Million Jobs”, Paradigm Publications, Taos, New Mexico, USA.

27. Pauli, G. (2015), “The Blue Economy 2.0: 200 Projects Implemented; US$ 4 Billion Invested; 3 Million Jobs Created”, Academic Foundation, New Delhi, India.

28. Pauli, G. (2017) “The Blue Economy 3.0: The marriage of science, innovation and entrepreneurship creates a new business model that transforms society”, Xlibris, Bloomington, Indiana, USA.

29. Ponce de Leon, S. (2019) “Ocean Economy Takes Center Stage at Davos”, Available at: https://gritdaily.com/ocean-economy/ (Accessed July 11th, 2021).

30. Radone, M. (2016) “MedTrends Project: Blue Growth Trends in the Adriatic Sea - the challenge of environmental protection”, Available at: http://www.medtrends.org/reports/MedTrends_AD-Report.pdf (Accessed August 28th, 2021).

31. Ramieri, E., Andreoli, E., Fanelli, A., Artico, G., Bertaggia, R. (2014) “Methodological handbook on maritime spatial planning in the Adriatic Sea”, https://maritime-spatial-planning.ec.europa.eu/sites/default/files/methodological_handbook_on_msp_in_the_adriatic.pdf (Accessed June 21st, 2022).

32. Sakhuja, V. (2015) “Harnessing the Blue Economy” Indian Foreign Affairs Journal, 10(1): 39-49

33. Santander, E. (2020) “European Tourism: Challenges Are in the Sky”, https://a4e.eu/european-tourism-challenges-are-in-the-sky/ (Accessed June 21st, 2022).

34. Schaefer, N., Barale, V. (2011) “Maritime spatial planning: opportunities & challenges in the framework of the EU integrated maritime policy”, Journal of Coastal Conservation, 15: 237-245.

35. Schutter, M.S., Hicks, C.C., Phelps, J., Waterton, C. (2021) “The blue economy as a boundary object for hegemony across scales”, Marine Policy, 132: 104673, doi.org/10.1016/j.marpol.2021.104673

36. Sharafuddin M.A., Madhavan M. (2020) “Thematic Evolution of Blue Tourism: A Scientometric Analysis and Systematic Review”, Global Business Review, November 2020, https://doi.org/10.1177/0972150920966885.

37. Silver, J.J., Gray, N.J., Campbell, L.M., Fairbanks, L.W., Gruby, R.L. (2015) “Blue economy and competing discourses in international oceans governance”, The Journal of Environment and Development, 24: 135-160, doi.org/10.1177/1070496515580797

38. Spalding, M.J. (2021) “Measuring sustainable ocean economy investing”, Available at: https://afghanistan.wilsoncenter.org/article/measuring-sustainable-ocean-economy-investing (Accessed July 1st, 2022).

39. Stern, D.I. (1993) “Energy and economic growth in the USA – a multivariate approach”, Energy Economics, 15: 137-150.

40. The Commonwealth of Nations (2021) “Blue economy”, Available at: https://thecommonwealth.org/blue-economy (Accessed July 11th, 2021).

41. UNCSD (2012) “Blue economy concept paper”, Available at: // sustainabledevelopment.un.org/content/documents/2978BEconcept.pdf (Accessed July 10th, 2021).

42. UNCTAD (2014a) “Small Island Developing States: Challenges in Transport and Trade Logistics”, Background note to third session of Multi-Year Expert Meeting on Transport, Trade Logistics and Trade Facilitation. Geneva, 24–26 November.

43. UNCTAD (2014b) “The Oceans Economy: Opportunities and Challenges for Small Island Developing States (SIDS)”, United Nations, Geneva.

44. UNDP (2018) “Blue Economy: a sustainable ocean economic paradigm”, Available at: https://www.undp.org/blogs/blue-economy-sustainable-ocean-economic-paradigm (Accessed July 11th, 2021).

45. UNWTO (2021) “Impact assessment of the COVID-19 outbreak on international tourism”, Available at: https://www.unwto.org/impact-assessment-of-the-covid-19-outbreak-on-international-tourism (Accessed June 21st, 2022).

46. UNEP (2012) “Green Economy in a Blue World”, Available at: https:// www.unep.org/resources/report/green-economy-blue-world-full-report-0 (Accessed July 4th, 2022).

47. Wenhai, L., Cusack, C., Baker, M., Tao1, W., Mingbao, C., Paige, K., Xiaofan, Z., Levin, L., Escobar, E., Amon, D., Yue1, Y., Reitz, A., Sepp Neves, A.A., O’Rourke, E., Mannarini, G., Pearlman, J., Tinker, J., Horsburgh., K.J., Lehodey, P., Pouliquen, S., Dale, T., Peng, Z., Yufeng, Y. (2019) “Successful Blue Economy Examples With an Emphasis on International Perspectives”, Frontiers in Marine Science, 6:261, doi: 10.3389/fmars.2019.00261

48. Wilms, R., Mäthner, E., Winnen, L., Lanwehr, R. (2021) “Omitted variable bias: a threat to estimating causal relationships”, Methods in Psychology, 5: 100075, doi.org/10.1016/j.metip.2021.100075

49. World Bank (2017a) “What is the Blue Economy?”, Available at: https:// www.worldbank.org/en/news/infographic/2017/06/06/blue-economy (Accessed July 12th, 2021).

50. World Bank (2017b) “The Potential of the Blue Economy: Increasing Long-term Benefits of the Sustainable Use of Marine Resources for Small Island Developing States and Coastal Least Developed Countries”, World Bank, Washington DC.

51. World Bank (2021) “Cost of environmental degradation report”, World Bank, Washington DC.

52. WWF (2015a) “What a ‘blue economy’ really is – WWF’s perspective”, Available st: https://wwf.panda.org/?249111/What-a-blue-economy-really-is (Accessed July 11th, 2021).

53. WWF (2015b) “Principles for a sustainable blue economy”, Available at: https://wwfint.awsassets.panda.org/downloads/15_1471_blue_economy_6_pages_final.pdf (Accessed July 12th, 2021).

CHAPTER 10

ICT-enabled healthcare and economic evaluations: a bibliometric analysis

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ABSTRACT

The adoption of ICT in health care received major encouragement during the COVID-19 pandemic. Barriers such as high cost of technology or inconsistent cost-effectiveness results were set aside to assure remote healthcare delivery and enable access to care in the wake of social distancing while the need for more rigorous analyses of benefits and economic justification of such healthcare delivery was emphasised. The objective of this paper is therefore to identify the key terms used to describe ICT-enabled healthcare and to assess the latest research in this field with the focus on issues related to economic evaluation. In this paper, bibliometric methods are used to analyse relevant publications from the Web of Science Core Collection database. Key research areas, journals and author keywords are identified. The co-occurrence analysis of keywords is used to compare publications using different terms. The analysis reveals that the number of publications on ICT-enabled healthcare has been steadily increasing over the past 20 years, with a significant increase in 2020. Moreover, the number of publications in 2021 more than doubled compared to 2019, and the increase was particularly high for telemedicine services. Although the number of publications on the economic evaluation of such services has also increased, their share in the ICT-enabled healthcare field remains very small. Development and implementation of beneficial ICT-enabled healthcare services is proving to be a contemporary and compelling issue. Efforts should be made to replace traditional healthcare with effective ICT-enabled healthcare, which could prove to be the new mainstream.

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1. Introduction

ICT has been used in healthcare for more than 50 years. ICT-enabled healthcare provides accessible, affordable, sustainable, and personalized healthcare that aims to detect, prevent, and respond to various diseases and health conditions. ICT-enabled healthcare is also used to promote health and well-being and improve the outcomes of medical diagnoses and treatments. In addition, given the severity of the COVID-19 pandemic, steps have been taken to establish ICT-enabled remote healthcare as an essential form of healthcare delivery (Monaghesh and Hajizadeh, 2020; Smith et al., 2020; Greiwe, 2022). Furthermore, the strategic use of innovative ICT in healthcare is seen as an essential factor in enabling an additional 1 billion people to enjoy a better quality of life and better healthcare, according to the World Health Organization's Global Digital Health Strategy for 2020 – 2025 (World Health Organization, 2021).

However, given the rapidly changing technology used in the delivery of ICT-enabled healthcare, the literature on this topic continues to evolve and is broad in both scope and variability. In addition, there are a variety of terms used to describe a healthcare practice that employs ICT. The most commonly used terms are telehealth, telemedicine, eHealth, and digital health (Sikandar et al., 2021). Another challenge to the adoption and use of ICT in healthcare is the diversity of outcomes related to the cost and effects of economic analyses of such services. Due to the heterogeneity of the effects considered in the different economic analyses and because of the different cost structures and types of services considered, it is difficult to obtain a clear picture of the actual net benefits of ICT-enabled healthcare compared to usual, face-to-face healthcare (Eze, Mateus and Hashiguchi, 2020; Snoswell et al., 2020).

Several publications have used bibliometric analysis as a particularly useful quantitative tool to examine the growing literature on ICT in healthcare. However, they usually focused on only one term, such as digital health or telemedicine (Ahmadvand et al., 2019; Fatehi, Samadbeik and Kazemi, 2020; Waqas et al., 2020), or on two terms, such as telemedicine and eHealth (Sikandar et al., 2021). Telemedicine was found to be one of the most frequent keywords related to health communication in the pandemic of COVID-19 (de las Heras-Pedrosa et al., 2022). Furthermore, a bibliometric analysis was used to examine the relationship between social sciences and ICT-enabled healthcare (Uribe-Toril, Ruiz-Real and Nievas-Soriano, 2021). In addition, a recent bibliometric analysis of cost-effectiveness analyses in health and health-related topics identified a lack of economic research related to current health topics, particularly those involving evolving technologies, such as telemedicine (dos Santos Silva et al., 2021).

In this paper, we also use bibliometric analysis to examine the field of ICT-enabled healthcare to address some gaps in the current reviews of this filed. First, we provide an overview of the four main terms used to describe ICT-enabled healthcare (i.e., telemedicine, telehealth, eHealth and digital health). We distinguish the publications according to the terminology used and perform a bibliometric co-occurrence analysis of the author keywords on

the four different sets of publications. We contrast the keywords used in the publications with the terminology presented, allowing a comparison between the use of keywords in practice (i.e., in publications) and the keywords proposed by the terminology. Using this approach, we provide a new perspective and a deeper understanding on the evolution of the field, as new terminologies incorporate new keywords and technologies. We also identify characteristics and trends among publications in ICT-enabled healthcare, such as the most productive journals and research areas, and highlight in particular the rapid growth of publications in due to the recent COVID-19 pandemic. Second, we identify keywords in the analysis associated with health economics and economic evaluations in particular, illuminating the part of the field in which economic evaluations have been used and the topics with which they are associated. Economic evaluations of ICT-enabled healthcare account for a significantly small share of publications in the field of ICT-enabled healthcare.

The remainder of the paper is organized as follows. In Chapter 2, we provide a narrative literature review on ICT-enabled healthcare terminology and economic evaluations in healthcare. In Chapter 3, we discuss the data collection and the research methodology used. To collect the bibliographic data from the Web of Science Core Collection database (WoS CC), we use the keywords based on the literature review in Chapter 2. In Chapter 4, we analyse the bibliographic data, distinguish keywords related to economic evaluations, and discuss the results. VOSviewer was used to visualize the bibliometric co-occurrence networks. In Chapter 5, we draw a conclusion.

2. Literature review

2.1. Evolution of ICT-enabled healthcare terminology

In the field of health sciences, the terms eHealth, telehealth, telemedicine, and, in more recent literature, digital health are used to describe ICT-enabled healthcare. The first applications of ICT in healthcare were primarily associated with the use of telephones and television and grouped under the term telemedicine. As new technologies developed, the original concept of telemedicine was expanded. This led to a 2007 study that found 104 peer-reviewed definitions of the word telemedicine (Sood et al., 2007). The definitions illustrate the broad scope and complexity of the services covered, as well as technology as one of the most important components of telemedicine. When it comes to the second term used, telehealth, it seems difficult to define it without interfering with the definition of telemedicine. The gist is that both telemedicine and telehealth rely on ICT to deliver services remotely. However, some distinguish that telemedicine includes only clinical services, while telehealth additionally includes nonclinical services such as staff meetings or education. It is said that "*telemedicine is to telehealth what medicine is to health"* (Bashshur et al., 2011: 487). The World Health Organization (WHO) recognizes the similarity of the two terms and considers them synonyms, noting that the key elements are the same for both telehealth and telemedicine: clinical support, remoteness, use of ICT, and improved

health outcomes (World Health Organization, 2010). Therefore, WHO has adopted the following broad description for telemedicine and telehealth: "*The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities*" (World Health Organization, 2010: 9).

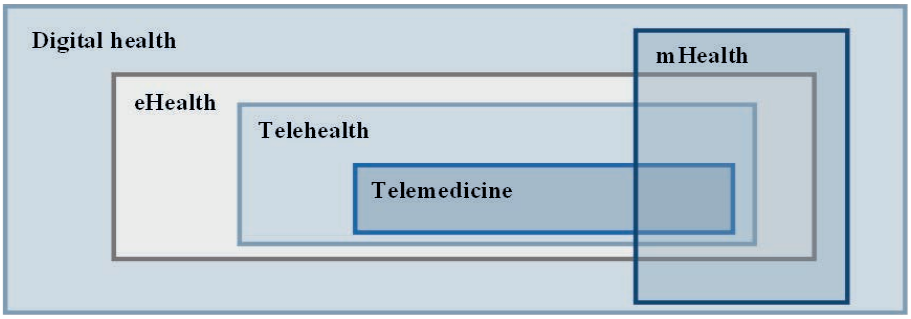
The term eHealth, introduced in the late 90s, is considered to further augment telehealth. When telemedicine was recognized as cost-effective, ICTs were integrated into the health sector on a larger scale. This led to the identification of a new term, eHealth, to cover various combinations of the use of ICT in the health sector, both remotely and on-site. In 2005, there were already 51 unique definitions of eHealth (Oh et al., 2005). WHO defines the term eHealth as "*The cost-effective and secure use of information and communications technologies in support of health and health-related fields, including health care services, health surveillance, health literature, and health education, knowledge and research*" or shortly as "*the use of information and communications technology in support of health and health-related fields*" (World Health Organization, 2016a: 5). The term eHealth refers to the use of ICT-enabled healthcare by professionals and nonprofessionals, such as patients or the public, covers both remote and on-site uses, and accompanies all variety of ICT, like apps or websites (Stevens et al., 2019).

More recently, the buzzword in the field of ICT-enabled healthcare is digital health. Digital health is understood as an extension of eHealth services through newer technologies such as artificial intelligence, machine learning, robotics, Internet of Things (IoT), and Big Data. The use of the term digital health has surged since 2019, and its use is rapidly catching up with that of eHealth. The often-used definition of digital health is the one defined by WHO: *"…the field of knowledge and practice associated with the development and use of digital technologies to improve health. Digital health expands the concept of eHealth to include digital consumers, with a wider range of smart devices and connected equipment. It also encompasses other uses of digital technologies for health such as the Internet of things, artificial intelligence, big data and robotics*." (World Health Organization, 2021: 11). WHO furthermore notes that digital health is rooted in eHealth, making eHealth a subset of digital health: "*Today the term 'digital health' is often used as a broad umbrella term encompassing eHealth as well as developing areas such as the use of advanced computing sciences*." (World Health Organization, 2021: 11). However, as it was with the previous definitions, there is ambiguity in the definition of digital health as well. A recent study found 95 unique definitions to digital health (Fatehi, Samadbeik and Kazemi, 2020). They emphasize that digital health is more about population and individual health care and well-being than it is about the use of technology.

Apart from the previously discussed terms, the term mHealth is also often used in the context of ICT adoption in healthcare. mHealth is defined by WHO as "*the use of mobile wireless technologies for public health*" (World

Health Organization, 2011: 10). Many researchers argue that this service spans across telehealth, telemedicine, eHealth and digital health, as mobile services can be used to monitor patients and communicate remotely, promote education, store data, and support knowledge and research (van Dyk, 2014). Other less commonly used terms include telematics, a term that encompasses both telemedicine and telehealth (World Health Organization, 1998) and uHealth, an acronym for "*ubiquitous health*" (Song, Ryu and Ho Lee, 2011). As a result of the discussion presented, we created a diagram that graphically represents the relationships between the key terms described (Figure 1).

Figure 1: Graphical representation of relationship between key terms used to describe ICT-enabled healthcare



Source: Author's own work

2.2. Economic evaluations used in ICT-enabled healthcare

The goal of the health care system is to ensure the well-being of the population given the available resources (Robinson, 1993). Therefore, to maximize population health, decisions must be made about how to use limited resources efficiently and must encompass a wide range of conditions, services, and populations (Drummond et al., 2005). However, healthcare decisions have evolved from decisions about using alternative drugs or alternative procedures. Today, they often involve complex interventions, especially in areas where ICTs have been introduced. The most commonly used types of economic evaluations in healthcare are cost-effectiveness analysis, cost-utility analysis, cost-benefit analysis, and cost-minimization analysis (Drummond et al., 2005). In cost-effectiveness analysis, consequences are measured in natural units, often using clinical outcomes (e.g., complications avoided) or measures such as life years (LYs) (Drummond et al., 2005). A cost-effectiveness ratio (ICER – incremented cost per measured unit of effect) is used to compare healthcare alternatives in cost-effectiveness analysis. However, it only captures one dimension of the health outcome and only indicates which alternative is more efficient to achieve the desired outcome, not which alternative should be chosen (Udeh, 2020). In the cost-utility analysis outcomes are measured in terms of disability-adjusted life-years (DALYs) or quality-adjusted life-years (QALYs) and capture both length and quality of life (Udeh, 2020). In cost-benefit analysis, outcomes

are measured in monetary units (Drummond et al., 2005). Cost-benefit analysis is commonly used for public policies because it considers how much individuals are willing to pay for the benefits of a policy (Turner et al., 2021) and can be used for the optimal distribution of benefits in the broadest sense, as monetary units can be easily compared. Cost-minimization analysis examines alternatives on the basis of cost only, when the consequences of alternatives are considered equivalent. This type of economic analysis is usually not preferred because the consequences of different interventions are rarely the same and because there is uncertainty around the estimates of costs and effects. All of the analyses discussed can be used in evaluating ICT-enabled healthcare but must be selected and adapted according to the research question and context of the service evaluated. While ICT-based healthcare services can provide numerous benefits to healthcare, they also pose particular challenges for economic evaluations due to their complexity, rapidly evolving technology, and interactivity with users on the part of both patients and healthcare professionals (Gomes, Murray and Raftery, 2022).

3. Data collection and research methodology

3.1. Data collection

The bibliographic data for the bibliometric analysis and network visualization were obtained through an extensive literature search of the Web of Science Core Collection (WoS CC). The literature search was conducted up to May 2022 and was based on topic search. The database search was limited to English-language journal publications dating back to 2000 to cover over two decades of ICT use in healthcare. Search queries were distinguished by the terminology discussed in the previous chapter (e.g., “digital health”).

3.2. Research methodology

We perform a bibliometric analysis of keyword co-occurrence based on the full publication dataset and cited references from the WoS CC, as one of the large publication databases commonly used for bibliometric analysis (Visser et al., 2021). In bibliometric analysis, various mathematical and statistical methods are applied to publications to quantify the importance of scientific research (Pritchard, 1969). VOSviewer software was used for bibliometric analysis and visualisation of bibliometric networks (van Eck and Waltman, 2010). A thesaurus file was used for data cleaning and synonym merging. For each term, around 50 of the most frequently occurring keywords were extracted. In the constructed bibliometric network, the nodes represent keywords. The size (weight) of the node represents the number of occurrences of the particular keyword. The links (edges) represent the relationships between the nodes based on the number of documents in which they occur together (van Eck and Waltman, 2010, van Eck and Waltman, 2014). In the network visualisation, keywords were coloured according to the clusters to which they belong. Alternatively, the keyword nodes were coloured according to the average year of publication (van Eck and Waltman, 2014). This allows us to visualise the keywords according to their average year of use, and

thus distinguish between older and newly used keywords. In addition, we examined publications by year, research area, and source (i.e., journal). We further examined the publications related to economic evaluations and the COVID-19 pandemic by using appropriate terms (e.g., “cost-effectiveness”, “pandemic”), and considering the year of publication for pandemic-related publications.

4. Results and discussion

4.1. Analysis of publications and used terminology

The first term used to describe ICT-enabled healthcare to appear in the WoS CC database was telemedicine in 1969, followed by telehealth in 1985, digital health in 1995, and eHealth in 2000. Telemedicine was the term mentioned in the majority of publications. However, the number of publications related to telemedicine is almost 20,000, which is twice the number of publications for telehealth or eHealth, which amount to more than 10,000. Finally, there were the fewest publications on digital health, as shown in Table 1.

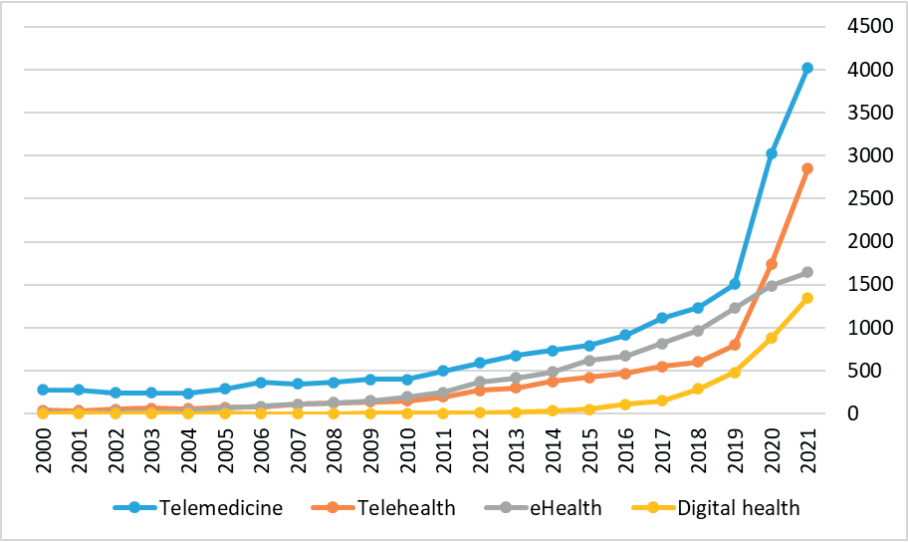
Table 1: First occurrence and total number of publications related to terms describing ICT-enabled healthcare, 2000-May 2022

Year of 1st occurrence	Terminology	Number of publications
1969	Telemedicine	19,871
1985	Telehealth	10,070
1995	Digital health	3,673
2000	eHealth	10,097

Source: Author’s work based on Web of Science Core Collection database

The total number of publications since year 2000 is graphically presented in Figure 2. Both the number of publications on telemedicine, telehealth and eHealth increased steadily over the last 20 years. However, in the years of the COVID-19 pandemic, 2020 and 2021, the number of publications on telemedicine and telehealth increased significantly, as the provision of health services remotely was essential to maintain accessibility to healthcare. The total number of publications on telemedicine doubled in 2020 compared with 2019, increasing from 1,506 to 3,023 publications, as was the case for telehealth (from 797 in 2019 to 1,738 publications in 2020). In 2021 alone, there were more than 4,000 publications on telemedicine. The term eHealth was used more than telehealth in publications before the pandemic, from 2010 until 2020. Furthermore, the use of digital health is quickly catching up with the use of eHealth in recent years.

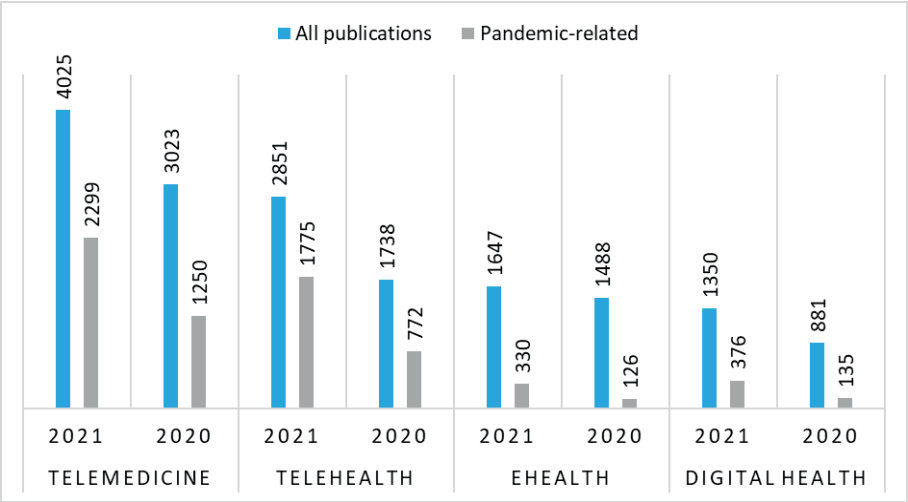
Figure 2: Annual number of publications related to terms describing ICT-enabled healthcare, 2000-2021



Source: Author's work based on Web of Science Core Collection database

To further distinguish the effect the pandemic had on the number of publications related to ICT-enabled healthcare, we report the number of publications related to the COVID-19 pandemic in Figure 3. In 2020, 41.35% of telemedicine publications and 44.42% of telehealth publications were related to the pandemic. In 2021, the proportion of publications related to the pandemic was even greater: 57.12% of telemedicine publications and 62.26% of telemedicine publications. For eHealth and digital health services, the proportion of pandemic-related publications was not as high.

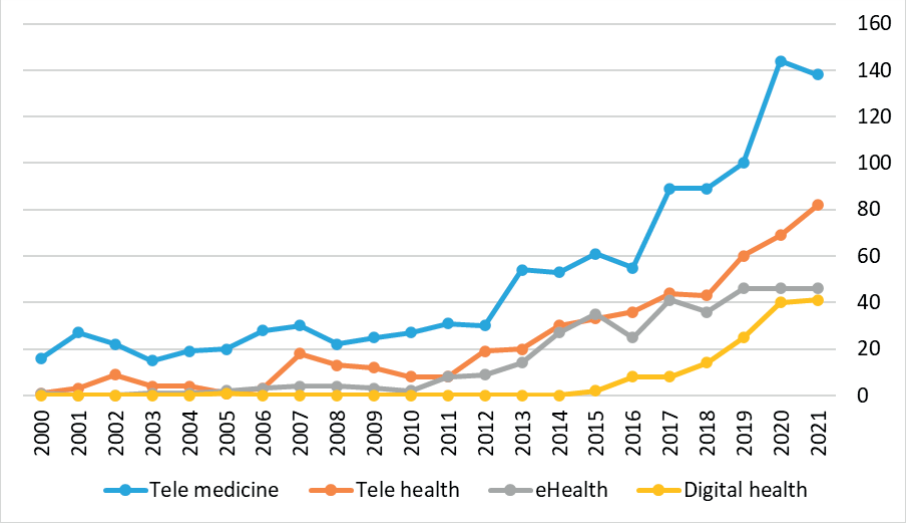
Figure 3: Annual number of publications related to terms describing ICT-enabled healthcare and the COVID-19 pandemic in 2020 and 2021



Source: Author's work based on Web of Science Core Collection database

The number of publications also increases when we distinguish publications related to economic evaluations of ICT-enabled healthcare interventions (Figure 4). It is clear that there is a significant lack of research in the area of economic evaluations if we compare the number of publications on economic evaluations with the total number of publications (see Figure 2). For example, the number of publications in 2021 in the field of telemedicine was more than 4,000, while the number of publications on economic evaluations was less than 150, which is less than 4%. We can also note that most of the economic evaluations were related to telehealth and telemedicine. Since telemedicine and telehealth cover the first application areas of ICT in healthcare, are less broad and focus more on specific services, but also comprise the majority of publications, economic evaluations are more likely to be conducted in this area. In the area of digital health, for example, which covers a broad spectrum of complex services, economic evaluations are likely to be more difficult to conduct.

Figure 4: Annual number of publications related to terms describing ICT-enabled healthcare and economic evaluations, 2000-2021



Source: Author's work based on Web of Science Core Collection database

We further analyse in which research areas and in which journals most publications were published, disaggregated by each term studied. The five research areas with the highest number of publications are shown in Table 2. The research areas of *Health Care Sciences Services*, *Medical Informatics* and *Public Environmental Occupational Health* were among the five research areas containing the majority of publications on each of the four terms studied. In addition, *Health Care Sciences Services* was ranked the first research area by the number of publications connected with each term.

Table 2: Top five research areas by number of publications related to terms describing ICT-enabled healthcare

Research Areas	Telemedicine	Telehealth	eHealth	Digital health	Total
Health Care Sciences Services	6,045 (30.42%)	3,265 (32.42%)	3,466 (34.33%)	1,232 (33.54%)	14,008
Medical Informatics	2,012 (10.13%)	802 (7.96%)	2,308 (22.86%)	1,003 (27.30%)	6,125
Public Environmental Occupational Health	1,307 (6.58%)	879 (8.73%)	1,284 (12.72%)	678 (18.45%)	4,148
Computer Science	1,435 (7.22%)	354 (2.59%)	1,556 (15.41%)	232 (6.32%)	3,577
General Internal Medicine	1,797 (9.04%)	750 (7.45%)	466 (4.24%)	239 (6.51%)	3,252

Source: Author's work based on Web of Science Core Collection database

The five journals which published the majority of publications are listed in Table 3. Most of the publications were published in the *Telemedicine and e-Health*, which ranks first in the number of publications for each term, except for telehealth, where it ranked second, and digital health. The *Telemedicine and telecare* journal also ranked high for number of publications connected with telemedicine, telehealth and eHealth, while the *Journal of Medical Internet Research* ranked high across all terms. Other prolific journals are presented in Table 3.

Table 3: Top five journals by number of publications related to terms describing ICT-enabled healthcare

Journal	Telemedicine	Telehealth	eHealth	Digital health	Total
Telemedicine and e-Health	1,742 (8.77%)	1,020 (10.13%)	587 (5.81%)	12 (0.33%)	3,361
Journal of Telemedicine and Telecare	1,386 (6.98%)	636 (6.32%)	125 (1.24%)	5 (0.14%)	2,152
Journal of Medical Internet Research	518 (2.60%)	254 (2.52%)	924 (9.15%)	442 (12.03%)	2,138
JMIR mHealth and uHealth	238 (1.20%)	66 (0.66%)	194 (1.92%)	162 (4.41%)	660
JMIR Research Protocols	130 (0.66%)	69 (0.69%)	217 (2.15%)	101 (2.75%)	517

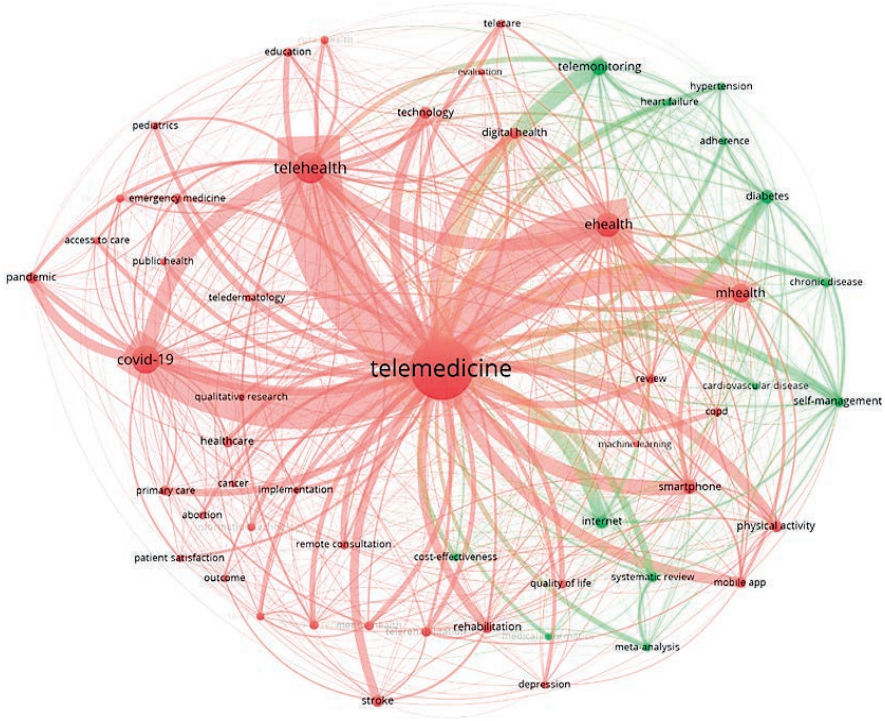
Source: Author's work based on Web of Science Core Collection database

The results show us that publications span across a variety of research areas that include social sciences, medicine, and computer science, while journals are grouped into discipline-specific journals that specifically address topics related to ICT-enabled healthcare.

4.2. Bibliometric co-occurrence analysis of keywords

First, we perform a bibliometric co-occurrence analysis of author keywords on the first set of publications which were related to telemedicine. The analysis revealed that telemedicine is strongly linked with telehealth and eHealth (Figure 5). Telemedicine, telehealth, and eHealth are the most frequently occurring keywords, which was to be expected since these are the generic terms used to describe ICT-enabled healthcare. In addition, COVID-19 is one of the most frequently occurring keywords, as is mHealth. This is consistent with the fact that both telemedicine and telehealth were used extensively during the COVID-19 pandemic due to the need for remote health care. Digital health, on the other hand, is a keyword less frequently used in the context of telemedicine. Numerous chronic diseases are mentioned, including cancer, COPD, stroke, heart failure, and diabetes. Related telemedical specialties such as telerehabilitation, telepsychiatry, teledermatology are also frequently mentioned. Keywords related to the use of technology are also frequently used, such as implementation, information technology, medical informatics, smartphones, and mobile applications. In the context of economic evaluations, cost-effectiveness is also one of the 50 most frequently used keywords. We can distinguish two clusters of keywords, the red group, which refers to terminology describing ICT-enabled healthcare, and the green group, which refers to telemonitoring (i.e., remote patient monitoring) as a specific type of telemedicine frequently used to monitor chronic patients. Furthermore, we can see that the green cluster is more scientifically oriented and includes keywords such as meta-analysis and systematic review, as well as cost-effectiveness.

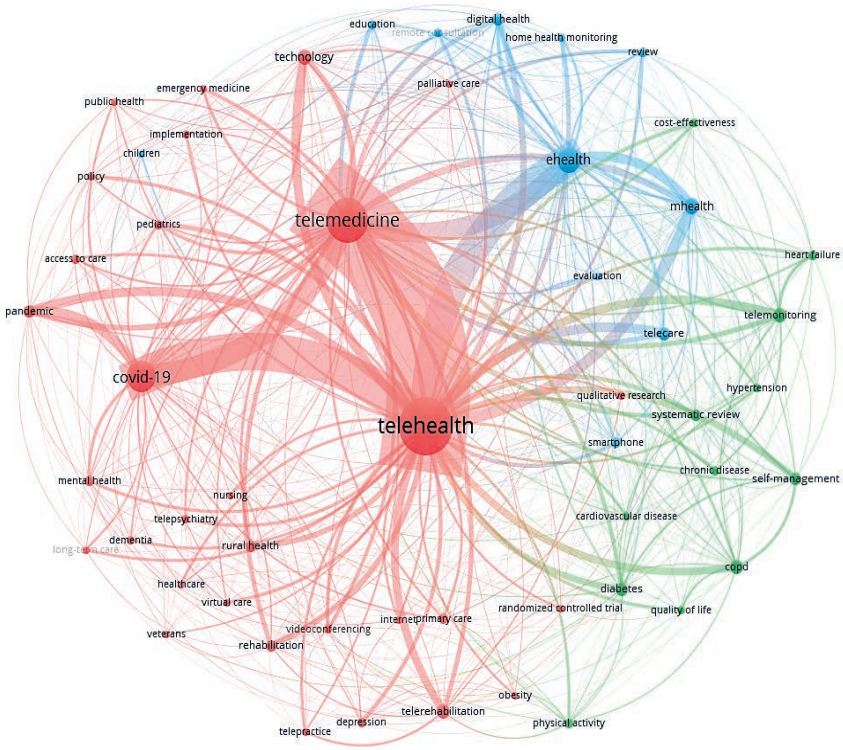
Figure 5: Bibliometric network of keyword co-occurrence in telemedicine publications



Source: Author's own work using VOSviewer

Second, we repeat the analysis on the second set of publications, related to telehealth, and find that the telehealth keyword frequently occurs together with telemedicine and COVID-19 (Figure 6). Most of the keywords are identical as in the previously created keyword co-occurrence network for telemedicine. In the network presented for telemedicine publications, the focus was more on medicinal specialties and chronic diseases, while in telehealth some new keywords appear, such as like children, dementia, nursing, veterans, and virtual care. As discussed in the literature review section on terminology, this is consistent with the relatedness of the definitions of telehealth and telemedicine, which are sometimes even considered synonyms. Cost-effectiveness was again one of the 50 most frequently occurring keywords. There were three clusters of keywords found in this network: the red group refers to telehealth, telemedicine, and COVID-19; the blue group refers to keywords used in newer terminology, like eHealth, digital health, and mHealth; and the green group refers to telemonitoring and chronic diseases, as was the case in the network related to telemedicine publications.

Figure 6: Bibliometric network of keyword co-occurrence in telehealth publication



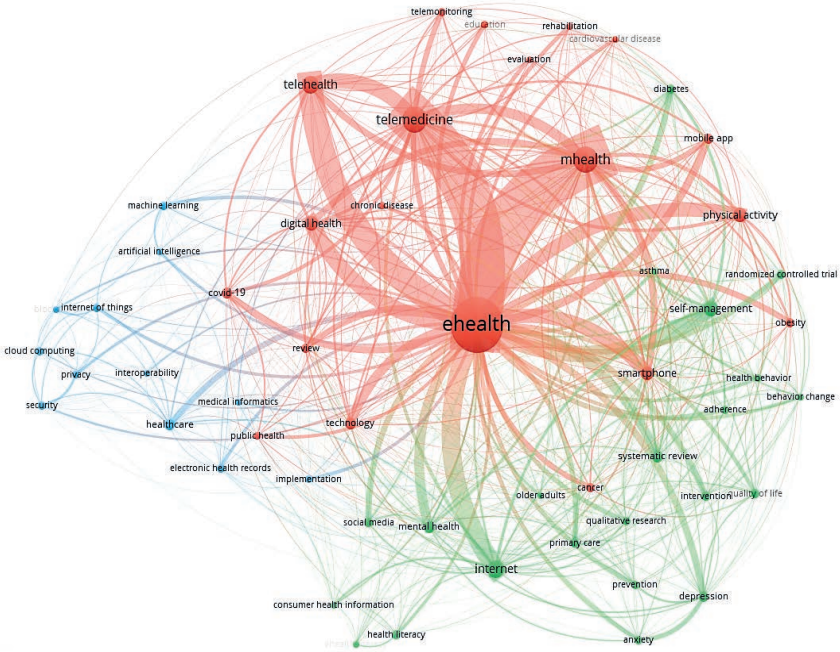
Source: Author's own work using VOSviewer

Next, we analyse keywords related to publications on eHealth and observe keywords related to new technologies emerging, such as artificial intelligence, blockchain, cloud computing, electronic health records, Internet of Things, and machine learning (Figure 7). In addition, keywords that relate more to the consumer and patient and address their behaviours and concerns related to the use of patient data are used: consumer health information, health behaviour, eHealth and health literacy, privacy, behaviour change, security, adherence and social media. Therefore, the use of keywords is consistent with the definition presented in the literature review chapter, stating that eHealth augments telehealth and telemedicine with on-site uses of ICT and covers public and patients use of ICTs through a variety of services. The term eHealth has a strong link to telehealth, telemedicine, and mHealth, followed by Internet and digital health. However, there is absence of keywords related to economic evaluations or economics in general.

For eHealth, as the term that has been in use for nearly two decades and addresses ICT-enabled care broadly, we have additionally created a network of keywords coloured based on average publication year to present the use

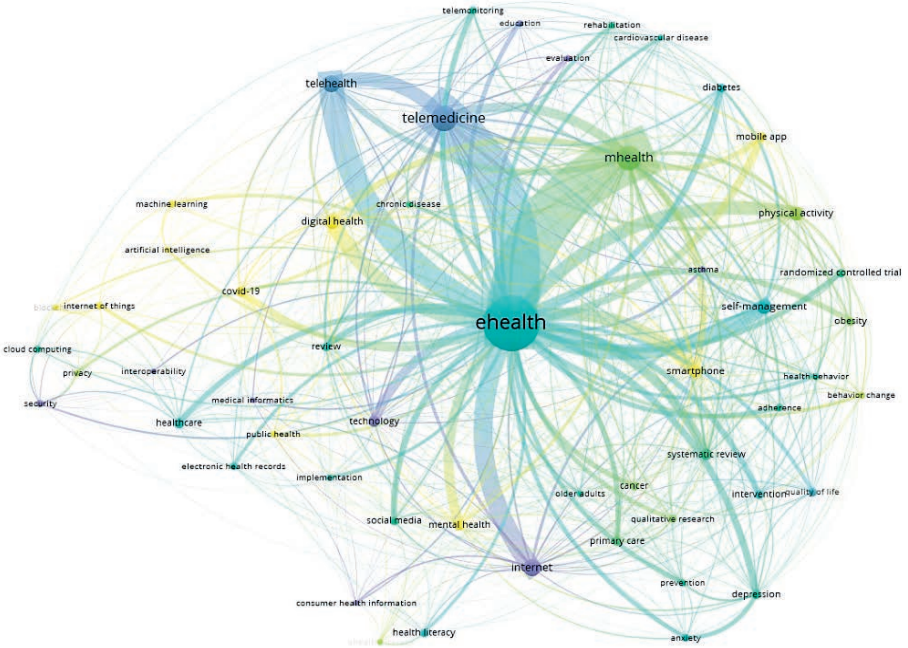
of keywords in publications over time (Figure 8). On the one hand, digital health, COVID-19, mental health, mobile app, and smartphone were among the most recently used keywords. Emerging technologies in healthcare such as machine learning, artificial intelligence, blockchain, and the Internet of Things have also been used more frequently recently. This is in line with the definitions presented and the evolution of ICT-enabled healthcare terminology, with the development and various uses of smartphones and apps, as well as with the COVID-19 pandemic and increased focus on mental health and well-being. On the other hand, telemedicine and telehealth, along with internet and technology, were among the keywords more frequently used in earlier publication years.

Figure 7: Bibliometric network of keyword co-occurrence in eHealth publications



Source: Author's own work using VOSviewer

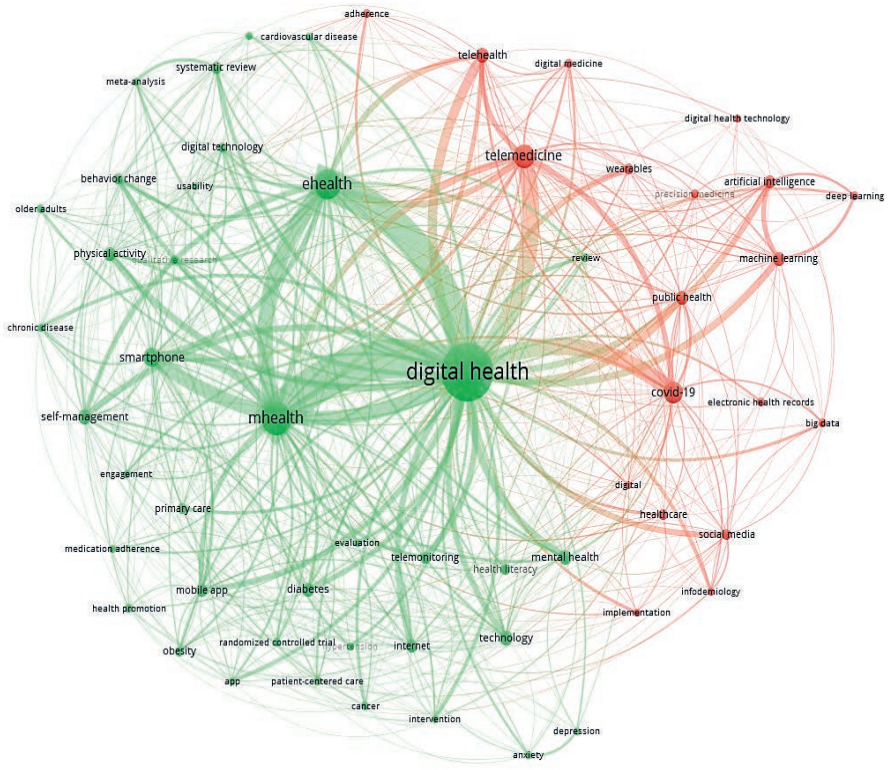
Figure 8: Bibliometric network of keyword chronology in eHealth publications



Source: Author's own work using VOSviewer

Finally, the last set of publications was on digital health. When analysing the co-occurrence of keywords from publications on digital health, some new technological keywords emerged, such as Big Data, Deep Learning, and wearables, in addition to those already mentioned for eHealth (Figure 9). Furthermore, several new keywords related to digital technology were used, such as digital health interventions, digital health technology, digital medicine, digital technology, precision medicine. Patient-centred care, usability, and health promotion were also used. Infodemiology, the dissemination of information and misinformation related to health, especially during an epidemic, was also introduced as a new keyword. The occurrence of words such as telemedicine and telehealth was less common in the context of digital health. However, the relationship of digital health with eHealth is strong, as well as with mHealth. Lastly, there were no keywords found related to economics or economic evaluations.

Figure 9: Bibliometric network of keyword co-occurrence in digital health publications



Source: Author's own work using VOSviewer

To summarize, in Table 4 we present of the VOSviewer output for the 15 most frequently occurring keywords together with the number of occurrences, distinguished by terminology. First, we can distinguish mHealth as one of the most frequently occurring keywords in each analysis with each terminology, proving that it is a term that spans across all terms used to describe ICT-enabled health services. In addition, telehealth, telemedicine, eHealth and mHealth were in the top 5 most frequently occurring keywords in almost all co-occurrence analyses. Second, the COVID-19 pandemic had a significant impact on publications on telehealth, telemedicine, and to a lesser extent digital health and eHealth, as it was among the top 5 most frequently occurring keywords in almost all analyses. Telemonitoring and rehabilitation was one of the most important keywords for telemedicine and telehealth publications, while self-management was a frequently occurring keyword in all analyses considered, as well as the technology keyword. Various chronic diseases are most common in telemedicine and telehealth publications, while mental health and similar keywords addressing well-being are more occurring in eHealth and digital health. Finally, keywords related to emerging technologies

such as machine learning and artificial intelligence were among the 15 most frequently occurring keywords for digital health publications.

Table 4: Most occurring keywords in publications related to terms describing ICT-enabled healthcare

Telemedicine		**Telehealth**		**eHealth**		**Digital health**	
Keyword	Nr	Keyword	Nr	Keyword	**Nr**	**Keyword**	**Nr**
telemedicine	1,584	telehealth	873	ehealth	1,336	digital health	438
telehealth	386	telemedicine	523	telemedicine	300	mhealth	151
covid-19	338	covid-19	258	mhealth	288	ehealth	123
ehealth	259	ehealth	164	telehealth	144	telemedicine	81
mhealth	148	mhealth	68	internet	137	covid-19	66
telemonitoring	108	technology	61	self-management	102	smartphone	53
smartphone	79	copd	56	physical activity	95	telehealth	35
diabetes	78	telerehabilitation	55	digital health	91	mental health	33
internet	71	telemonitoring	54	smartphone	86	self-management	33
technology	62	diabetes	48	systematic review	65	technology	32
stroke	60	telecare	46	mental health	63	diabetes	30
physical activity	56	pandemic	44	technology	60	machine learning	28
self-management	53	digital health	41	covid-19	58	physical activity	28
pandemic	52	self-management	40	healthcare	54	public health	28
rehabilitation	52	systematic review	38	depression	50	artificial intelligence	26

Source: Author's work based on VOSviewer output

5. Conclusion

Clearly, ICTs have an important role to play in strengthening health systems, promoting public health, and improving equity in access to health services. The significant increase in publications as presented in this paper is evidence of the broader adoption and implementation of ICT in healthcare, especially during the COVID-19 pandemic period when remote health care delivery was a necessity.

In the bibliometric co-occurrence analysis, we examined the relationship between keywords used in publications distinguished by the terminology used to describe ICT-enabled healthcare services. The keywords used in the publications are consistent with the terminology presented. Furthermore, the

keywords across publications outline the evolution in ICT-enabled healthcare, from telemedicine, which deals with technology and clinical services according to both the keywords used and terminology presented, to digital health, which deals with mental health, well-being, and new emerging technologies. Emerging topics in this area seem to focus on mental health, smartphones, and new technological advances, which is consistent with the uptake of new technologies to maximize health outcomes and the various uses of smartphones for health and well-being, as the aftermath of the COVID-19 pandemic and lockdowns. Moreover, the keyword cost-effectiveness, as a representative of economic evaluations, is only found in the bibliometric networks for telemedicine and telehealth publications, clustered together with telemonitoring, chronic diseases and research-related keywords. Other keywords related to economic evaluations, such as health economics, cost-utility, or cost-benefit, were not among the top 50 most occurring keywords for each set of publications. Furthermore, the number of publications related to economic evaluations of ICT-enabled healthcare is very small when compared to the total number of publications in this field, particularly for publications related to eHealth and digital health, as highlighted by the absence of relevant keywords. This indicates that economic evaluations of ICT-enabled health care are under-researched, and that further research is needed in this area, as is understanding the benefits and costs of such services. Because economic evaluations are key to funding of services with high technology costs such as ICT, research in this area will be critical to advancing ICT-enabled health services beyond pandemic-related needs.

The contribution of this study is threefold. First, this study provides an overview of the terminology in the field with definitions of the terms used, providing a knowledge base on ICT-enabled healthcare terminology. Second, this study describes the evolution of terminology over the past decades, highlights the current state of research, and introduces key research areas and journals. Third, our findings highlight the lack of economic evaluations in this field and emphasize that these have been conducted primarily in telemedicine and telehealth publications. This work is limited to the application of bibliometric analyses to publications written in English, and the literature search was restricted to a single database. This suggests that our results may not be representative of the entire literature. Future research could examine publications related to COVID-19 to see how the pandemic has affected progress in this area. In addition, there is need for future research on economic evaluations in this field. Future research should provide a review of economic evaluations conducted in this field, synthesize identified methodological challenges, provide insights into perceptions of different stakeholders on the relevant benefits and costs that should be considered and suggest guidelines on how to conduct economic evaluations for ICH-enabled healthcare services to advance their role.

References

Books:

1. Drummond, M. F. et al. (2005) *Methods for the economic evaluation of health care programme*, Third edition. Oxford: Oxford University Press.

Journals:

1. Ahmadvand, A. et al. (2019) "Trends and visibility of "digital health" as a keyword in articles by JMIR publications in the new millennium: Bibliographic-bibliometric analysis", Journal of Medical Internet Research, Vol. 21, No. 12, pp. 1-12. doi: 10.2196/10477.
2. Bashshur, R. et al. (2011) "Policy The Taxonomy of Telemedicine", Telemedicine journal and e-health : the official journal of the American Telemedicine Association, Vol. 17, No. 6, pp. 484-494, doi: 10.1089/tmj.2011.0103.
3. van Dyk, L. (2014) "A review of telehealth service implementation frameworks", International journal of environmental research and public health, Vol. 11, No. 2, pp. 1279-1298, doi: 10.3390/IJERPH110201279.
4. van Eck, J. N. and Waltman, L. (2010) "VOSviewer: A Computer Program for Bibliometric Mapping", Scientometrics, Vol. 84, No. 2, pp. 523-538, doi: 10.1007/s11192-009-0146-3.
5. van Eck, N. J., & Waltman, L. (2014) "Visualizing Bibliometric Networks", Measuring Scholarly Impact: Methods and Practice, pp. 285-320, doi: 10.1007/978-3-319-10377-8_13
6. Visser, M., van Eck, N. J., & Waltman, L. (2021) "Large-scale comparison of bibliographic data sources: Scopus, Web of Science, Dimensions, Crossref, and Microsoft Academic", Quantitative Science Studies, Vol.2, No.1, pp. 20-41. doi: 10.1162/qss_a_00112.
7. Eze, N. D., Mateus, C. and Hashiguchi, T. C. O. (2020) "Telemedicine in the OECD: An umbrella review of clinical and cost-effectiveness, patient experience and implementation", PLOS ONE, Vol. 15, No. 8, pp. 1-24, doi: 10.1371/journal.pone.0237585.
8. Fatehi, F., Samadbeik, M. and Kazemi, A. (2020) "What is Digital Health? Review of Definitions", Studies in Health Technology and Informatics, Vol. 275, pp. 67-71, doi: 10.3233/SHTI200696.
9. Gomes, M., Murray, E. and Raftery, J. (2022) "Economic Evaluation of Digital Health Interventions: Methodological Issues and Recommendations for Practice", PharmacoEconomics, Vol. 40, pp. 367-378, doi: 10.1007/S40273-022-01130-0.
10. Greiwe, J. (2022) "Telemedicine Lessons Learned During the COVID-19 Pandemic", Current Allergy and Asthma Reports, Vol. 22, No. 1, pp. 1-5. doi: 10.1007/S11882-022-01026-1.

11. de las Heras-Pedrosa, C. et al. (2022) “COVID-19 Study on Scientific Articles in Health Communication: A Science Mapping Analysis in Web of Science”, International Journal of Environmental Research and Public Health, Vol. 19, No. 3, pp. 1-29, doi: 10.3390/IJERPH19031705.

12. Monaghesh, E. and Hajizadeh, A. (2020) “The role of telehealth during COVID-19 outbreak: A systematic review based on current evidence”, BMC Public Health, Vol. 20, pp. 1-9, doi: 10.1186/s12889-020-09301-4.

13. Oh, H. et al. (2005) “What Is eHealth (3): A Systematic Review of Published Definitions”, Journal of Medical Internet Research, Vol. 7, No. 1, pp. 1-12, doi: 10.2196/JMIR.7.1.E1.

14. Pritchard, A. (1969) “Statistical Bibliography or Bibliometrics”, Journal of Documentation, Vol. 25, pp. 348-349.

15. Robinson, R. (1993) “Economic evaluation and health care. What does it mean?”, British Medical Journal, Vol. 307, No. 670, pp. 670-673, doi: 10.1136/BMJ.307.6905.670.

16. dos Santos Silva, E. K. et al. (2021) “Cost-effectiveness in health: consolidated research and contemporary challenges”, Humanities and Social Sciences Communications, Vol. 8, No. 1, pp. 1-10, doi: 10.1057/S41599-021-00940-5.

17. Sikandar, H. et al. (2021) “Bibliometric Analysis of Telemedicine and E-Health Literature”, International journal of online and biomedical engineering, Vol. 17, No. 12, pp. 52-69, doi: 10.3991/ijoe.v17i12.25483.

18. Smith, A. C. et al. (2020) “Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19)”, Journal of Telemedicine and Telecare, Vol. 26, No. 5, pp. 309-313, doi: 10.1177/1357633X20916567.

19. Snoswell, C. L. et al. (2020) “Determining if Telehealth Can Reduce Health System Costs: Scoping Review”, Journal of Medical Internet Research, Vol. 22, No. 10, pp. 1-22, doi: 10.2196/17298.

20. Song, T. M., Ryu, S. and Ho Lee, S. (2011) “U-Health Service for Managing Chronic Disease: A Case Study on Managing Metabolic Syndrome in a Health Center in South Korea”, Healthcare Informatics Research, Vol. 17, No. 4, pp. 260-266, doi: 10.4258/HIR.2011.17.4.260.

21. Sood, S. et al. (2007) “What is telemedicine? A collection of 104 peer-reviewed perspectives and theoretical underpinnings”, Telemedicine journal and e-health : the official journal of the American Telemedicine Association, Vol. 13, No. 5, pp. 573-590, doi: 10.1089/TMJ.2006.0073.

22. Stevens, W. J. M. et al. (2019) “eHealth Apps Replacing or Complementing Health Care Contacts: Scoping Review on Adverse Effects”, Journal of Medical Internet Research, Vol. 21, No. 3, pp. 1-9, doi: 10.2196/10736.

23. Turner, H. C. et al. (2021) “An Introduction to the Main Types of Economic Evaluations Used for Informing Priority Setting and Resource Allocation in Healthcare: Key Features, Uses, and Limitations”, Frontiers in Public Health, Vol. 9, pp. doi: 10.3389/FPUBH.2021.722927.

24. Udeh, B. L. (2020) “Economic Evaluation Studies”, Chest, Vol. 158, No. 1, pp. S88-S96, doi: 10.1016/j.chest.2020.03.008.

25. Uribe-Toril, J., Ruiz-Real, J. L. and Nievas-Soriano, B. J. (2021) “A study of ehealth from the perspective of social sciences”, Healthcare (Switzerland), Vol. 9, No. 2, pp. 1-19, doi: 10.3390/HEALTHCARE9020108.

26. Waqas, A. et al. (2020) “Harnessing telemedicine for the provision of health care: Bibliometric and scientometric analysis”, Journal of Medical Internet Research, Vol. 22, No. 10, pp. 1-16, doi: 10.2196/18835.

Official publications:

1. World Health Organization (1998) *A Health Telematics Policy in Support of WHO’S Health-For-All Strategy for Global Development: Report of the WHO Group Consultation on Health Telematics.* [Internet], Geneva: World Health Organization. Available at: <https://apps.who.int/iris/handle/10665/63857> [Accessed: March 28, 2022]

2. World Health Organization (2010) *Telemedicine: Opportunities and Developments in Member States: Report on the Second Global Survey on eHealth*, Healthcare Informatics Research. [Internet], Geneva: World Health Organization. Available at: <https://apps.who.int/iris/handle/10665/44497> [Accessed: March 27, 2022]

3. World Health Organization (2011) *mHealth: new horizons for health through mobile technologies: second global survey on eHealth*. [Internet], Geneva: World Health Organization. Available at: <https://apps.who.int/iris/handle/10665/44607> [Accessed: April 1, 2022]

4. World Health Organization (2016a) *Global diffusion of eHealth: making universal health coverage achievable. Report of the third global survey on eHealth*. [Internet], Geneva: World Health Organization. Available at: <https://apps.who.int/iris/handle/10665/252529> [Accessed: April 1, 2022]

5. ---------- (2016b) *Monitoring and evaluating digital health interventions: a practical guide to conducting research and assessment*. [Internet], Geneva: World Health Organization. Available at: <https://apps.who.int/iris/handle/10665/252183> [Accessed: April 1, 2022]

6. World Health Organization (2021) *Global strategy on digital health 2020-2025*. [Internet], Geneva: World Health Organization. Available at: <https://apps.who.int/iris/handle/10665/344249> [Accessed: April 1, 2022]

CHAPTER 11

The role of marketing communication in perception of information availability about renewable energy sources[1]

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ABSTRACT

Aims of the paper: Clean energy and renewable energy sources are becoming strategic directions for many businesses and economies. Although prioritized by various industries, customers constantly lack sufficient information to make relevant decisions on how to act in regards with renewable energy sources. With the abundance of information available to customers today, it is of the utmost importance to have the ability to distinguish between different information and different sources of information with focus on their credibility and information content. On the other hand, companies lack consistency, transparency in their marketing communications, and they do not provide enough information to their customers so that they can make informed decisions. Therefore, the purpose of this paper is to analyse the perception of information availability related to renewable energy sources. Consequently, the research objective is to examine the relationship between marketing communication efforts, and perceptions of information availability in relation to renewable energy sources. Methodology: The empirical research was conducted on a sample of 130 respondents in Croatia and Bosnia and Herzegovina, using predefined scales from previous literature. Research results: Research revealed that citizens are not adequately informed about energy from renewable energy sources. As they are mostly well informed about the positive aspects of renewable energy sources, however they are not informed about the negative aspects nor about representation of energy from renewable energy sources in the current electricity supply. Individuals that are informed about negative effects of energy from renewable energy

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sources, mostly acquired that information through educational system and personal research on the internet.

Key words: *marketing communication, perceived information, renewable energy sources*

JEL classification: *JEL_M30, JEL_M39, JEL_Q20*

1. Introduction

The level and quality of information can influence an individual's decisions, and the problem mentioned, is important regarding the availability of everyday information and managing of the information through public media (Varey, 2002). Both perception, and effects of the information overload are made worse by quick advancement in the information and communication technology (Edmunds and Morris, 2000). Although, there is a plethora of available information, it is often difficult to access useful and relevant information when they are needed.

With the arrival of digital technology media awareness is given a pivotal role. Media literacy, information literacy and digital literacy are three most common concepts which focus on critical approach to media messages and information which are available in an unimaginable quantity and diversity (Koltay, 2011). Besides the amount of information, the diversity of media and manners of communication, it is implied that there is a doubt in the quality of information. The media deeply affects perception, beliefs, and attitudes, thus grows the importance of visual communication and information, useful application of information in a society, and the need for lifelong learning grows in importance (Jolls and Thoman, 2008).

In their everyday life individuals are exposed to a great deal of information, most of which are filtered through, maintaining only those they find useful. One of the criteria that is used for filtering information is their credibility and quality (Nurse et al., 2011). Therefore, getting credible information is necessary, but not the appropriate component of any means of communication. Basically, marketing communication includes improving or achieving awareness, better understanding, shared beliefs and meanings, and positive association, attitudes, and predispositions for the usefulness of the product, service or organization which is launched into the market (Varey, 2002). It includes a message (what needs to be said), medium (where in wants to be said) and goal (who gets the message) (Lagrosen, 2005). A lot of information through this manner reaches the consumer, but at the same time, those consumers cannot distinguish important from non-important information.

Today 80% of energy sources is provided by oil, coal and natural gas, and they are called fossil fuels (Šoštarić, 2017). Fossil fuels, along with nuclear energy are non-renewable energy sources. Since it is not possible to determine with high certainty how large the crude oil supply is, and due to the high level of pollution, other alternative sources are looked for manufacturing electricity (Evans et al., 2010). A response to the current situation, is manufacturing energy from several renewable energy sources, whose technology is exceptionally expensive, and production is not constant, or predictable in most cases. But as a consequence, cleaner and ecologically acceptable energy is produced (N.A, 2019).

Therefore, the purpose of this paper is to analyze the perception of information availability related to renewable energy sources. Furthermore, to explore the relationship between marketing communication channels and citizen's information about renewable energy sources, advantages, and disadvantages

of the so called “green energy” taking into account more than one factor; from manufacturing to waste disposal in regard to the type of technology it uses. Marketing communication, by using different communication channels, reaches the consumer (Kotler et al., 2014). The most important issue is that communication rises the awareness with the citizens about taking care of the environment, general knowledge about renewable energy and to make them aware of the consequences of using renewable energy sources (both positive and negative). Therefore, the research objective is to examine the relationship between marketing communication efforts and perceptions of information availability in relation to renewable energy sources.

Having this in mind, the paper aims to contribute to better understanding of marketing communication in the field of renewable energy sources and to provide customer perception of information related to energy production from renewable energy sources that is placed through different communication channels.

Paper is structured as follows. After Introduction, Literature review is provided with stated research hypothesis. Next is the Methodology section, followed with analysis of the research results and discussion. At the end Conclusion is offered.

2. Literature overview

In the last couple of decades manufacturers and buyers have been raising concerns about the influence of the production on the environment. Consumers and manufacturers have focused their attention on ecological products for which it is assumed they are “green” or ecologically acceptable (Bhatia and Jain, 2013). Statistics have shown that 80% of worlds energy is produced from fossil fuels which are precious sources of energy, however they are not renewable. Because of this, it is necessary to constantly develop and to increase renewable energy sources, but in order to achieve that, it is necessary to overcome several difficult questions (Šoštarić, 2017).

With regards to the fact that the technology of producing electricity advances, at the same time there is a discussion on appropriate mechanisms for promoting renewable energy (Kalea, 2014). The term green advertisement, i.e., green communication where the focus is on marketing communication, is trying to develop a new market for renewable energy sources and green products in general. Green marketing communication encompasses a wide range of activity, starting with change in production processes, packaging, or materials, and ending with communication strategies (Mydock, 2014) with focus on marketing activities that simultaneously consider environmental harm of such activities and the attempt to minimize it (Polonsky, 2011). Also, green marketing is used to “describe efforts to produce, promote, package, and reclaim products in a manner that is sensitive or responsive to ecological concerns” (AMA, 2017).

Informing through marketing communication channels influences citizens in a way that it constantly raises consumer consciousness of environment and

affinity towards ecologically friendly products. The consumers are ready to pay more for such a product based on the information that are getting through to them, but the question is if their opinion would change if the information would be based on the negative aspects of production process or even waste disposal (Ramli, 2009). Design of marketing communication campaigns promote renewable energy sources because of the importance of green value amongst the consumers (Bhatia and Jain, 2013).

Solar panels are pointed out by research as one of the most important segments of the renewable energy sources with negative impact of this type of technology on the environment (Chowdhury et al., 2020). Therefore, after their production life is over, they become dangerous waste. Production life of the solar panels is approximately 25 years, and so far, this has not been worrying because the technology is still young. However, soon it will become one of the most important environmental protection questions.

Looking at it from different aspects, the conclusion is that it is necessary to successfully produce energy from renewable energy sources for it to be economical and competitive in comparison to traditional energy sources. Furthermore, for an energy source to be profitable, it has to be stable, safe, and in a concentrated form which can be stored and transported (Kalea, 2014). It is important to pay attention to pollution caused by this type of technology, storing the waste after its production life expires, and profitability of investment in such technology.

Energy must be available in a concentrated form to fulfil the great needs for energy, also there must be a way of storing energy so it can be accumulated and transported to remote areas (Evans et al., 2010). The success of fossil fuels lays in the fact that they satisfy three basic demands, while renewable energy sources still have certain limitations which prevent their spread in larger scales (Shellenberger, 2019).

Since climate change has become a global challenge during the last decade, the international community is more and more coming together to act. It is a challenge which not only threatens the sustainability of our planet, but also has long-term threats to the global economy. Green marketing communication demands new communication strategies and management to efficiently deal with challenges for development of renewable energy sources (Ganganaboina and Riaz, 2017). Green marketing communication is the response to environmental care. In ethical sense it is a reasonable decision to act in a responsible way in renewable energy sources production, technology, and steps after production, such as recycling and safe waste disposal (Kotler, 2001).

Carefully thought of and credible plan of ecologically oriented marketing communication has a key role in achieving sustainable development, which is indubitably aim of every society and every community (Koltay, 2011). Companies provide superficial or unmeaningful information about their products, and service, and the impact on the environment (Smith and Brower, 2012). Hence, raising skepticism and negatively influencing credibility of green marketing communication. Marketing communications therefore should

be approached as part of green marketing communication strategies with challenges ahead.

Following the above, the research question is stated as following: How marketing communication is related to the knowledge about renewable energy sources and which media is dominantly used for informing on energy from renewable energy sources with aim to determine the role of marketing communication channels in this process.

3. Methodology

The research has been conducted in the period between May and July of 2020 on a sample of 130 respondents of different age, and economical background. The respondents were from Croatia and Bosnia and Herzegovina. Considering that this is quantitative research, wanting to establish motives, attitudes, thoughts, and personal values of individuals who participated in the research, we chose to conduct the research via online survey, as our main instrument, we choose 1ka.si platform. The respondents were reached by posting a link to the questionnaire on social media platforms and sent via email to authors' contacts. Respondents were asked to send e-mail with link and/or to forward link to the questionnaire to at least three of their friends and acquaintances. Therefore, snow-ball technique of collecting data was used.

The questionnaire included closed-ended questions to explore objective facts and open-ended questions to explore the opinions of the respondents. Likert's scale was used for exploring different attitudes and opinions; we applied 7-point Likert scale anchored at (1) I completely disagree and (7) I completely agree. Also, questions considered the importance od several practices and used 5-point importance scale with (1) not at all important and (5) extremely important.

The questionnaire was divided into several parts. The questions were formed according to the previous research. The questions in the questionnaire can be put into four categories which had the aim to determine the level of information on energy production from renewable energy sources (Zakaria et al., 2019; Curry et al., 2005) and its advantages and disadvantages (Kufrin et al., 2004). Also, to explore media and communication channels used for informing about renewable energy sources (Khambalkar et al., 2010; Curry et al., 2005) where media (radio, TV, internet portals, social networks) and communication channels (professional literature, education system and through personal search over internet) were included. They were divided into two groups to distinguish between modes of transferring the information (media) and possible ways of searching the information (communication channels). And the fourth aim was to determine the knowledge and attitudes of the citizens about their willingness to pay more for energy from renewable energy sources (Curry et al., 2005; Khambalkar et al., 2010; Khambalkar et al., 2010). Demographic questions relate to age, gender, education, occupation, marital status, income, number of people in the household, country of residence and the size of population in their hometown.

Results were analyzed using univariate (descriptive statistics and frequencies) and bivariate statistical methods (correlations, t-test and analysis of variance) with SPSS ver 26 program.

4. Empirical data and analysis

4.1. Research sample

After examining the collected database, it was decided that due to missing values in 10 of collected questionnaires, analysis will proceed with 120 fully answered questionnaires. Research analysis of the research sample is presented in Table 1.

Table 1: Research sample structure

Characteristic	Number of respondents	Percentage
Gender		
Female	90	75%
Male	30	25%
Marital status		
Single	40	33.3%
In a relationship	19	15.8%
Living with partner	19	15.8%
Married	39	32.5%
Divorced/Widow(er)	3	2.5%
Education level		
Elementary school	0	0%
Secondary school	23	19.2%
Bachelor	39	32.5%
Master	50	41.7%
Postgraduate	8	6.7%
Average net income in the household		
Below the average (up to 750 euro)	9	7.5%
Average (between 750 and 1100 euro)	74	61.7%
Above the average (above 1100 euro)	37	30.8%
Employment status		
Unemployed	12	10.0%
Fixed-term contract	8	6.7%
Full time contract	69	57.5%
Student	31	25.8%
Number of inhabitants in place of residence		

Up to 10.000 inhabitants	36	30.0%
Between 10.000 and 100.000 inhabitants	35	29.2%
More than 100.000 inhabitants	49	40.8%
Country of residence		
Croatia	28	23.3%
Bosnia and Herzegovina	92	76.7%

Source: Research results

Average respondent is a female (75%), has 31 years (average from range of 18 years till 65 years), is single (33.3%) or married (32.5%), lives in a household consisting of 3.5 members, has finished master level education (41.7%), has average (between 750 and 1100 euro) net household income (61.7%), is employed with full-time contract (57.5%), lives in a city with more than 100.000 inhabitants (40.8%) and lives in Bosnia and Herzegovina (76.7%)

4.2. Analysis of the research results

To explore stated research question, several aims were proposed. Analysis was organised according to them.

Determine the level of information on energy production from renewable energy sources

Research analysis was done using paired samples t-test between Perceived personal information level and Willingness to acquire more information on renewable energy sources. Results are presented in Table 2.

Table 2: Comparison of obtained and desired information level

Characteristic	Perceived personal information level		Willingness to acquire more information		T-test (df=119)
	Mean	SD	Mean	SD	
The use of renewable energy sources (solar, wind) in the household	2.73	1.179	4.06	0.823	10.970***
Alternative fuels as car driving force (e.g. Autogas, biodiesel, ethanol)	2.68	1.174	3.91	0.810	10.128***
Plans to build new power plants in the country where you live	2.04	1.266	3.87	0.903	12.551***
Using renewable energy sources in the city where you live	2.13	1.332	4.08	0.836	13.584***

Note: ***p<0.001

Source: Research results

Respondents perceive statistically significantly lower levels of personal information related to renewable energy sources than their willingness to acquire more knowledge on them. Therefore, there is a discrepancy of current knowledge and willingness to learn. This is also evident from responses related to knowledge on renewable energy sources which average value range from 2.04 and 2.73.

Explore advantages and disadvantages of energy produced from renewable energy sources

Additional analysis was done with aim to explore level of knowledge about advantages and disadvantages of renewable energy sources usage among respondents. Identified advantages: a) it is environmentally friendly (Mean=3.99, SD=0.884); b) encourages the development of local communities (Mean=3.68, SD=0.869); c) creates additional positions in businesses (Mean=3.62, SD=0.812).

Acknowledging disadvantages of renewable energy sources: 1) RES production technology is completely environmentally friendly and has no negative impacts (Mean=3.33, SD 0.956); 2) The lifespan of a solar panel is approx. 20 years (48.3%) and other answers included: less than 15 years (16.7%), approx. 30 years (25%) and approx. 40 years (10%); 3) Most carcinogenic technological waste is related to the technology of energy production from wind energy (6.7%), solar energy (31.7%), small hydropower plants (10.8%) and large hydropower plants (50.8%); 4) Wind power plants are represented with 5-15% (27.5%) in the electricity production in their countries, and other answers include: less than 5% (36.7%), more than 15% (1.7%), and not sure (34.2%).

Explore media and communication channels used for informing about renewable energy sources

Respondents were informed about renewable energy sources through different media (radio, TV, internet portals, social networks) and communication channels (professional literature, education system and through personal search over internet). Results on the way how they acquire information through media and communication channels are presented in Table 3.

Table 3: Acquiring information on renewable energy sources

Characteristics	Mean	SD
Radio	1.77	0.837
TV	2.77	1.075
Internet portals	3.39	1.056
Social networks	2.73	1.158
Professional literature	2.30	1.178
School	2.31	0.933
Higher educational institution	2.38	1.047
Personal search over the internet	2.92	1.127

Source: Research results

As research results indicate, the most dominant media are internet portals (Mean=3.39) indicating that through this media majority of information on renewable energy sources are acquired. Respondents were also asked about the presence of environmental topics in the media. Results indicate that Environmental topics are sufficiently present in the media today (Mean=2.45, SD 0.969).

Additional analysis was done using correlation analysis. As variables measured respondents' perception of media contributing to acquired information about renewable energy sources it was possible to conduct correlation analysis. Correlation was measured between media (radio, TV, social networks…), communication channels (school, professional literature, higher educational institutions (HEIs)) used for informing about renewable energy sources and perceived sufficient presence of environmental topics in the media. Results of the correlation analysis are statistically significant only for the ones who perceive presence of environmental topics in media is adequate and the ones who acquire information on renewable energy sources through their education at HEI's ($r=0.235$, $p<0.001$). Hence, implying that formal education about environmental topics is important for individuals to perceive differently presence of environmental topics in media.

Additionally, we compared individuals who stated that they were informed about the negative aspects of renewable energy sources (35%) and ones who were not informed about them (65%) with channels of acquiring information about renewable energy sources. Analysis of variance (ANOVA) was performed. All the relations were tested with Levene's homogeneity of variance test. Test revealed that all the relations were statistically not significant, indicating that variances are not homogeneous. Results are presented in Table 4.

Table 4: Analysis of variance for informing on negative aspects of renewable energy sources and media and other ways of informing

Characteristic	**F-value**
Radio	n.s.
TV	n.s.
Internet portals	F(1, 118)=5.368**
Social networks	F(1, 118)=9.718**
Professional literature	F(1, 118)=4.165**
School	F(1, 118)=7.561**
Higher educational institution	F(1, 118)=13.165***
Personal search over the internet	F(1, 118)=10.671***

Note: n.s.=relationship not statistically significant; *** $p<0.001$; ** $p<0.05$; * $p<0.1$

Source: Research results

In the previous table it can be concluded that there exists difference between individuals who state that they have been informed about negative aspects of renewable energy sources and the ones that have not been informed about

that, related to the media and other ways of informing on renewable energy sources. Hence, TV and radio are not perceived as media where individuals are informed on negative aspects of renewable energy sources.

Explore knowledge and attitudes about willingness to pay more for energy from renewable energy sources

Individuals are willing to pay more for the energy from renewable energy sources (51.7%), but still 48.3% of them are not willing to pay additionally for energy produces in such a way. Individual's reasons influencing willingness to pay more for energy from renewable energy sources is presented in Table 5. Also, analysis of variance was performed to check if there is a difference between individuals willing to pay more for energy from renewable energy sources and the ones that are not willing to pay additionally for that energy. All the relations were tested with Levene's homogeneity of variance test. Test revealed that all the relations were statistically not significant, indicating that variances are not homogeneous. Results are presented in Table 5.

Table 5: Reasons influencing willingness to pay more of energy from renewable energy sources

Characteristics	Mean	**SD**	**F-value**
Security in electricity supply	3.17	0.956	n.s.
Cheap energy	3.34	0.992	n.s.
Climate change prevention	3.80	1.009	F(1, 118)=8.474**
Energy sources that are cleaner than fossil fuels	3.72	1.070	F(1, 118)=3.229*

Note: n.s.=relationship not statistically significant; *** p<0.001; ** p<0.05; * p<0.1

Source: Research results

Results indicate that individuals that are willing to pay more for energy from renewable energy sources are the ones who are worried about climate change and are willing to prevent that (F=8.474, p<0.05), and the ones who consider the energy from renewable energy sources cleaner than energy from fossil fuels (F=3.229, p<0.1).

Respondents are not aware that incentives for producing energy from renewable energy sources are already included in their monthly electricity bills (77.5%), only 22.5% of them are aware of that information. Research focused on reasons that contributed to the decision for unwillingness to pay additionally for energy from renewable energy sources. Results are presented in Table 6.

Table 6: Reasons for not willing to pay additionally for energy from renewable energy sources

Characteristics	Mean	SD
financial reasons, low salaries, and pensions	3.65	0.950
electricity is already too expensive	3.77	0.817
it represents unacceptable cost increase	3.68	0.871
that electricity should be cheaper, production has lower costs	3.84	0.810
because that energy renews itself (sun and wind)	3.56	0.887
excessive personal investment	3.57	0.786
the State should pay for it	3.36	0.877
I am not informed enough	3.35	0.876
adverse effects on the environment (animals are endangered, noise) and health (disposal)	3.18	1.029

Source: Research results

Research results indicate that several reasons are important when individuals are not willing to pay additionally for energy from renewable sources such as "that electricity should be cheaper, production has lower costs" (Mean=3.84) or that "electricity is already too expensive" (Mean=3.77) or "it represents unacceptable cost increase" (Mean=3.68).

5. Results and discussion

Conducted research aimed to contribute to better understanding of marketing communication in the field of renewable energy sources and to provide customer perception of information related to energy production from renewable energy sources that is placed through different communication channels. Research revealed that citizens are not adequately informed about energy from renewable energy sources and that they are willing to acquire more information. Their perceived level of knowledge is low, hence providing the opportunity to governmental and other institutions to act in that direction. As SDG (2015), more precisely goal 7: Ensure access to affordable, reliable, sustainable, and modern energy for all, points out the need to focus on clean energy, it is important that individuals are knowledgeable about that clean energy sources. Also, research results point out that there is an even greater need for wide use of public relations with aim to educate individuals about clean energy from renewable energy sources. Individuals' awareness to have additional information is high, implying that they are aware of education and acquiring information on renewable energy sources. Similar results have been identified in Khambalkar et al. (2010) research. Education can be done through various media and using different communication channels, with aim to provide both positive and negative aspects of the energy production from renewable energy sources.

Individuals are mostly well informed about the positive aspects of renewable

energy sources, but not about the negative aspects nor about representation of energy from renewable energy sources in the current electricity supply. It can be concluded that individuals are willing to support the implementation of renewable energy sources in their daily life activities in order to create a sustainable country. Individuals support the idea of replacing conventional energy sources with renewable energy sources because they believe that there are positive aspects of such replacement, and they believe that both citizens and the state could benefit from the use of renewable energy sources. Similar results were obtained by Zakaria et al. (2019). But as there are also negative effects of producing energy from renewable energy sources, individuals should also be informed about that. This is related mainly to the production of such renewable energy sources power plants or disposal of their components.

Research results also indicate that individuals that are informed about negative effects of energy produced from renewable energy sources, mostly got that information through educational system and personal search through the internet. Consequently, pointing out that educational system is responsible for providing objective perspective on renewable energy sources, and forming the informed individuals. Early education in school is very important in providing knowledge about the importance of energy in general, need to use renewable energy sources but also about the facts related to the positive and negative aspects of its production.

From the research it can be concluded that the public perceives renewable energy sources as a non-polluting source and that the use of energy from renewable energy sources is a very good idea. The ones who are supporting this idea and expressing their willingness to pay more for energy from renewable sources are the ones who are worried about climate change and are willing to prevent that and the ones who consider that energy from renewable energy sources is cleaner than energy from fossil fuels. A large percentage of individuals are not willing to pay additionally for energy from renewable energy sources. As reasons the following are mentioned; energy is already highly priced, having low incomes, and that it represents unacceptable cost increase. Hence, state subsidies are important for South-east European countries to continue using energy from renewable energy sources (Žiković and Gržeta, 2017). A great proportion of individuals are not aware that already with each electricity bill a percentage is included of which the state pays incentives to the producers. This is also due to lack of information as claimed by Zakaria et al. (2019).

Transitions to low-carbon energy systems will be comprehensive and demanding, certainly requiring significant public support. Climate change is challenging societies around the world to reconfigure their energy systems. But it is believed that energy systems will never completely transfer to energy from renewable energy sources. Until some new technologies are created that will ensure security of supply or new way of storing energy. For this reason, the EU plans to build plants for renewable energy sources and by 2050 to have a 50% share in total production (Ryghaug et al., 2018).

6. Conclusions

By identifying changes in the behavior, companies can modify their offer to consumers. Similarly, with identifying trends in the market also countries and governments must adapt their policies. Consumers today are mostly concerned about the degradation of the environment and the negative impact of their use of products and services on the environment, so they only look at the positive side of energy production, which is better in certain respects. The cause of this concern could be visible climate change, global warming and increasing air and water pollution. Furthermore, research pointed out that respondents are not sufficiently informed about energy from renewable energy sources. This can contribute to overappraisal of such energy, neglecting the existent or future negative aspects on the environment. Through educational system by providing adequate information on all aspects of energy production from renewable energy sources, individuals can more realistically form their expectations and act in advance, not when the problem occurs related to disposal of such renewable energy production facilities.

Research aimed to contribute to exploring level of knowledge about renewable energy sources in South-east European countries. And it also aimed to determine the possibility of using various marketing communication channels that can be used for informing on energy from renewable energy sources. Hence, it identified the level of knowledge about renewable energy sources, which is low, but individuals are willing to learn and be educated about. It identified that educational system is very important in providing objective data and information on all aspects of renewable energy sources. Also, that individual's willingness to self-educate about renewable energy sources is important source of knowledge on this topic. Therefore, marketing communication channels about energy from renewable energy sources should be managed through educational system and new media (internet portals and social networks), not through traditional mass media as TV and radio. This aims in providing adequate level of knowledge and information to form decisions and act accordingly.

Research has several implications. Firstly, it noted that educational system is providing objective information (both positive and negative) upon energy from renewable energy sources, helping individuals to bring informed decisions. Therefore, governmental institutions are responsible for such process, and it should be included in the school curriculum more extensively to reach larger percentage of individuals. Secondly, individuals are aware of lacking information on renewable energy sources but are willing to learn about them. Therefore, both higher educational institutions through offering different life-long learning programs, short courses or workshops could contribute to this expressed market need. On the other hand, marketing or communication managers from governmental institutions could provide additional information about renewable energy sources with aim to educate, inform and help society to be adequately informed. Thirdly, as it is found that individuals lack basic knowledge about renewable energy sources and its role in electricity supply in a country, communication managers from public and governmental institutions could provide articles, interviews or other type of materials to

increase awareness and information availability about production of energy from renewable energy sources. Hence, contributing to an informed society.

The limitations of this research are found in the fact that a small number of respondents were included in the research, so it is advised to increase number of the respondents in future research. Also, as the structure of the respondents does not follow the structure of the population, according to age, gender, or income, it is suggested to take this into account in future research. Although the survey included respondents from two countries, due to the small number of respondents in Croatia, comparison of respondents on a country level was not done. It is believed that future research could focus on a separate observation and comparison of the two countries, but also include in the sample of observations some other neighbouring countries such as Serbia, Slovenia, or Hungary. As, it is possible that the population of economically more developed countries has different attitudes towards renewable energy sources than the population of less economically developed countries.

References

1. AMA (2017) “Definitions of marketing”, American marketing association [Internet] Available at: https://www.ama.org/the-definition-of-marketing-what-is-marketing [Accessed: March 24, 2022]
2. Bhatia, M., Jain, A. (2013) „Green Marketing: A Study of Consumer Perception and Preferences in India“, Electronic Green Journal, Vol. 1, No. 36., pp. 1-19.
3. Chowdhury, M. et al. (2020) „An overview of solar photovoltaic panels’ end-of-life material recycling“, Energy Strategy Reviews, Vol. 27, pp.100431
4. Curry, T. et al. (2005) „A Survey of Public Attitudes Towards Energy & Environment in Great Britain“, Massachusetts Institute of Technology, Laboratory for Energy and the Environment, Cambridge, Publication No. LFEE 2005-001 WP
5. Edmunds, A., Morris, A. (2000) “The problem of information overload in business organisations: a review of the literature”, International journal of information management, Vol.20, No.1., pp.17-28.
6. Evans, A., Strezov, V., Evans, T. J. (2010) „Sustainability considerations for electricity generation from biomass”, Renewable and sustainable energy reviews, Vol.14, No.5, pp.1419-1427.
7. Ganganaboina, A.Y., Sana, R. (2017) Communication of green marketing strategies for creating consumer awareness: A study of grocery retail sector in Sweden, Thesis, University of Gaevle.
8. Kalea, M. (2014) Obnovljivi izvori energije – energetski pregled [Renewable energy sources – energetic overview], Zagreb: Demona.

9. Khambalkar, V. et al. (2010) „Renewable energy: An assessment of public awareness“, International journal of ambient energy, Vol. 31, No.3, pp. 133-142.

10. Koltay, T. (2011) “The media and the literacies: Media literacy, information literacy, digital literacy”, Media, Culture & Society, Vol. 33, No. 2, pp.211-221.

11. Kotler, P. (2001) Upravljanje marketingom : analiza, planiranje, primjena i kontrola [Marketing management: analysis, planning, implementation and control], Zagreb: Mate

12. Kotler, P., Keller, K. L., Martinović, M. (2008) Upravljanje marketingom [Marketing management], 14th edition, Zagreb: Mate d.o.o.

13. Kufrin, K., Domac, J., Šegon, V (2004) „Informiranost i stavovi o obnovljivim izvorima energije i energetskoj efikasnosti [Knowledge of renewable energy sources and energy efficiency] “, Socijalna ekologija - journal for environmental thought and sociological research, Vol. 13, No. 3-4, pp. 325-345.

14. Lagrosen, S. (2005) “Effect of the internet on the marketing communication of service companies”, Journal of Services Marketing, Vol. 19, No. 2, pp. 63-69.

15. Mydock, S.J. (2014) On green marketing: consumer behaviour in response to marketing renewable energy usage, DBA thesis, Southern Cross University, Lismore, NSW

16. N.A. (2019) “Obnovljivi izvori energije kao budućnost svjetskog korištenja energije [Renewable energy sources as a future of the worlds energy use]“, Obnovljiva energija - Ekološki aspekt izvora energije [Renewable energy – Ecological aspect of energy sources] [Internet] Available at: <https://sites.google.com/site/brankobalog/obnovljivi-izvori-energije-kao-buducnost-svjetskog-koristenja-energije/ekoloski-aspekt-izvora-energije>[Accessed:January 14., 2020]

17. Nurse, J.R.C. et al. (2011) “Information Quality and Trustworthiness: A Topical State-of-the-Art Review”, In The International Conference on Computer Applications and Network Security (ICCANS), pp. 492-500.

18. Polonsky, M.J. (2011) ‘Transformative green marketing: impediments and opportunities’, Journal of Business Research, Vol. 64, No. 12, pp. 1311–1319.

19. Ramli, N. (2009) „Awareness of Eco-label in Malaysia’s Green Marketing Initiative“, International Journal of Business and Management, Vol. 4, No. 8, pp. 132-141.

20. Ryghaug, M. Skjølsvold, T.M. and Heidenreich, S., (2018) „Creating energy citizenship through material participation“, Social studies of science, Vol. 48, No. 2, pp. 283–303.

21. SDG (2015) “Sustainable development goals”, UN Department of Economic and Social Affairs [Internet], https://sdgs.un.org/goals [Accessed April 21, 2022]

22. Shellenberger, M. (2019) „Why Renewables Can’t Save Internet“, Quillette, [Internet] Available at: <https://quillette.com/2019/02/27/why-renewables-cant-save-the-planet/> [Accessed: December 28, 2019]

23. Smith, K.T., Brower, T.R. (2012) “Longitudinal study of green marketing strategies that influence Millennials”, Journal of Strategic Marketing, Vol.20, No.6, pp. 535-551.

24. Šoštarić. T. (2017) „Turbulentna budućnost svjetske Internetike“, Aljazeera Balkans, [Internet] <http://balkans.aljazeera.net/vijesti/turbulentna-buducnost-svjetske-energetike>[Accessed: January 15., 2020]

25. Varey J.R. (2002) Marketing Communication: Principles and Practice, London: Routledge

26. Zakaria, S.U. et al. (2019) „Public Awareness Analysis on Renewable Energy in Malaysia“, In IOP Conference Series: Earth and Environmental Science,Vol.268, No.1, pp.012105.

27. Žiković, S., Gržeta, I. (2017) “Competitiveness of renewable energy sources on the liberalized electricity market in South Eastern Europe countries”, International Journal of Energy Economics and Policy, Vol. 7, No. 3, pp.326-336.

CHAPTER 12

Smart grid concept for electrical power system: a case of a Croatian region

Vladimir Valentić, Saša Žiković, Alfredo Višković

ABSTRACT

For a successful transition to the future green, low-carbon electrical power system, significant financial investments are needed, both from institutional/ government entities and private investors. A methodology that takes into account the three essential pillars (economic factors, security/reliability factors, and ecological/environmental factors) is presented in the paper. The proposed methodology was tested using different scenarios on the largest Croatian region/Istrian peninsula electrical power system. This is performed on current data (the year 2022), for an intermodal period (the year 2030), and the forecasted green energy power system in the year 2050. A smart grid with a virtual power plant networked by a carefully selected production mix (consisting of renewable energy sources suppressed by battery storage and manageable consumption) is a significantly more flexible solution than investing in high-voltage power transmission infrastructure and large conventional production plants.

Key words: *Smart grid, Virtual power plant, Low carbon energy power system*

JEL classification: *L94, P18, Q31, Q41, Q42*

1.Introduction

In recent years, under the influence of many factors, the energy sector has undergone extensive changes that have led to new understandings related to the selection of the optimal electricity production mix or optimal electrical power system. The main aim of this paper will be electric power systems with the main focus on their transition from a current energy power system (the year 2022) to a low carbon energy power system (expected around the year 2050). To achieve these ambitious goals over the next couple of decades it is necessary to get a significant decline in CO_2 emissions, increase of implementation of renewable energy and encourage extensive electrification process e.g. electric mobility (vehicles). A significant role in this process could have the smart grid concept with virtual power plants. A smart grid refers to the whole power infrastructure and ICT (computer-communication) infrastructure that is able to effectively integrate all activities of connected users (production, customers, battery storage, manageable consumption, complex user energy systems, etc.) with the aim of secure and economical electricity supply. They are based on a strong communication and computer infrastructure in order to enable reliable, secure and economical operation of the power system through the huge amount of information that arrives at the VPP in a second raster from each point of the system.

Smart grid and virtual power plant concept harnessed by optimal diversified generation production mix offer interesting opportunities for private investors. The main hypothesis which is being questioned in this paper is: implantation of smart grid concept could save government/state-owned companies a significant amount of financial resources and they could be invested in other more suitable projects. Also, this new energy power concept could maintain (or even upgrade) security and reliability, and has significantly higher flexibility (it could be achieved not on a yearly or monthly basis but even on an hourly basis).

The present research is organized into six primary sections. The introductory chapter provides an overview of the study's aims and objectives, as well as the background and context of the research. In the second chapter, the existing literature is reviewed briefly, focusing on the relevant theoretical and empirical studies in the field.

The third chapter outlines the methodology employed in the research, including data collection, analysis techniques, and modeling approaches. This chapter also presents a detailed discussion of the analytical framework, which is essential to the study's empirical investigation.

In the fourth chapter, the case study data is presented, consisting of four distinct scenarios based on the Istrian electric power subsystem. Each scenario is analyzed and evaluated based on its economic and environmental impacts, allowing for a comprehensive comparison of the different policy options.

The fifth chapter discusses the results of the research, drawing upon the findings presented in the previous chapters. The results are discussed in

light of the research objectives, and the policy implications of the results are also explored. The paper concludes with a summary of the key findings and recommendations for further research and practical applications of the research outcomes. This discussion emphasizes the importance of the research for decision-making processes related to sustainable energy policy and practice.

2. Literature review

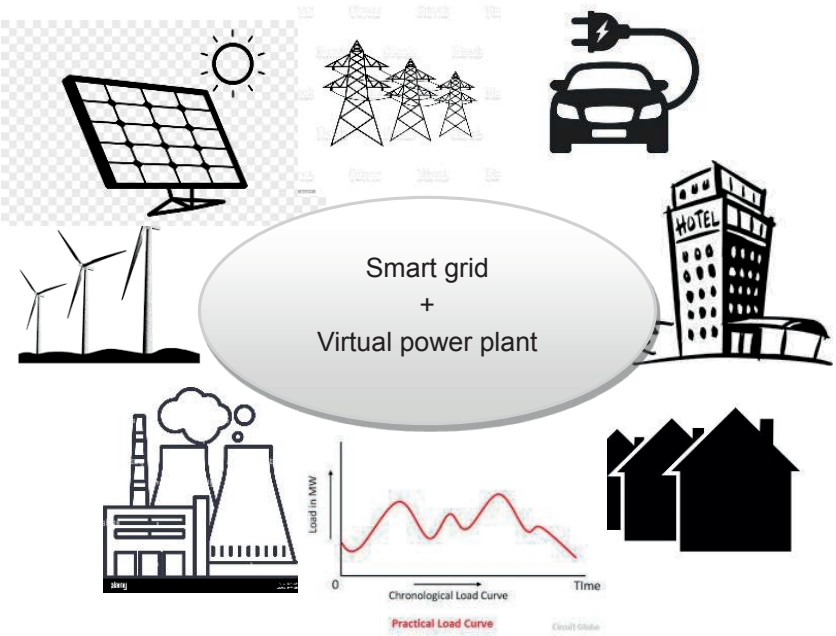
The literature is different for these three main parts/factors of any (future) energy power system: security and reliability, economic and environmental factors. Smart grid concept for electrical power system: a case of the Croatian region is assessed/processed/explored on the Istrian peninsula. Security and reliability factors, especially those related to the Croatian (Istrian) electricity power system safety has been analysed in several articles by many authors (Kotorac et al., 2009; Sokolić et al., 2012; Valentić et al., 2021). An introduction to the issue of the Electricity Market is discussed in the literature (Tešnjak, Banovac and Kuzle, 2009). Electricity in the countries of the European Union and the role of the state in privatization is presented by (Višković, 2005). Furthermore, the economy and policy of electricity production are presented in the literature (De Paoli, Višković, 2007). Third, but not less important factor, deals with the environmental issues and has been analysed in the development, legislation, strategies and technologies for Kyoto Protocol (Piani, Višković and Saftić, 2011). The impact of emission treatment on the sustainability of the independent electricity power producer has been presented in the literature (Višković, Valentić and Franki, 2013; Valentić, Višković and Franki, 2014; Valentić, Žiković and Višković, 2016).

Finally, a current review of knowledge about virtual power plant models and electricity markets is described in a review (Naval, Yust, 2021). The specific influence of electric power elements on a future smart grid and virtual power plant operations are described and presented in the literature (Sokolić et al., 2008; Kotorac et al., 2010; Mandić et al., 2010; Kotorac et al., 2013; Luburić et al., 2017; Noskov et al., 2020).

3. Methodology

The main issue (for any state, district, city or island) is to find an optimum (or compromise) between security, economic and ecological factors for the future energy power system depending on its current status, features, needs and desires. For that reason, the methodology for assessing an “optimal” electric energy power system (or subsystem) has been developed. The smart grid concept networked with is virtual power plants represents a possible and a very interesting solution for future electric power system, as is shown in Figure 1.

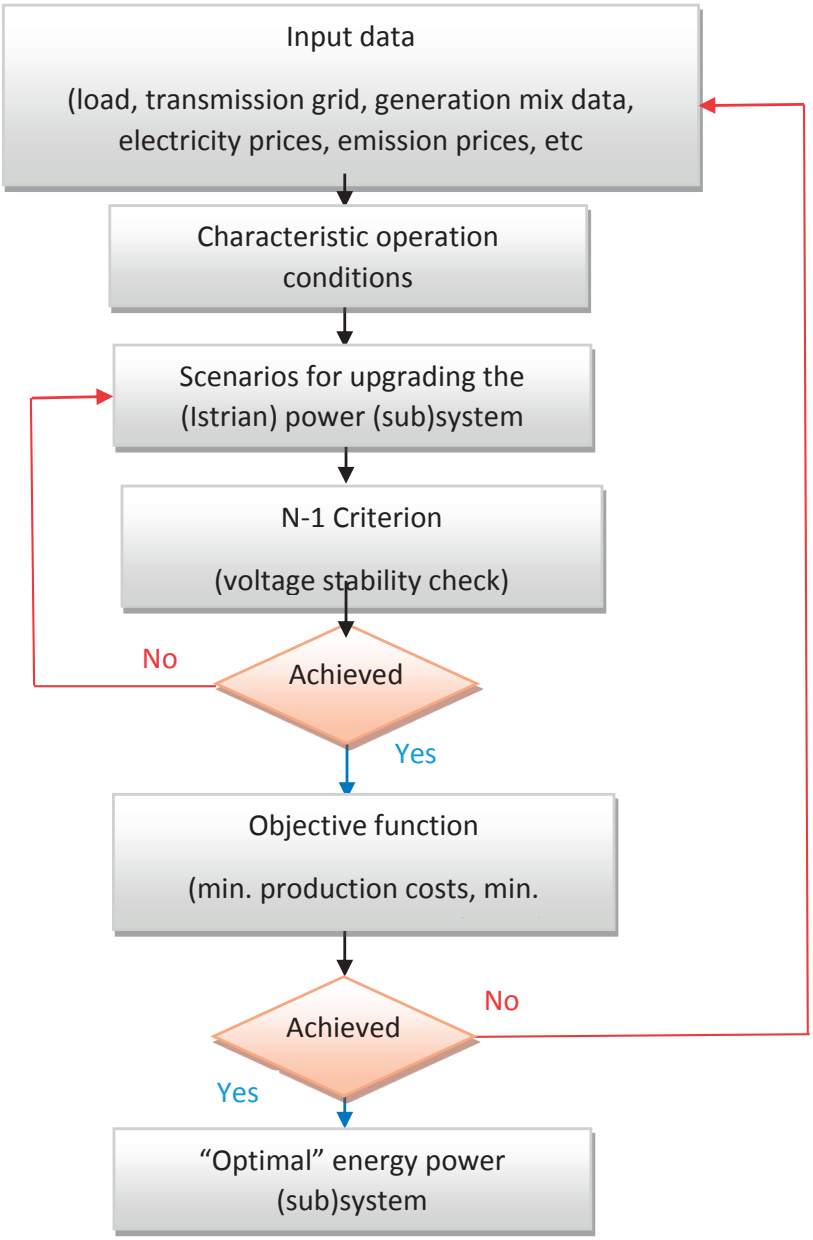
Figure 1: Smart grid and virtual power plant basic concept



“Optimal” electric energy power system concept consists of several steps as shown in Figure 2. The word “optimal” should be taken with a dose of caution because it is not possible to have a high level of reliability, low level of environmental pollution and low cost of electricity (or vice versa). That is simply not possible. In the first step, all input data, i.e. load, generation mix data, and transmission network characteristics, are loaded into the PSS®E (Power Transmission System Planning Software) in order to create a relevant grid model. The second and third steps, with characteristic operation conditions and scenarios for upgrading the Istrian power subsystem, are described in section 4 (Case study data). The fourth step deals with achieving the N-1 criterion with the main aim to prevent blackouts. Blackout (all areas without electricity) in a certain region, especially during the tourist season, has several obvious and unforeseeable consequences. The obvious consequences include the cost of undelivered MWh, which could be calculated as the quotient of GDP and total electricity consumption. It is much more difficult to assess other damages and inconveniences caused by the blackout. Because Croatia is a tourist country, and Istria significantly contributes to Croatian tourism, such a scenario should be avoided at all costs. For this reason, in the proposed methodology for the assessment of an “optimal” electric energy power system first step is to achieve the N-1 Criterion and this means security/reliability factors. Achieving the N-1 criterion raises many questions and doubts about how to ensure load-frequency control in power systems; primary, secondary and tertiary load-frequency control; frequency collapse and under frequency load shedding; reactive power-voltage control in power systems and appropriate voltage control devices; voltage collapse and under-

voltage load shedding; dynamic characteristics of electric machines, network, loads and interconnections, etc.

Figure 2: Flow diagram of the proposed methodology for assessment an "optimal" electric energy power subsystem

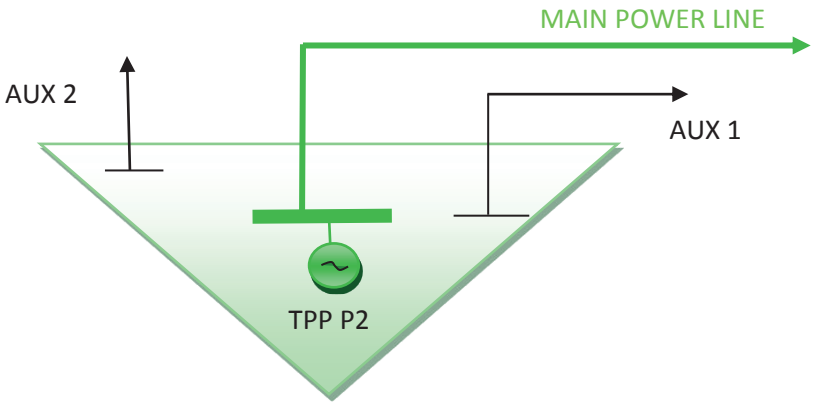


But once the N-1 criterion is met then the objective function could be set. It could be minimal production costs, minimal carbon dioxide (CO2) emissions, maximal profit, or something else. Carbon dioxide emissions can be measured in tCO2/MWh. The Istrian peninsula is becoming attractive for ecologically aware guests and that specialized facilities or resorts are being opened, whose companies also take care of the emitted carbon dioxide, and it is measured in kgCO2 per guest night (Valamar Riviera, 2020). Accordingly, the lower the energy production mix emissions are, the lower kg CO2 per guest night emissions will be. This could be an additional advantage in the development of a particular region or tourist destination. Also, this could bring additional revenue as well.

4.Case study data

The proposed method is tested in a semi-isolated part of the Croatian electric power system, the peninsula of Istria. In Istria is situated one big thermal power plant called TPP Plomin 2 with a nominal output power of 210 MW and a technical minimum of 120 MW. Also, there are renewable energy sources with very little installed capacity so it will not be considered account for the year 2022. Istrian consumption ranges from 80 MW to 318 MW and increases significantly each year. With the main electrical power system, Istrian power subsystem has one main supply line and two auxiliary lines (one line is connected with the main power system, and the other line is connected with the territory of the neighbouring Republic of Slovenia, as is shown in Figure 3.

Figure 3: Basic schematic representation of the Istrian electric power subsystem



The main power line is a double system 220 kV transmission line connecting thermal power plant Plomin 2 (TPP P2) with the rest of the Croatian power system with nominal power of 2x366 MW. In the last ten years, the main 220 kV power line had five unexpected outages, resulting in the outage probability once in two years (Luburić et al., 2018). The two auxiliary transmission lines (AUX 1 and AUX 2) are 110 kV and they are limited to 90 MW. If TPP Plomin

2 is offline, in case of unavailability of the main supply route (fire below the route, lightning strike, fall of the transmission line, etc). theoretically, the largest possible consumption of Istria which can supply two auxiliary power lines is 2x90 MW = 180 MW. In reality, due to physical limitations, these two auxiliary power lines could safely supply Istria's consumption from its minimum to some 150 MW. With a consumption larger than 150 MW, these two transmission lines would be overloaded and this could cause a blackout and the complete Istria region will be without electricity and this scenario should be avoided at all costs. For this reason, four scenarios will be set. Scenario 0 or the base scenario represents the current situation (without any reinforcements on generation production or network upgrades). Scenario 1 and Scenario 2 are conventional scenarios that imply the construction of power transmission power lines with appropriate voltage levels (Scenario 1 takes into account a 220 kV power line with nominal operating power of 366 MW and Scenario 2 assumes a 400 kV power line with nominal power 1.330 MW) and appropriate power transformer stations. Scenario 2 also takes into account the construction of a conventional thermal power plant in Plomin bay with nominal power of 500 MW. Scenario 3 consists of the smart grid concept and virtual power plant with built renewable energy sources (four solar plants with total installed power of 320 MW, one wind plant with 60 MW and five batteries with a total installed capacity of 250 MW). All four scenarios retain the existing high voltage infrastructure and will be analyzed for the current state (the year 2022), the intermodal period (2030) and finally for the year 2050.

5. Results and discussion

The results of four scenarios are shown in Table 1. Economic significance is shown in a separate column. Investment costs for the government are assessed with a weight factor in relation to *Scenario 3*, which is considered a reference (because *Scenario 3* implies the minimum required government investment).

Table 1: Four scenarios results

Scenarios	***Scenario 0 Baseline***	***Scenario 1***	***Scenario 2***	***Scenario 3***
Economic significance	Investment costs for the government (in relation to Scenario 3, which is considered as a reference)	Large, Assigned weight factor **(3)**	Very large Assigned weight factor **(6)**	The lowest Assigned weight factor **(1)**
Data for 2022 (min consumption 80 MW / max 330 MW)				
Total installed production	220 [MW]	220 [MW]	720 [MW]	Solar 320 [MW] Wind 60 [MW] Batteries 250 [MW]
Power supply issues	Not achieved	Achieved	Achieved	Achieved
Power evacuation issues	Achieved	Achieved	Achieved	Achieved
Data for 2030 (min consumption 100 MW / max 380 MW)				
Total installed production [MW]	220 [MW]	220 [MW]	500 [MW]	Solar 320 [MW] Wind 60 [MW] Batteries 250 [MW]
Power supply issues	Not achieved	Achieved	Achieved	Achieved
Power evacuation issues	Achieved	Achieved	Achieved	Achieved
Data for 2050 (min consumption 160 MW / max 560 MW)				
Total installed production [MW]	220 [MW]	0 [MW] Plomin 2 is decomisioned	500 [MW] Plomin 2 is decomisioned	Solar 320 [MW] Wind 60 [MW] Batteries 250 [MW]
Power supply issues	Not achieved	Not achieved	Achieved	Achieved
Power evacuation issues	Achieved	Achieved	Achieved	Achieved

Scenario 0 or baseline scenario represents current status without any investment or improvement in observed electrical power system. Analysing the results of *Scenario 0*, it can be concluded that an urgent improvement/ extension in electrical power system is needed, otherwise it will not be able

to safely supply electricity and a blackout may very likely occur. *Scenario 1* implies building a new 220 kV power line. The aforementioned reinforcement proved to be sufficient for the current situation and for the situation expected in 2030, but for 2050 it does not represent a satisfactory solution. Also *Scenario 1* has assigned weight factor (3) in relation to *Scenario 3* which is considered as a reference. *Scenario 2* includes building a new 400 kV power line and thermal power plant with nominal power output of 500 MW. This scenario represents a conventional solution and proved to be good for all three observed periods. However, it represents an outdated technology, mainly referring to the construction of a conventional thermal power plant. Also, *Scenario 2* has the largest assigned factor (6). *Scenario 3* implies mart grid with virtual power plant concept with installed renewable energy sources (solar plant 320 MW and wind plant 60 MW) supported with five batteries (individual installed power 50 MW). Table 1 shows that the *Scenario 3* could be an optimal solution because it satisfies all conditions and there is no violation of the N-1 safety criterion and also has a lowest assigned weight factor.

6. Conclusions

The findings of the study support the initial hypothesis that the smart grid concept is a cost-effective solution for government and state-owned companies seeking to conserve financial resources while improving the flexibility and security of the power system. Based on the case study data and the analysis of the results, it can be concluded that investing in smart grid technology can generate significant cost savings that can be channeled into other high-priority projects or initiatives. The smart grid concept could maintain and even upgrade security and reliability of the whole system and has significantly higher flexibility. Flexibility can be achieved across very different time frames, limited not only to perennial, yearly or monthly basis but extending even to an hourly basis. Flexibility has become paramount in the last couple of years due to a rapidly changing environment (COVID-19 pandemic, wars, shortages, logistical bottlenecks, changes in energy prices, etc.).

An additional advantage that is strongly in favour of developing localized smart grids compared to the classical approach of designing and running the system is financing and ownership of the system. The grid does not have to be financed by the state or state-owned companies but can be financed, owned and operated by private investors. What the government/ regulator needs to do is create, improve or adjust legislative frameworks that encourage investment in the smart grids / virtual power plants concepts. In this way state financial resources do not have to be invested in capital-intensive infrastructural projects but freed and can be invested in other more necessary or more suitable projects.

Our research limitations and problems are predominately tied to the selection of variables i.e. the exact determination of input settings. Future research in this field can be pursued in exploring and quantifying the relationship between

the security and ecological factors for the future energy power system or a subsystem on a local level.

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References

1. De Paoli, L., Višković, A., (2007) *Ekonomija i politika proizvodnje električne energije*. Zagreb, Kigen
2. Kotorac, D., Valentić, V., Šumberac, B., Zbunjak, Z., Sokolić, L., Analiza mogućnosti primjene naprednog vođenja prijenosnog sustava na elektroenergetskom podsustavu Istre, 11. savjetovanje HRO CIGRÉ, Cavtat, 10. - 13. 11. 2013., C2–18
3. Kotorac, D., Šumberac, B., Valentić, V., Sokolić, L., Hitno rasterećenje proizvodnje TE Plomin 2 kao doprinos sigurnosti EES-a, 9. simpozij o sustavu vođenja EES-a, Zadar, 8.-10. studenog 2010., 1-27
4. Kotorac, D., Šumberac, B., Rubeša, B., Valentić V., Analiza mogućnosti povećanja sigurnosti napajanja Istre sekcioniranjem glavnih sabirnica rasklopišta 110 kV u TE Plomin, 9. savjetovanje HRO CIGRÉ, grupa C2 – Pogon i vođenje EES-a, Cavtat 8.–12. studenoga 2009., C2-20.
5. Luburić, Z., Pandžić, H., Plavšić, T., Teklić, L., Valentić, V., Role of energy storage in ensuring transmission system adequacy and security, Energy 156, 229-239, 2018.
6. Luburić, Z., Pandžić, H., Plavšić, T., Teklić, L., Valentić, V., Assessment of N-1 criteria using energy storage, 2017/6/6 IEEE International Conference on Environment and Electrical Engineering and 2017 IEEE Industrial and Commercial Power Systems Europe (EEEIC/I&CPS Europe)
7. Mandić, N., Tenđera, T., Valentić, V., Utjecaj vjetroelektrana na sigurnost i vođenje elektroenergetskog sustava, 9. simpozij o sustavu vođenja EES-a, Zadar, 8.-10. studenog 2010., 1-36
8. Naval, N., Yust. J. M., Virtual power plant models and electricity markets – A review, Renewable and Sustainable Energy Review, Volume 149, October 2021, 111393
9. Noskov, R., Petrović, I., Valentić, V., Analiza nekih aspekta vođenja EES-a u novim uvjetima distribuirane proizvodnje i aktivnih distribucijskih mreža, 14. simpozij o vođenju EES, Cigre, 2020, 1-11
10. Piani, G., Višković, A., Saftić, B., (2011) *Protokol iz Kyota, ostvarenje i budući razvoj, zakonodavstvo, strategije, tehnologije*. Zagreb, Graphis

11. Sokolić, L., Kotorac, D., Valentić, V., Bartula, D., Princip, M., Sigurnost napajanja i evakuacija snage iz Istre za vrijeme radova na dvostrukom dalekovodu potez 220 kV Plomin – Melina – Pehlin, 10. simpozij o sustavu vođenja EES-a, Opatija, 11.-14. studenog 2012., 1-42

12. Sokolić, L., Belobrajić, R., Z. Grba, Z., Valentić, V., Tehnička i ekonomska revalorizacija u novim tržišnim uvjetima pumpnih hidroelektrana i dirigirane potrošnje (crna tarifa) u sprezi s budućim vjetroelektranama na području PrP Rijeka, 8. simpozij o sustavu vođenja EES-a, Cavtat 9. - 12. studenog 2008., R3-10.

13. Valamar Riviera d.d. Integrirano godišnje izvješće i društveno odgovorno poslovanje 2020, Valamar Riviera 2021. available at link https://valamar-riviera.com/hr/mediji/integrirana-godisnja-izvjesca/

14. Valentić, V., Višković, A., Franki, V., Market position simulation of an independent power producer on the South East Europe electricity market, 2014 IEEE International Energy Conference (ENERGYCON), 508-513

15. Valentić, V., Žiković, S., Višković, A., Can CCS save the coal fired power plants – European perspective, International Journal of Greenhouse Gas Control, 47, 2016, 266-278 doi:10.1016/j.ijggc.2016.01.037

16. Valentić, V., Croatian islands supply issues, Resilience of Electrical Grids, „State of Art, Best Practies and Operational Aspects", SEERC, January 26, 2021.

17. Višković, A., Valentić, V., Franki, V., 2013. The impact of carbon prices on CCS investment in South East Europe, Economics and Policy of Energy and the Environment, Volume 2013/3

18. Višković, A., (2005) *Elektroenergetika u zemljama Europske unije u devedesetima, Uloga države u eri privatizacije*, Zagreb Kigen.

19. Tešnjak S., Banovac E., Kuzle I., (2009) *Tržište električne energije*, Zagreb, Graphis

CHAPTER 13

Incentivizing sustainable sewage sludge management within bioeconomy concept

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ABSTRACT

Sewage sludge represents a significant problem on a global scale. This is mainly due to the negative environmental impact caused by its improper treatment. Many sustainable and innovative technologies and processes are developed nowadays, which resolve the problem of sewage sludge management. However, developing these technologies and their further uptake and commercialization is expensive. In order to examine the feasibility of such a solution, this paper analysed the implementation and feasibility of a wastewater treatment plant upgrade, in the form of a struvite crystallization plant, through a case study for Rijeka, Croatia. Moreover, the literature overview concludes that most innovative solutions require incentives to become feasible. Therefore, this paper also analysed the implementation of incentives – subsidies for the final product and grant schemes for plant construction. The results showed that plant implementation standalone is not feasible. Moreover, the utilization of incentives also proved non-effective since it required a level of incentives of over 270% and 100% for subsidies and grant schemes, respectively, for the plant to become feasible. Therefore, it can be concluded that incentives are a valuable tool in the uptake of innovative technologies, although a broader overview of the scope is required.

Key words: *sewage sludge, bioeconomy, financial analysis, waste management, struvite*

JEL classification: *JEL_O13, JEL_C88, JEL_O23, JEL_D61, JEL_E61*

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1. Introduction

Waste management is one of increasing problem of modern world. One of the major issue is sewage sludge, produced as a by-product of wastewater treatment process occurring at wastewater treatment plants (WWTP). The number of WWTPs is increasing each day, resulting in an increase in sewage sludge amounts (Đurđević, Blecich & Jurić, 2019). Moreover, sewage sludge contains various heavy metals, pollutants and pharamaceuticals, which have a negative impact on the environment, making its treatment complicated and costly.

However, sewage sludge also has a significant potential within the bioeconomy concept, due to a high amount of valuable nutrients, such as phosphorus, nitrogen and potassium, which could be recovered and recycled. Bioeconomy is defined as "an economy where the basic building blocks for materials, chemicals, and energy are derived from renewable biological resources" (Pacheco-Torgal, 2020) – in this case, sewage sludge. Therefore, sewage sludge and its contents represent a significant potential for new feedstock and energy, which can lead to a positive impact on the environment, but also on the economy. Through utilization of new technologies, which contribute to positive environmental impact of WWTPs, positive socio-economic impacts are also achieved, such as: jobs creation, lower prices of fertilizers, reduction of impact on human health, etc. (Đurđević, Žiković, Čop, 2022).

Still, implementation of new technologies has a significant cost, especially after it has been recently developed within the laboratory and/or pilot conditions, followed by commercialization process. In order to achieve further commercialization and ensure spreading of technology utilization, some sort of incentive is needed – which would cover the costs of research and development, but also encourage further development of technologies with a positive environmental impact.

These incentives come in many shapes and forms – from subsidies that are improving product marketability, to grant schemes that reduce the costs of plant construction. Within this paper, an analysis will be conducted to determine the feasibility of sustainable sewage sludge treatment technology – specifically nutrient recovery via struvite crystallization process of anaerobically digested sewage sludge. The paper is divided in the following chapters: Chapter 2 will provide a literature overview of the research conducted in the field of sewage sludge management, including the incentives aspect. Chapter 3 describes the methodology of analysis, which is divided into three sub-chapters. The first one describes the incentive schemes that will be implemented within the paper. The second sub-chapter describes the struvite crystallization plant, which will provide data and information used as the basis for further analysis. An overview is provided for the case of Rijeka, Croatia. The third sub-chapter briefly describes the financial analysis that will be conducted. Chapter 4 will provide the results of the conducted analysis, while the conclusions will be presented in Chapter 5.

The final goal of the paper is to provide dynamic indicators for project rentability and examine wether the observed technology for sewage sludge

is financially feasible – within a standalone financial structure, and through implementation of incentives.

2. Literature review

Until now many research papers and studies have been conducted on the topic of incentivizing new and innovative technologies, especially in terms of environmentally friendly technologies, that would be beneficial for the future generations. Since new technologies are often expensive to implement, they need to be stimulated by some sort of financing (Kremer & Williams, 2010; Wagner, 2011). The private sector is usually leading the technology development, as the market players are trying to stay ahead of competition and dominate the market with new technologies and concepts.

However, innovativeness usually has a high price, since conducted research and development have their specific costs, that needs to be covered by the private entity. In order to implement the new solution on the market, which will be cost-acceptable to the end-users, the new technology needs to be incentivized, before it reaches the level at which it can generate revenue without incentives (Jaffe, Newell, & Stavins, 2003; Smith, 2014). This incentive is usually implemented by the national/regional governments but can be conducted also by the private sector (Westmore, 2013), in form of mergers and collaborations.

For example, Mahpour and Mortaheb (2018) presented a study, which uncovered that incentivizing provides better results compared to penalizing in construction waste reduction. The main explanation for this observation is that incentivizing promotes ethics, is more efficient, and is more compatible with sustainable development goals. Mitrano and Wohlleben (2020) determined specific cases in which incentivizing of technologies for microplastics is necessary, in order to achieve fast reduction of environmental degradation. Moreover, Potluri and Phani (2020) suggested several policies, which would encourage industry players to turn towards green technologies and away from environmental pollution – such as: incentives for efficient use of natural resources, research and development support and investment bias towards green technologies, removal of cross-border barriers, implementation of subsidies and loan guarantees for green projects, etc.

Incentives encourage technology development and its fast implementation. This is specifically needed in waste management sector, especially in the sewage sludge management segment, where new and environmentally friendly solutions are needed. As far as nutrient recovery is concerned, these technologies are associated with significant costs, which stem from the need to implement innovative solutions, high energy requirements, and the requirement to ensure complete operational safety. (Rajendran et al., 2019).

There is also other research in the field of secondary raw material, which is a significant aspect of bioeconomy and which also needs to include some regulatory and legislative aspects – Schreck and Wagner (Schreck & Wagner, 2017) determined the need for some regulatory flexibility on the

permitted range of uses of secondary raw materials, which can lead to social welfare, while preserving company profit. Dagerskog and Olsson (Dagerskog & Olsson, 2020) examined the possibility of phosphorus recovery through sludge reuse in Sweden. The report concluded the possibility of vast potential for innovation, in case sludge reuse under stricter regulations is allowed, and not completely prohibited.

On the other hand, some research considers incentives for sewage sludge management via benefits obtained through utilization of the new products. For example, Cao et al. (2017) showed options of how resource recovery and reuse can be an incentive for the sustainable sanitation service chain, by recovering costs where revenue can feed back internally. Turlej and Banas (Turlej & Banas, 2018) presented the positive financial impact of material and energy recovery of sewage sludge in Poland. Ghacha et al. (Ghacha, Ammari & Allal, 2020) examined the situation with sewage sludge management in Europe, and concluded that there is a need for promoting the potential economic and financial gains for beneficiaries, based on the case study of Morocco. Moreover, Anderson et al. (2021) presented the need to implement new solutions for energy and material recovery of sewage sludge, in order to separate environment protection from economic development.

However, none of the research is oriented towards examining incentivization of sustainable technologies for sewage sludge treatment, that consider bioeconomy approach – e.g. energy and nutrients recovery. The failure to integrate economic signals into energy and nutrient management, included in the waste management sector, contributes to a lack of technological innovation and development, that benefit environmental protection and socio-economic development (Sinner & Salmon, 2003).

Therefore, this paper will consider implementation of new technologies for sewage sludge management, which includes upgrade of the wastewater plant, containing anaerobic digestion process for sewage sludge treatment, with struvite crystallization process. It will analyse the financial aspect of the energy and material recovery of sewage sludge, presenting two scenarios where incentives will be considered: incentivizing the plant construction and incentivizing the product sales on the market.

3. Methodology of analysis

3.1. Incentive schemes

According to a range of papers and reports, various types of economic incentives have been identified for promoting sustainable development, with their key characteristics outlined (Sinner & Salmon, 2003). These approaches are sometimes referred to as “economic instruments” or “market-based instruments” for environmental or resource management. In this paper, we will examine two scenarios of positive incentives: subsidies and competitive grant schemes.

Subsidies, within this paper, will consider subsidies on products, i.e. subsidies payable per unit of a good – struvite – produced, paid to the producer by

national government. In terms of grant schemes, they are considered as non-refundable financial support for construction of the considered plant – struvite crystallization upgrade of wastewater treatment plant.

For the purpose of this analysis, subsidies will include incentive of additional 10-100% on the market price, for the producer. Within the calculations, this will be included in the income segment of the product price.

In terms of grants, the total capital investment will be reduced in the calculations by 30-80%, as an incentive for the plant operator.

3.2. Struvite crystallization plant

Considering the available information for planned WWTP Delta in agglomeration Rijeka, Croatia, and the need for implementation of sustainable technologies, this paper will analyse the financial aspect of WWTP Delta upgrade with struvite crystallization plant.

In area of agglomeration Rijeka, in Croatia, at Delta location, it is necessary to treat wastewater with 2nd level WWTP (biological treatment), before releasing it into the natural recipient. The necessary treatment level is based on the agglomeration capacity, which amounts to 200,000 people equivalent (PE) and recipient sensitivity (Kvarner bay).

The plant includes mechanical and biological wastewater treatment, with sewage sludge management through anaerobic digestion. The scheme of the plant is presented in Figure 1.

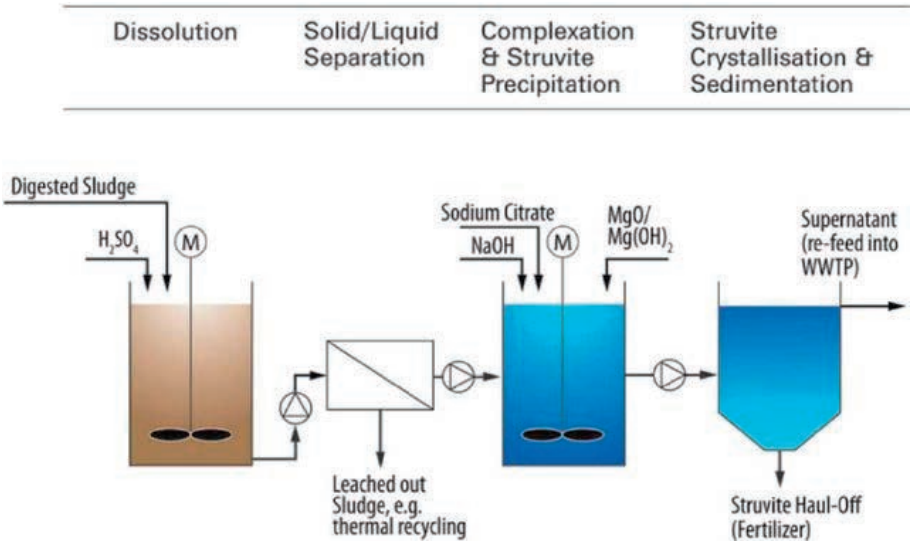
Figure 1: WWTP Delta location and plant segment

Source: Elektroprojekt, 2015

The upgrade of the plant would include struvite crystallization process. Struvite crystallization is a promising method to remove and recover phosphorus from wastewater (Ye et al., 2014) and sewage sludge (Türker & Celen, 2010). The process itself is presented in the following figure (Figure 2), and is based on a simple chemical formula (Türker & Celen, 2010; Rahman, et al., 2014):

$$NH_4^+ + PO_4^{3-} + M_g^{2+} + 6\ H_2O \rightarrow MgNH_4PO_4 \times 6\ H_2O \qquad (1)$$

Figure 2: Struvite crystallization process ("Stuttgart process")



Source: Antakyali et al., 2013)

3.3. Financial analysis

Costs, incomes and investments presented, are based on publicly available data and information. For the amount of investment, related to equipment (long-term assets), amortization is calculated with a rate of 6.67%, based on best practice and professional experience (Sartori, et al., 2014). The basic means are amortized with linear method. At the end period of project operation, the residual value of basic means is zero.

With regard to investment financing, specifically project capital expense (CAPEX), we have made the conservative assumption of a nominal interest rate of 3.5% per annum. It is important to note, however, that the cost of CAPEX and associated financing terms are subject to fluctuations in the capital market, as well as changes in investor credit ratings.

It is realistic to expect favourable financing terms, from assumed ones, based on the current market capital conditions, where extremely low interest rates on long-term debts are dominating. However, due to early phase of

project development and following the best practice during implementation of economic and financial analysis, the conservative approach is used and nominal interest rate of 3.5% p.a. For the purpose of financial analysis, it is assumed that the plant will obtain the following debt terms, at commercial banks as financing source:

1. Interest rate: 3.5%;
2. Debt period: 10 years;
3. Grace period: 2 years.

CAPEX of the plant is assumed to be 1.6 million EUR, based on research by Đurđević et al. (2022), while operational expenses (OPEX) are assumed the amount of averaged 103,049.59 EUR, based on expenses which are comprised from:

1. Employee salaries
2. Operation and Maintenance
3. Administrative costs
4. Insurance (1% of total investment)
5. Taxes and certifications
6. Variable Costs (5% of total income)

Considered income is based on the sale of struvite as fertilizer on the market. Current price is assumed to 336.93 EUR. However, due to increase in demand for fertilizers, the price is assumed to grow over the years. Therefore, an increase of around 4% per annum is assumed.

Financial analysis is conducted by utilizing discounted cash flow method. By using discounted cash flow method (recommended 4%, by European Commission), time value of cash is considered, which is determined by capital cost. The energy prices are assumed from projection, without impact of taxes and other levies. Analysis is also conducted without value added tax (VAT) calculation, both on cost and income sides, according to best practice and aforementioned literature. For the purpose of economic and financial analysis of the project, an individual model of discounted cash flows is created, in time interval of 15 years – which is the assumed lifetime of the project.

Net present value (NPV) is the basic criterium of financial decision-making, which can be defined as the difference between sum of discounted cash flows in overall project lifetime and the amount of investment costs. The term “net value” generally determines the difference between positive and negative impacts that are a result of certain activity, while the term “present” determines that all impacts need to be reduced to current value, in order to make the values of invested means and expected returns generated through cumulative of future cash flows mutually comparable. Mathematically, this can be described as the following equation:

$$NPV = \sum_{t=1}^{T} \frac{V_t}{(1+k)^t} - I_0$$

where:

V_t – future cash flow of the project
$(1+k)^t$ – discount factor
k – discount rate
I_0 – initial investment (t=0)
t – project year.

Payback period is the simplest criterium of financial decision-making for realistic investments, and it implies the number of periods, mainly years, within which the investment will be returned for a specific project. The cash invested in a project (investment costs) is returned through inflow of cash flows during the operation of the project. In period, i.e. the year, in which operational cash flows have reached the level of investment costs, payback period is achieved. Mathematically, payback period can be described in the following equation:

$$\sum_{t=0}^{t_p} V_t = \sum_{t=0}^{t_p} I_t$$

where:

$\sum_{t=0}^{tp} Vt$ = sum of total future cash flows
$\sum_{t=0}^{tp} It$ = invested means.

Economic flow represents the overview of all incomes, outcomes and their difference. Economic flow is the basis for calculating project rentability and implementing dynamic methods for assessment of investment project and represents the broader term than cash flow.

Inputs in economic flow are not only incomes from products selling, but also the residual value of the project. Outcomes in economic flow include: investments and other outcomes related to investments, expenses without amortization, specific expenses for social standard, income tax and allocation for reserve. Net incomes in economic flow are defined as the difference between incomes and outcomes.

4. Results and discussion

Economic flow is the basis for calculation of dynamic indicators of project investment rentability, such as: net present value, internal rate of return (IRR) and payback period. These indicators, based on the results of calculations with inputs and assumptions from previous segments, are presented in the following table (Table 1).

Table 1: Overview of dynamic indicators of project rentability – case without incentives

Indicator	Unit	Amount	Limit values	Amount of limit values
IRR	%	/	> discount rate	4
Payback period	year	18	< indebtedness period, loan maturity	10
NPV	EUR	-2,074,625	> 0	/
ROE	%	/	> discount rate	4

Considering the negative NPV, payback period above the limit value and lack of internal rate of return, it can be concluded that the plant upgrade is not feasible in the standard form. Therefore, it is necessary to implement some incentive, in order to make it profitable and feasible.

Considering the aforementioned incentives, two options were analyzed – one with subsidies and the other one with grant schemes. The results are presented in the following tables.

Table 2: Overview of dynamic indicators of project rentability – case with incentives: subsidies

Indicator	Unit	Amount	Limit values	Amount of limit values
IRR	%	/	> discount rate	4
Payback period	year	18	< indebtedness period, loan maturity	10
NPV	EUR	-1,995,208	> 0	/
ROE	%	/	> discount rate	4

It can be seen that the NPV has improved, but it is still negative and the plant is not feasible. Therefore, a sensitivity analysis was conducted, to see at which subsidies level, the plant becomes feasible. The relation with NPV and subsidies increase is presented in the following table (Table 3).

Table 3: Sensitivity analysis of subsidies levels

Subsidies level	NPV [EUR]
10%	-1,995,208,40
20%	-1,915,792,10
30%	-1,836,375,80
40%	-1,756,959,50
50%	-1,677,543,20
60%	-1,598,126,90
70%	-1,518,710,60
80%	-1,439,294,30
90%	-1,359,878,00
100%	-1,280,461,70

After conducting our analysis, we can conclude that the net present value (NPV) of the project only reaches a positive value when subsidies are set at the level of 270%. Our results are presented in Tables 3 and 4, which highlights the relationship between subsidies and NPV. The finding is significant as it highlights the critical role of subsidies in determining the financial viability of the project, which is currently financially unfeasible. This suggests that the level of subsidies provided by government or other stakeholders needs to be carefully considered in order to ensure that the project can be successfully implemented and sustained over the long-term.

Table 4: Overview of dynamic indicators of project rentability – case with incentives: increased subsidies to achieve plant feasibility

Indicator	Unit	Amount	Limit values	Amount of limit values
IRR	%	4,4	> discount rate	4
Payback period	year	13	< indebtedness period, loan maturity	10
NPV	EUR	69,615	> 0	/
ROE	%	3.3	> discount rate	4

In terms of grant schemes, plant feasibility is also non-existent, as the NPV was negative, and there was no internal rate of return. Also, the payback period was above the limit value (Table 5).

Table 5: Overview of dynamic indicators of project rentability – case with incentives: grant scheme

Indicator	Unit	Amount	Limit values	Amount of limit values
IRR	%	/	> discount rate	4
Payback period	year	18	< indebtedness period, loan maturity	10
NPV	EUR	-1,494,814	> 0	/
ROE	%	/	> discount rate	4

Therefore, a sensitivity analysis was also done for this case, and obtained results are presented in the following table (Table 6).

Table 6: Sensitivity analysis of grant scheme

Grant scheme level	NPV [EUR]
30%	-1,494,814,47
40%	-1,301,544,39
50%	-1,108,274,32
60%	-915,004,24
70%	-721,734,17
80%	-528,464,09

From the previous table, it can be concluded that, even with significant grant schemes related to CAPEX reduction, the plant cannot achieve profitability. Moreover, even with 100% reduction of CAPEX, economic indicators do not present the feasibility of the plant.

Therefore, it can be concluded that the CAPEX has a less significant role in the financial aspect of the struvite crystallization upgrade plant, while OPEX and income have more significance. By increasing the income level of the plant (or by reducing OPEX), it could be possible to achieve plant feasibility.

5. Conclusions

Sustainable development is inevitable and it is becoming a necessity in every sector – including the wastewater management sector. Moreover, this sector considers and includes several aspects – environmental protection, material and energy recovery, and also the financial aspect.

Economic incentives are a promising tool for advancing sustainable development. These incentives can take a variety of forms, and they are not just tools for government. Businesses can adjust their own pricing policies to ensure that their customers have incentives to conserve scarce resources.

From the conducted analysis in this research, it can be concluded that incentives are necessary in order to make the struvite crystallization plant

feasible. However, this is only the case with subsides on the product, sold on the market. In case of grant schemes, they do not make a significant difference, which could contribute to plant profitability, or even feasibility.

All in all, several general conclusions can be drawn from this research:

1. Properly implemented, economic incentives achieve environmental and sustainability objectives effectively and at lower cost than other approaches.
2. While economic incentives have mostly been targeted at achieving environmental objectives in an economically efficient manner, they can also be designed to enhance social objectives, such as reducing waste, utilizing recycled and recovered nutrients and energy, etc.
3. Economic incentives encourage business development – they enable flexible low-cost solutions, spur innovation, increase employment levels and enable future investments and economic growth.
4. As users respond to incentives, more resources become available for new users, enabling economic growth within a framework that protects sustainability.

While economic incentives have proven to be effective in many situations, they are not a universal solution. Their effectiveness is highest when there is a clear understanding of the need to conserve a resource, where users have diverse needs and cost structures, and thus, place different values on the resource. Additionally, incentives are most successful when they can be designed and implemented with minimal transaction costs.

Therefore, it is essential to exercise caution when applying incentives and to undertake extensive and detailed analysis that considers the specific sectors in which they are planned to be implemented. This approach will help ensure that the incentives are appropriate and effective for the particular situation, leading to optimal outcomes for all stakeholders involved.

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References

1. Anderson, N., et.al. (2021). *Sewage sludge and the circular economy.* Copenhagen: European Environment Agency.
2. Antakyali, D., Meyer, C., Preyl, V., Maier, W., & Steinmetz, H. (2013). Large-scale application of nutrient recovery from digested sludge as struvite. *Water Practice and Technology, 8*(2), 256-262. doi: https://doi.org/10.2166/wpt.2013.027

3. Cao, K., Otoo, M., Drecshel, P., & Hanjra, M. (2017). Resource Recovery and Reuse as an Incentive for a More Viable Sanitation Service Chain. *Water Alternatives, 10*(2), 493-512.

4. Dagerskog, L., & Olsson, O. (2020). *Swedish sludge management at the crossroads.* Stockholm: SEI policy brief.

5. Đurđević, D., Blecich, P., & Jurić, Ž. (2019). Energy Recovery from Sewage Sludge: The Case Study of Croatia. *Energies, 12*(10), 1927. doi: https://doi.org/10.3390/en12101927

6. Đurđević, D., Žiković, S., & Blecich, P. (2022). Sustainable Sewage Sludge Management Technologies Selection Based on Techno-Economic-Environmental Criteria: Case Study of Croatia. *Energies, 15*(11), 3941. doi: https://doi.org/10.3390/en15113941

7. Đurđević, D. Žiković S. & Čop T. (2022): Socio-Economic, Technical and Environmental Indicators for Sustainable Sewage Sludge Management and LEAP Analysis, Energies 2022, 15(16), 6050, doi: https://doi.org/10.3390/en15166050

8. Elektroprojekt. (2015). *Studija utjecaja na okoliš sustava javne odvodnje „Grad".* Zagreb: Elektroprojekt.

9. Ghacha, A., Ammari, M., & Allal, L. B. (2020). Sustainable sewage sludge management in Morocco: Constraints and solutions. *Journal of Water and Land Development, 46*(8-9), 71-83. doi: https://doi.org/10.24425/jwld.2020.134199

10. Jaffe, A. B., Newell, R. G., & Stavins, R. N. (2003). Chapter 11 - Technological change and the Environment. In K.-G. Mäler, & J. Vincent, *Handbook of Environmental Economics* (pp. 461-516). Elsevier. doi: https://doi.org/10.1016/S1574-0099(03)01016-7

11. Kremer, M., & Williams, H. (2010). Incentivizing Innovation: Adding to the Tool Kit. *Innovation Policy and the Economy, 10*(1), 1 – 17, doi:https://doi.org/10.1086/605851

12. Mahpour, A., & Mortaheb, M. (2018). Financial-Based Incentive Plan to Reduce Construction Waste. *Journal of Construction Engineering and Management, 144*(5). 04018029, doi:https://doi.org/10.1061/(ASCE)CO.1943-7862.0001461

13. Mitrano, D., & Wohlleben, W. (2020). Microplastic regulation should be more precise to incentivize both innovation and environmental safety. *Nature Communications, 11*. doi:https://doi.org/10.1038/s41467-020-19069-1

14. Pacheco-Torgal, F. (2020). 1 - Introduction to biobased materials and biotechnologies for eco-efficient construction. In F. Pacheco-Torgal, V. Ivanov, & D. Tsang, *Bio-Based Materials and Biotechnologies for Eco-Efficient Construction* (pp. 1-16). Portugal: Woodhead Publishing Series in Civil and Structural Engineering. doi:https://doi.org/10.1016/B978-0-12-819481-2.00001-5

15. Potluri, S., & Phani, B. (2020). Incentivizing green entrepreneurship: A proposed policy prescription (a study of entrepreneurial insights from an emerging economy perspective). *Journal of Cleaner Production, 259*, 120843. doi:https://doi.org/10.1016/j.jclepro.2020.120843

16. Rahman, M., Mohd.Salleh, M. A., Rashid, U., Ahsan, A., Hossain, M. M., & Ra, C. S. (2014). Production of slow release crystal fertilizer from wastewaters through struvite crystallization – A review. *Arabian Journal of Chemistry, 7*(1), 139-155. doi:https://doi.org/10.1016/j.arabjc.2013.10.007

17. Rahman, M., Salleh, M. M., Rashid, U., Ahsan, A., Hossain, M., & Ra, C. (2014). Production of slow release crystal fertilizer from wastewaters through struvite crystallization – A review. *Arabian Journal of Chemistry, 7*(1), 139-155.

18. Rajendran, K., Lin, R., Wall, D., & Murphy, J. (2019). Chapter 5 - Influential Aspects in Waste Management Practices. In M. Taherzadeh, K. Bolton, J. Wong, & A. Pandey, *Sustainable Resource Recovery and Zero Waste Approaches* (pp. 65-78). Elsevier. doi:https://doi.org/10.1016/B978-0-444-64200-4.00005-0

19. Sartori, D., Catalano, G., Genco, M., Pancotti, C., Sirtori, E., Vignetti, S., & Bo, C. D. (2014). *Guide to Cost-Benefit Analysis of Investment Projects.* Brussels: European Commission.

20. Schreck, M., & Wagner, J. (2017). Incentivizing secondary raw material markets for sustainable waste management. *Waste Management, 67*, 354-359. doi:https://doi.org/10.1016/j.wasman.2017.05.036

21. Seiple, T., Skaggs, R., Fillmore, L., & Coleman, A. (2020). Municipal wastewater sludge as a renewable, cost-effective feedstock for transportation biofuels using hydrothermal liquefaction. *Journal of Environmental Management, 270*, 110852. doi:https://doi.org/10.1016/j.jenvman.2020.110852

22. Sinner, J., & Salmon, G. (2003). *Creating Economic Incentives for Sustainable Development.* New Zealand: Ecologic Foundation.

23. Smith, S. (2014). *Creating Incentives for Greener Products: Policy Manual for Eastern Partnership Countries.* OECD.

24. Turker, M., & Celen, I. (2010). Chemical equilibrium model of struvite precipitation from anaerobic digester effluents. *Turkish Journal of Engineering and Environmental Sciences, 34*, 39-48.

25. Türker, M., & Celen, I. (2010). Chemical Equilibrium Model of Struvite Precipitation from Anaerobic Digester Effluents. *Turkish Journal of Engineering and Environmental Sciences, 34*, 1-10.

26. Turlej, T., & Banas, M. (2018). Sustainable management of sewage sludge. *SOLINA 2018 - VII Conference SOLINA Sustainable Development: Architecture - Building Construction - Environmental Engineering and Protection Innovative Energy-Efficient Technologies - Utilization of Renewable Energy Sources. 49.* E3S Web Conf. doi:https://doi.org/10.1051/e3sconf/20184900120

27. Wagner, J. (2011). Incentivizing sustainable waste management. *Ecological Economics, 70*(4), 585-594. doi:https://doi.org/10.1016/j.ecolecon.2010.11.007

28. Westmore, B. (2013). Policy incentives for private innovation and maximising the returns. *OECD Journal: Economic Studies*, 121-163. doi:https://doi.org/10.1787/19952856

29. Ye, Z., Shen, Y., Ye, X., Zhang, Z., Chen, S., & Shi, J. (2014). Phosphorus recovery from wastewater by struvite crystallization: Property of aggregates. *Journal of Environmental Sciences, 26*(5), 991-1000. doi:https://doi.org/10.1016/S1001-0742(13)60536-7

CHAPTER 14

Self-employment, entrepreneurship and digitalization,: A literature review[1]

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ABSTRACT

Self-employment represents an independent and perspective work within the framework of the realization of one's own existence and interests in the individual career. Due to the heterogeneity of its multiple forms of operationalization, the concept of self-employment poses a challenge for conceptual scientific capture, definition and, by extension, measurement of its associated economic and social effects. This is particularly evident when discussing the potential interrelationship between the concept of self-employment and entrepreneurship. The emergence of new forms of self-employment on the market as a result of the process of intense digitalization in recent years highlights the discussion and the need to distinguish these two phenomena in the context of the perception of the benefits and factors of their development. Moreover, the multiplication of research results in the field of self-employment, digitalization and their relationship in the last two decades shows the need for a comparative analysis, a review of the extensive literature and the definition of areas for further research on this topic.

The purpose of this paper is to give a systematic overview of previous research on the differentiation of the concepts of self-employment and entrepreneurship, in relation to self-employment and digitalization, using

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qualitative research methods - regular desk research, i.e. literature review. A review of the literature revealed that the impact of digitalization on self-employment is evident in the context of reducing constraints and increasing labor flexibility, establishing new models of self-employment, reducing operating and transaction costs of business activities and making them more efficient. The paper also presents theoretical implications and guidelines for future research on the impact of digitalization on self-employment.

***Key words**: self-employment, entrepreneurship, digitalization, digital transformation, digital technology*

***JEL classification:** O15, J01, J24*

1. Introduction

The concept of self-employment, representing promising work for one's own interests and existence, has emerged, after several years of sporadic research, as a prominent area of scientific research and a significant mechanism for the development of the economies of many countries in the world. The issue of difficulty in dealing with high unemployment rates in the world during the 1970s and 1980s prompted the implementation of a series of studies, the result of which was the priority in creating jobs in small businesses as opposed to large corporations (Birch, 1979, Storey, 1987). The subject research encouraged scholars to deal with the reinterpretation of self-employment in the context of its redefinition and adaptation to modern market conditions, where today it is difficult to exist independently in the market without the support of digital technologies - competences and infrastructure.

Self-employment is a desirable form of economic development (Szaban and Skrzek-Lubasińska, 2016), and its promotion is an important method of creating new jobs and increasing labor market opportunities for the unemployed and other socially vulnerable groups. Georgellis, Sessions and Tsitsianis (2005) interpret self-employment as a sign of macroeconomic vitality and as such it represents a flexible form of employment (Congregado, Golpe and Carmona, 2010), i.e., an "escape from employment" (McKeown and Phillips, 2014). In this context, many employees are increasingly opt for entrepreneurial self-employment in their own legal entities.

The growing interest in the study of self-employment began in the 1970s - in those years when, in parallel, the concept of digitization appeared in the scientific literature. In the following 30 years, the number of published papers referring to the problem of self-employment and digitization is relatively small, reflecting the neglect of the studied topic in scientific research. In the 21st century, the number of works dealing with self-employment and digitalization and their mutual relationship is increasing exponentially. The multiplication of scientific output indicates the need for quantitative, qualitative, and comparative analysis and review of the extensive literature dealing with the phenomena of self-employment, digitalization and their interconnection. Therefore, it is necessary to question the complementarity of definition and approach to the phenomena under study and to try to determine to what extent there is consensus in the scientific community and on what problems there may be disagreement in the research, in order to make a contribution in defining the area of further research on the aforementioned issue.

In the beginnings of its definition, digitization was understood as a concept of computer-assisted research (Wachal, 1971), but its understanding has changed considerably. Rahrovani (2020) defined how digitization reveals a continuous adaptation within and between three elements of digital work: the acceptance of new uses of the platform at the user level, the redesign of administrative policies, and aligning the use with the logic of the platform, which is basically digital work. Digitization in current social conditions is characterised by the way digital media are structured and influence current trends of self-employment. It is no longer perceived as the digitization of

business processes or production, but refers to changes associated with the application of digital technology in all aspects of human society (Stolterman and Fors, 2004). Digitization has great importance for economic growth, structural change, and productivity, with the high speed of technological innovation in the business world, which is no longer limited to routine production tasks, contributing to the spread of digitization to many non-routine tasks (Brynjolfsson and Mc Afee 2011). Further advances in areas such as machine learning, artificial intelligence, mobile robotics, and the increasing usability of Big Data are still being explored (Holzinger, 2018).

Using qualitative research methods - regular desk research, i.e. literature review of theoretical aspects of the meaning of self-employment, digitalization and their interrelations - the paper will provide a systematic overview of previous research and draw conclusions on possible unexplored aspects in this field. Furthermore, the impact of digitalization on the conceptualization of the concept of self-employment, especially in relation to the concept of entrepreneurship, will be addressed in order to see the differentiation of these two concepts in the context of their many terminological explanations.

The results of the study revealed that the expansion of technology, changes in the industrial structure, and tax regulations determine the growth of self-employment. A review of the literature revealed a significant relationship between digitization and self-employment, manifested in the reduction of labour constraints, the establishment of new business models, and the more efficient performance of business activities. The differentiation of the relationship between the concepts of entrepreneurship and self-employment, although established by the scientific community, is still insufficiently researched, as the heterogeneity of these concepts remains as phenomena whose relationships overlap. The implications of digitalization on self-employment is mainly manifested in the flexibility of work performance, as well as in the facilitated performance of operational functions of business activity in the context of the interaction between the mode of development and the mode of production in companies.

The structure of the work is determined in four chapters. After the introductory part, the second chapter discusses the differentiation of the interrelated concepts of self-employment and entrepreneurship, as well as the role of digitalization in the heterogeneity of concepts of self-employment and entrepreneurship. In this context, the hystorical development of the conceptualization of the term self-employment is also discussed. The third chapter presents the theoretical background and analysis of the significance of digitalization for self-employment as well as the results of previous research. The fourth chapter presents a discussion on the researched topic and concluding considerations that can serve as a basis for future research.

2. Self-employment and entrepreneurship - development and differentiation of concepts

There are a multitude of terminology and heterogeneity of the different forms of self-employment and the need to measure and monitor issues of self-employment and its relationship with the concept of entrepreneurship.

2.1. Differentiation of self – employment and entrepreurship concepts

The concept of self-employment has undergone significant evolutionary changes in its historiography. Influencing components include institutional settings, space, historical periods, and dimensions of technological development (Bogenfold and Kandutsch, 2018). The term self-employment refers to an employment situation in which an employed person works for his or her own account with or without employees (Sheehan and Mc Namara, 2015). Thus, self-employment contrasts with employment, in which the individual works as an employee for an employer (Sheehan and Mc Namara, 2015) and in this form of employment receives a salary paid by his or her employer, while the self-employed person earns his or her own income.

The terms self-employment and entrepreneurship are often equated in the academic literature. The European Commission (2012) treats self-employment and entrepreneurship as two separate concepts. However, the distinction between these terms is certainly debatable, and both are key to achieving smart, sustainable, and inclusive growth (European Commission, 2012), and promoting them is an important way to create new jobs and increase labor market opportunities for the unemployed and other socially disadvantaged groups (European Commission, 2012).

The European Social Fund (2016) emphasizes the promotion of entrepreneurship through financial and entrepreneurial support, while the European Commission and the OECD (2015) emphasize the development of entrepreneurship among vulnerable groups such as young people, women, migrants, people with disabilities, and older people. The OECD (2016) defines an entrepreneur as a self-employed person who employs others. Inconsistent institutional perceptions of self-employment and entrepreneurship can also be found in academic work. Scholars emphasize the distinction between self-employment and entrepreneurship in the context of a flexible form of self-employment (Golpe nad Carmona, 2010), self-employment as an escape from employment (McKeown and Phillips, 2014), or the replacement of the usual contractual labor system with “specific” types of employment (Audretsch, Aranguren and Callejón, 2008). The aforementioned definitions of both terms point to the context of self-employment with elements of entrepreneurship, where an independent contractor employs workers as an employer. However, both terms are key to achieving smart, sustainable and inclusive growth. Self-employment is considered a form of entrepreneurship (Congregado, Golpe and Carmona, 2010) and also a flexible form of labor (form of employment) (Golpe and Carmona, 2010). In this context, there is a need to measure and monitor issues related to self-employment. Table 1 shows some common elements between the concepts of self-employment and entrepreneurship.

Table 1: Differentiation of the concepts of self-employment and entrepreneurship

Autor	Self-employment	Entrepreneurship	Common elements
Congregado, Golpe i Carmona, 2010	a flexible form of employment	sign of macroeconomic vitality	contribution to the growth of macroeconomic activities
Golpe and Carmona, 2010	self-employment as an element of entrepreneurship	flexible form of self-employment	flexibility in work
McKeown andPhillips, 2014	an escape from employment	self-employment is part of the entrepreneurship process and method of becoming an entrepreneur	freedom to perform activities
Sheehan and Mc Namara, 2015	a way in which the self-employed generate their own income	employers who employ employees and pay them a salary	independent income generation
Skrzek Lubasinska and Grodek Szostak, 2020.	a group of micro-entrepreneurs who run independent business and bear the related risk	business of founding a company, taking financial risks in the hope of profit with the implementation of innovation	form of independent business with risk-taking

Source: author's preparation by literature review

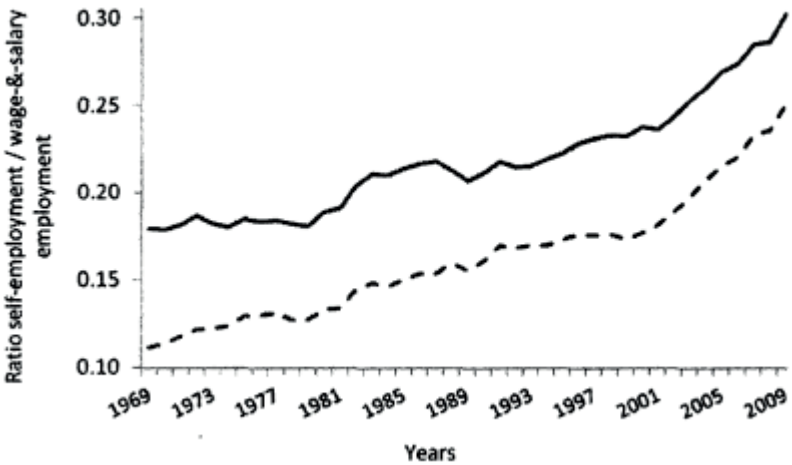
Self-employment in the context of modern business conditions is based in the literature on the traditional classification of employment (Pedersini and Colleto, 2009) used by the International Labor Organization (ILO) and the OECD. They define self-employment as "work in which wages depend directly on profits (or future profits) from goods produced or services rendered. A self-employed person alone makes decisions that affect the company and passes on decisions, while he or she is responsible for the company's assets (in this context, "company" includes only the activities of one- person)" (OECD and ILOSTAT, 2022.). When analyzing the concept of self-employment, authors interpret it differently (Blok and Sander, 2009; Singh Crump, 2007; Lofsrom and Bates, 2009; Krasniqi, 2009), as the coverage and interpretation of self-employment is influenced by a number of components determined by the different laws of each country: tax regulations, contributions to health and pension insurance, unemployment, sick leave, and disability benefits, and rights to social security and responsibility for the work of the self-employed.

The market components in the development process of self-employment have influenced labor market institutions, educational systems, political

systems, and the entire “social production system” (Hollingsworth, 1998). The rationality in such social systems that have influenced the development of self-employment can be found in the statements of Max Weber and his work Sociology of Law (Weber, 1978) and in his work The Iron Cage, in which he bases the components of self-employment within the social production system on technological efficiency, control, and rational calculation (Weber, 2003).

The process of self-employment showed growing tendencies in accordance with technological change, changes in industrial structure and tax regulations, and social security benefits (Blau, 1987). Chart 1 shows the share of the self-employed in total employment in urban and rural areas in the U.S.-from 1969 to 2009.

Chart 1: Share of the self-employed in total employment in urban and rural areas in the U.S.-from 1969 to 2009.

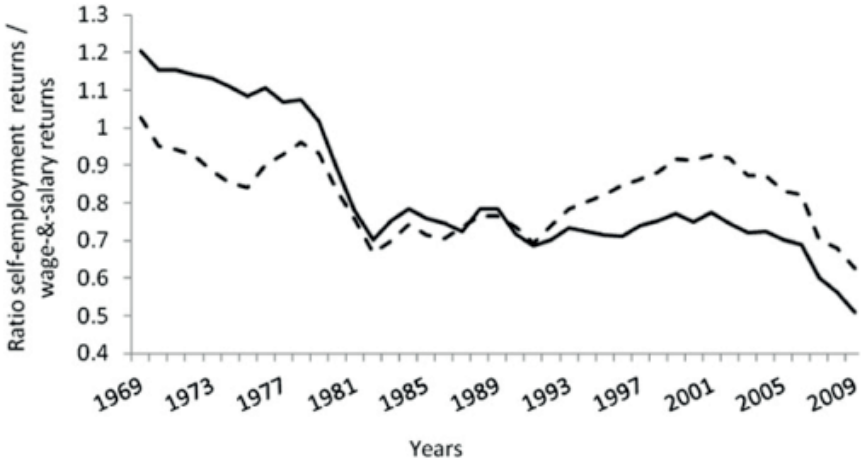


Source: Goetz, S., Fleming – Munoz, D. A., Rupasingha, A. (2012): The Economic Impacts of Self-Employment, Journal of Agricultural & Applied Economics, Vol. 44, No. 3, p. DOI: 10.1017/S1074070800000432, p. 316 (Self-employment in rural areas – solid line, self-employment in urban areas – dashed line)

The ratio of self-employed to employees in the U.S. has risen from 0.18 to 0.30 over the past four decades. The proportion of self-employed has been twice as high in rural areas as in urban areas, where this ratio has followed the trend of growth in self-employment. The proportion of self-employment has grown more since 2000 as a result of a structural break and a change in the relationship between the two forms of employment shown and is more pronounced in American urban areas (Goetz, Fleming - Munoz and Rupasingha, 2012). Since 2000, the trend of this ratio has been decreasing, suggesting that self-employment was an option of employment for the unemployed, where they entered employment out of necessity. Figure 2

shows the relationship between self-employment/ wage contribution in the United States from 1969 to 2009.

Figure 2: Self-Employment / Wage Contribution Ratio in the United States from 1969 to 2009

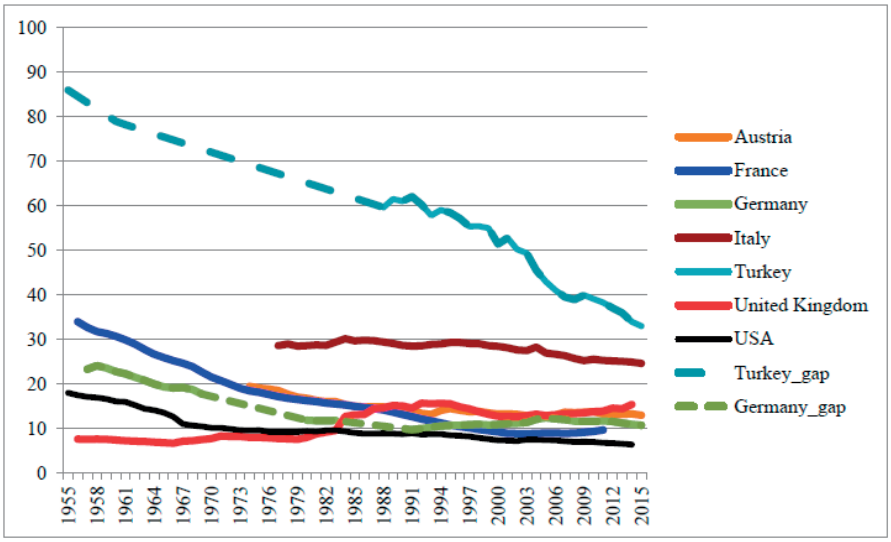


Source: Goetz, S., Fleming – Munoz, D. A., Rupasingha, A. (2012): The Economic Impacts of Self-Employment, Journal of Agricultural & Applied Economics, Vol. 44, No. 3, p. DOI: 10.1017/ S1074070800000432, p. 316

In the context of positive self-employment trends, the same is not true for self-employment in rural areas. Contributions to self-employed relative to contributions to the wages of the self-employed have fallen by half in rural areas since the 1980s, following expansive growth in the 1970s due to the boom in natural resource exploitation. This decline in the contribution to self-employment therefore supports the argument that choosing self-employment is the last resort for livelihood for unemployed workers who become self-employed out of necessity. The decline in the ratio of self-employment contributions to wage contributions showed a further downward trend, albeit less pronounced than in the late 1970s, suggesting that the increase in self-employment in Figure 1 is due to a decline in contributions to self-employment. The problem that arises from the above is the need to discuss whether self-employment has a local economic benefit to the economy in the form of income stimulus or the income of self-employed persons.

The trend of exponential growth in self-employment during the 20th century reversed into a decline at the beginning of the 21st century, due to a greater decline in employment in the agricultural sector (Bogenhold and Kandutsch, 2018). The relative shares of unemployed and employed workers were directly related to the shares of the self-employed.

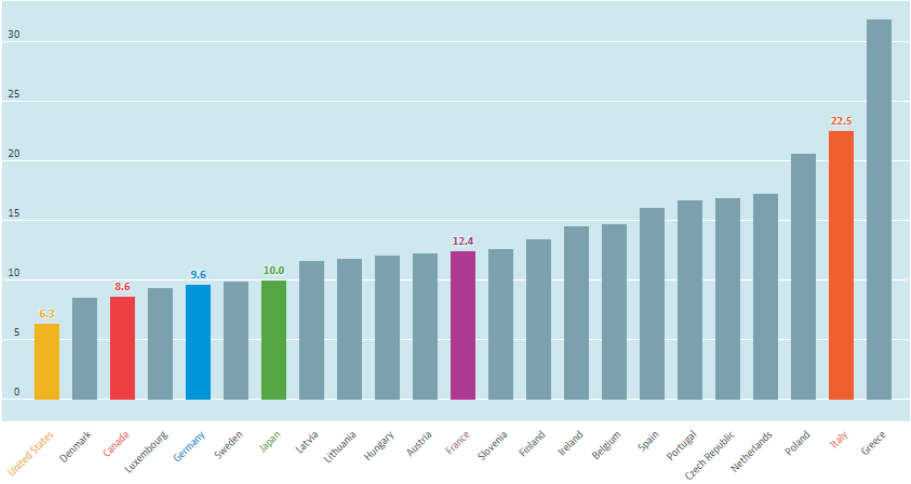
Figure 3: Ratios of Self-employment in OECD Countries from 1955 to 2015



Source: OECD (2017) and calculations by Bogenhold and Kandutsch (2018).

Figure 3 shows the trend of employment decline in the 1980s and its rebound. Cross-country studies for various OECD countries have shown that the rise in unemployment had a positive impact on the growth of self-employment during the observed period, over a time span of several decades (Bögenhold et al., 2017.). The trajectory of self-employment growth in the selected countries showed relatively similar overlapping courses. Figure 4 shows the share of self-employment in total employment for 2020 in the EU, the U.S., and Canada.

Figure 4: Self-employment rate in total employment 2020 – EU, the U.S., and Canada



Source: EUROSTAT, 2021, https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsa_esgais&lang=en

Figure 4 shows the rate of self-employment, as a share of the total employment of EU countries - as well as Canada and the U.S. - in 2020. The highest self-employment rates are in Italy (23.5%) and Greece (33.7%), while the lowest self-employment rates are in the U.S. (6.3%) and Denmark (8.7%). When measuring the unemployment rate, the aforementioned countries use different methods to present the results. When determining the number of self-employed, the countries of the European Union include the number of independent entrepreneurs who employ or do not employ workers, as well as the number of persons engaged in professional activities according to pension insurance records. In contrast to this methodology, the number of self-employed in the United States includes freelancers, small business owners, micro business owners, home-based workers, contractors, subcontractors, independent contractors, consultants, sole proprietors, Solo- entrepreneur and entrepreneurs (Skrzek-Lubasińska and Gródek-Szostak, 2020). In connection with the application of different methods in the presentation of the number of self-employed and, consequently, the calculation of the self-employment rate, the way in which the final number of self-employed is presented in different countries is highly debatable, which represents an additional segment that needs to be researched in order to be able to formulate a universal model for the calculation and presentation of a single indicator of self-employment for all countries.

2.2. The role of digitalization in the heterogeneity of concepts of self-employment and entrepreneurship

Self-employment is a process that offers many more opportunities than alleviating unemployment and promoting entrepreneurship. The development of the economy under modern business conditions has become largely dependent on the strong trends in the development of ICT technologies. Already Schumpeter (1934) claimed that self-employment created by small businesses is essential for economic growth, and Earle and Sakova (2000) pointed out that the lack of self-employed people is one of the main reasons for the weak economic development of Eastern European countries.

Digitization is closely related to the terms digitalization and digital transformation. Scholars recognize their terminological distinction and provide a constructive differentiation of these terms. Digitization represents the conversion of data from analog to digital form (Hess et. al., 2016), i.e., the automation of processes through information technologies (Horvath and Szabo, 2019). The exponential progress in the development of information technologies related to the emergence of smartphones, distributed computing and storage, and digital mobile networks as digital transformations have led to the emergence of the term digitalization. This is understood to mean a new form of collaboration between work and communication, i.e., the use of digital technologies and data for the purpose of generating income, improving operations, and transforming business processes, not just digitizing them (Kraus et. al., 2022). Digital transformation entails further changes related to the implementation of new processes and mechanisms that affect the key structures of business operations. Therefore, digital transformation represents an organizational transformation that integrates digital technologies (Liu, Chen, and Chou, 2011) and applies new strategies focused on the transformation of products, processes, and organizational aspects due to new technologies (Marr et. al., 2015). Digital transformation is a process that aims to improve an organization by initiating significant changes to existing characteristics through a combination of information, computing, communication, and technological connectivity (Vial, 2019).

Brennen and Kreiss (2016) highlight the OECD's definition of digitization as the most important, defining digitization as "the act or process of digitizing; converting analog data (especially in the subsequent use of images, video, and text) into digital form." Digitization refers to "the adoption or increased use of digital or computer technology by an organization, industry, country, etc." (OECD, 2014). The first use of the term "digitization" in the context of computer programming and business in academic literature appeared in 1971 in an essay by author Robert Wachal published in the North American Review (Wachal, 1971), in which he discusses the concept of "digitizing society." (Wachal, 1971). He considers digitization as computer-assisted humanistic research (Wachal, 1971). The term mentioned at the beginning of this article has subsequently been used by numerous authors in academic literature, who use it to describe not the specific process of converting analog data streams into digital bits or the specific capabilities of digital media, but the ways in which digital media structure, shape, and influence the modern

world differently (Brennen and Kreiss, 2016). Thus, the term digitization has acquired the meaning of creating the structure of numerous areas of social life united around digital communication.

Castells (2010) sees digitalization as creating “new economies, societies, and cultures” that are the hallmarks of the modern age. His work is the basis for the continuity of the use of the term digitalization, which represents the communication system and media as part of modern life. Thus, digitalization as a system connects all segments of society characterised by “new media” (Brennen and Kreiss, 2016) that can receive and manipulate digital signals.

The emphasis on the business orientation of digitalization is evident in Gartner’s definition of this term, which explains digitalization as “the use of digital technologies to change the business model and create new opportunities for revenue and value creation; it is the process of transitioning to digital business” (Gray and Rumpe, 2015 after Gartner Glossary, 2015). Henriette, Mondher, and Boughzala (2015) also emphasize the business elements of the term digitalization, explaining digitalization as “the ability to transform existing products or services into digital variants that thereby offer advantages over a tangible product.”

Digitalization has contributed to the “convergence” of different domains of social life (Brennen and Kreiss, 2016) and digital media. Jensen (2013) points out that “a digital computer can reproduce anything or simulate other known media.” Therefore, digitalization can also be considered as a fundamental disruptive force driven by the fourth industrial revolution and the Internet of Things (IoT), which has changed the way we approach and think about business processes and activities (Parida, 2018), with complex changes taking place in the digital age, transforming the organization and developing new business models. Digitalization refers to the use of any digital resources that organizations can use to improve their performance, as well as the impact of the aforementioned technologies that affect the functioning of the modern world (Kusisto, 2017). In this context, digitalization as a communication system encompasses all digital communication technologies and automated systems that store data on computing devices.

In the context of the given account of the literature, digitalization can be seen as the integration of digital communication systems and infrastructures that contributes to the growth of key economic flows through the impact on competition, productivity, and employment, as well as through interaction with business partners, colleagues, institutions, and business organization management.

In the context of the role of digitalization in differentiating the concepts of self-employment and entrepreneurship, it is important to distinguish these two concepts due to the significant impact of digitalization on them in practice. Self-employment is part of entrepreneurship as a broader concept of entrepreneurial activities, and therefore digitalization has wider economic and social effects on entrepreneurship than on self-employment.

3. Implications of digitalization on self-employment

The digital economy can increase productivity, income, and social welfare in modern enterprises (Bogenhold and Kandutsch, 2018). In the context of employment, it contributes to the creation of new forms of employment and entails the creation of employment opportunities in new markets and an increase in employment in some existing occupations.

Lane (1999) describes the digital economy as the convergence of computer and communications technology on the Internet and the resulting flow of information to technology that stimulates the determinants of electronic commerce and brings about powerful organizational changes. The digital economy is about dynamism rather than static efficiency, and is more about new activities and products than higher productivity (Carlsson, 2004). It enables and realizes the circulation of goods and services via electronic transactions on the Internet (OECD, 2013) and, as such, represents a share of total economic production derived from a large number of "digital" inputs. These digital inputs include digital skills, digital equipment (hardware, software, and communications equipment), and digital goods and services used in production. The digital economy or the new economy represents the evolution of economics associated with the advent of the Internet and related information and communication technologies (Barefoot et. al., 2018). It is a type of economy characterized by the active implementation and actual application of digital technologies for the collection, storage, processing, transformation, and transmission of data in absolutely all areas of human activity (Borremans et. al., 2018).

The development of self-employment is increasingly in line with secular trends characterized by the deindustrialization of society and the growth of employment in the tertiary sector. In OECD countries, more than 80% of employees work in this sector, compared to an average of 35% of employees in the tertiary sector in the mid-20th century (OECD, 2015). The result is greater diversification of the workforce in postindustrial activities than in primary production. Given the increasing convergence of society toward a post-capitalist dynamic society (Schumpeter, 1942), the structures of the labor market are subject to ever greater change (Castells, 2010), which is of particular interest to the self-employed.

Today's business conditions are geared towards the digital economy and therefore require entrepreneurs to be flexible in the way they conduct their business. This makes self-employment an attractive option for building a career (Figureoa - Armijos and Motta Veiga, 2019). The process of self-employment in the era of digitalization has taken on more differentiated contours than in capitalist societies 50 years ago. Important in the transformation of self-employment in the digital age is the interaction between modes of development and production ("the live meat of societies"), carried out by social actors in often unpredictable ways (McCloskey, 2010). Digitalization brought a transition to tertiary, quaternary, and quinary economies, which was accompanied by changes in the structure of occupations, educational profiles, and the structure of businesses (Bogenhold, 2018).

Van Alstyne and Brynjolfsson (2005) described digitalization as a desirable element of self-employment because mastering digital skills improves the choice of self-employment as a career option and allows individuals to interact with peers who have similar knowledge or preferences. In this way, digital innovations have become a powerful channel for enhancing and integrating knowledge flows between individuals (Oggero, Rossi, and Ughetto, 2019). Rippa and Secundo (2018) pointed out that the new digital paradigms encompass a wide range of digital technologies (e.g., Internet of Things, augmented and virtual reality, Big Data, artificial intelligence, cloud computing) and are changing the perception of self-employment.

Sabbagh et. al (2012) demonstrated that digitalization determines the incremental growth of self-employment and enables the self-employed to create 20% more economic value than in start-up companies. In addition to these benefits, digitalization reduces unemployment and encourages entrepreneurs to take more self-employment initiatives, improves the quality of life of the self-employed, and enables them to operate with greater productivity and transparency (Sabbagh et. al., 2012).

The implementation of digitalization in self-employment creates new forms of entrepreneurs - digital entrepreneurs. Digital entrepreneurs are considered a new type of entrepreneur; their motivations, needs, ways of working, and understanding of self-employment are influenced by some megatrends (Perez Alonso and Sanchez Garcia, 2017). An illustration of the megatrends can be quantified by the data analysis conducted by Satalkina and Steiner (2020): external social conditions (institutional influence, new market trends, changes in competitive advantage, digital trust, technology adoption) have increased the impact on the progress of self-employment by 70%; the analysis of digital entrepreneurship in 28 EU countries showed a growth of the average rate of the European Index of Digital Entrepreneurship Systems (EIDES) by 75.7 in Denmark, Sweden, Luxembourg and Finland; the Global Entrepreneurship Monitor pointed to a trend of change in the profile of entrepreneurship under the influence of digitalization, where the entrepreneurial profile of the self-employed is increasingly directed towards younger and female individuals. These trends can be explained by the complexity of the digital economy, which has changed traditional entrepreneurial profiles.

The issue of digitalization in the process of self-employment is complex. Henriette et. al (2015) point out that digitalization involves the implementation of digital capabilities to support the business model of transformation, impacting the entire organization, especially operational processes, resources, internal and external users. For the self-employed, this brings significant changes in the way they work and do business, which is now more intense. In addition, they can improve their business opportunities and create new value, both for the companies and for the self-employed, who can overcome new business challenges and contribute to their business success by acquiring new digital skills (Henriette et. al., 2015).

The growth of self-employment is enabled by the element of crowdsourcing, which is “conducted through Internet platforms that connect an undetermined number of organizations, companies, and individuals via the Internet,

potentially enabling the connection of customers and workers on a global scale (De Stefano, 2015). This form of self-employment combined with innovative digital potentials offers more opportunities for the development of new forms of self-employment, such as freelancers, digital nomads and microenterprises.

In the context of the impact of digitalization on self-employment, Bögenhold and Fachinger (2017) considered four interrelated trends in self-employment:

(1) increase in micro-self-employment,

(2) increasing rates of social destandardization and mobility,

(3) the development of a blurred boundary between self-employment and working for another employer, including various forms of hybridity; and

(4) highly visible patterns of employment precarity.

Digitalization has brought numerous benefits for the self-employed. Information-intensive processes through the implementation of digitalization have an impact on reducing business costs by up to 90% and improve the payback period of investments (Parvianian et. al., 2017). Digital transformation, which reduces manual work, enables companies to automatically collect data, improve business performance, and identify the root causes of risks.

Haake (2017) identified several correlations between digitalization and self-employment, as follows:

- making work more flexible through digitalization is always to the disadvantage of workers because it reduces the need for human intervention in work and increases the potential of using digital technology in business processes;
- crowdsourcing and other non-standard forms of employment bring a new problem, as the reduction of human resources in companies accelerates and intensifies the use of digital technologies in business processes in relation to human labour;
- experiences in the area of bogus self-employment - it is practically impossible to control formally concluded employment contracts according to the principle of freedom of contract. The regulatory problem is exacerbated when the number of online platforms grows along with the number of people employed there;
- the price for the work of a self-employed person or an employee of a company should be the same, but in practice this is often not the case because the self-employed pay themselves higher wages than their employees.

Fossen and Sorgner (2018) believe that the introduction of new technologies would replace many existing jobs, making self-employment a good alternative for many people. In this context, digitalization would facilitate the start of self-employment by, for example, improving access to finance through crowdfunding, reducing the cost of communication and ICT infrastructure

through cloud computing, and reducing the initial investment in human labor through artificial intelligence (von Briel, Davidsson, and Recker 2018).

Figureoa - Armijos and Motta Veiga (2019) examined the predictors of self-employment among Millennials (individuals born between 1980 and 1984) in the years before, during, and after the 2008 global financial crisis. The results of their study showed that Millennials have flexibility at work, organizational skills, extrinsic values at work-for example, particular career goals and expectations than previous generations-as basic entrepreneurial competencies in self-employment, which they understand as a modern lifestyle. Millennials are inclined to take on innovative roles in the self-employment process because they have high levels of education and digital skills (Figureoa - Armijos and Motta Veiga, 2019). Therefore, digital skills are crucial for Millennials when they choose self-employment as an option for their professional development and future career advancement.

Bouranta, Tsampra, and Sklavos (2019) investigated the level of implementation of ICT technologies and digital marketing in Greek microenterprises, as well as the self-employed's perception of the contribution of their use of social media to achieving business excellence. Their research findings showed how the implementation of digital skills and technologies illuminates important aspects of entrepreneurial motivation and perceptions and provides the self-employed with valuable information for shaping their business policies.

Eppler - Hattab (2021) used a qualitative organizational case study in the Israeli labor market to show how the independent acquisition of digital skills through the process of lifelong learning contributes to the successful process of self-employment. Oggero, Rossi, and Ughetto (2019) investigated whether self-employed individuals differ by gender in terms of possessing digital skills related to business success. Their results suggest a strong heterogeneity between men and women in the entrepreneurial role induced by digital skills, but also that men are more competent entrepreneurs than women in the context of higher levels of digital skills.

Despite previous research on the influence of digital skills on self-employment choices showing positive correlations between digital skills and self-employment, this relationship has yet to be fully considered as the interaction between digital skills and self-employment choices has not been fully explored.

Terry et al. (2021) investigated the heterogeneity of the impact of digitalization on the work process and autonomy of the self-employed in the banking credit industry. The introduction of digital applications in their business allowed them to have a higher level of digital control over their work, but also to improve their business.

Digital tools offer a wide range of business opportunities, strengthening the phenomenon of digitalization and promoting the redefinition of self-employment in every sector of the economy. Digitization is helping to drive new job creation and self-employment growth. Boegenhold et al. (2016) and Bonet et. al. (2012) emphasize this premise especially in the context of the

technologies of IT and the idea of innovative regional clusters where self-employment develops towards a sustainable economic and social future.

The change in business culture and the intensive education of the self-employed about the importance of digitalization and digital skills for their company as a strategic business orientation represents the basis for the progress of the business of entrepreneurs. In Spain, there are more than 2 million self-employed people in a wide range of professional activities, and more than 37,000 self-employed people belong to different professional sectors, including agriculture (11%), industry (4%), construction (11%), and services (73%). (Statista, 2022). In Croatia, the share of self-employed in the total number of employees has decreased over the last 10 years - in 2010 there were 21% self-employed in Croatia, in 2021 there were 11% (Tradineconomics, 2022). The self-employed in Croatia are preparing for the changes brought about by digital transformation by investing in their own intellectual potential through educational programs to develop skills in digital technologies - 45.2% of the self-employed in Croatia are developing their digital skills, which represents 25% of the total investment in education (Apsolon, 2020).

Digitalization has brought new development trends in the labor market. The process of self-employment, referred to as an element of macroeconomic vitality by Aronson (1991), OECD (2000), Georgellis, Sessions and Tsitsianis (2005), experienced stronger growth in all countries thanks to the implementation of digitalization in the business processes of self-employed people.

The implementation of digitalization improves the notion of self-employment in the modern business context, as it is prone to redefinition. Bogenhold (2016) emphasized this reshaping of self-employment in the context of the implementation of new IT tools in entrepreneurship, while Bonet (2012) highlighted the orientation of self-employment towards a sustainable future under the influence of digitalization.

Digitalization has brought a number of technological changes in the digital expansion of business activities and a greater tendency toward self-employment (Fossen and Sorgner, 2018), giving the self-employed more flexibility in their work. Fossen and Sorgner (2018) found that work in this way becomes much less constrained in terms of time, space, function, and organization. Bonet (2012) and Bogenhold (2016) also emphasized how the use of new digital tools helps establish new models of monitoring work processes and work outcomes.

Digitalization enables self-employed people to focus more on their core business by facilitating workflows. By modernizing their business infrastructure with the help of digitalization, self-employed workers achieve greater efficiency and work productivity in terms of prices and deadlines, as well as in the area of production and services. The EGSO (European Economic and Social Committee) (2017) estimates that the introduction of digitalization to self-employed workers increases their labor productivity by 20-30% and reduces operating costs by 60%. In addition, self-employed

workers are offered the opportunity to outsource auxiliary activities to external service providers (Todoli-Signes, 2015) and create new forms of work that self-employed workers can perform, based on the use of the Internet. De Rauseas et al. (2011) demonstrated in their study that one new job of a self-employed person based on the Internet can create 15.4 new jobs elsewhere in the economy, and Moretti (2010) emphasizes that the application of robotics to self-employed people can contribute to the creation of five additional new jobs somewhere in the economy.

Digitalization has brought with it the automation of business processes, contributing to the threat to certain jobs performed by self-employed workers - EGSO (2017) estimates that the share of such jobs in OECD countries is relatively high, estimated at up to 57%.

In their study on the digital transformation of the labor market in Croatia, Butković and Samaržija (2019) noted that digitalization brings to the self-employed independence and freedom at work, flexibility in performing work, and a challenge that gives them the opportunity for creativity, success, and self-satisfaction, provides them with a higher and unlimited income, and reduces the stress that traditional business tools bring.

The development of digitalization and the ever-increasing automation of business processes have become a significant resource in the process of self-employment. They facilitate many business processes for the self-employed, entrepreneurs can focus on improving their main activity and increasing work productivity, and they potentially open up the possibility for the self-employed to achieve business excellence.

The digitalization and automation of the economy increases entrepreneurial intentions and the incentives of individuals to become self-employed. With the introduction of the Internet, smartphones, and applications that collect, store, analyze, and share information, they play a transformative role in changing the entrepreneurial process (Anderson, 2014; Brynjolfsson and McAfee, 2014) in the context of new opportunities to start their own businesses (Elia et. al., 2016) and the development of self-employment as “an individual’s personal conviction to take one or more concrete actions in the process of taking advantage of a new business opportunity” (Ahmad and Hoffman, 2008: 137). Some studies have shown that generating and implementing one’s own entrepreneurial ideas is encouraged by the universities where they are educated (Fayolle and Gailly, 2015; Abou-Warda, 2016; Aloulou, 2016; Fichter and Tiemann, 2018), indicating a significant influence of high education on self-employment.

As the field of work becomes richer under the influence of digitalization and automation, new production systems with decentralized and coordinated production are possible, which reduce costs, all business options are increasingly oriented towards the individualization of work and the possibilities of starting a business. Brechemeier et. al (2016) have shown that the transition to robotization brought a doubling of productivity from 1975-1990 with a 45% decrease in the labor force, an improvement in occupational safety, and a 20% reduction in occupational accidents. Finally, the Millennium

Project by Daheim, Wintermann, Glenn, Korn & Schoon (2019) described three alternative visions of the impact of technology on self-employment:

- favorable (lower wealth concentration) and unfavorable scenario (make lifelong work decisions),
- a negative scenario of political and economic turmoil characterized by high levels of alienation, increased social division and political polarization,
- a positive scenario in which the symbiosis of man and technology is achieved and work has a meaning and leads to self-realisation.

Technology and automation allow individual decisions, more resources in the company, cheaper and dematerialized. Nevertheless, self-employed people have to bring their cognitive and mentally demanding skills more and more into their work, because the modern economy requires the processing of a large amount of data.

In the process of digital transformation, conducting transactions also plays an important role, as more and more of them take place digitally in the market and in organizations. In the last decade, digital transactions have become part of new business models used by companies such as AirBnB, eBay, Taobao, Amazon, Facebook, Google, and Uber (Nagle, Seamans, and Tadelis, 2020), and an advantage over "offline" transactions. it also refers to the transfer of data about each party, with the exception of money transfers, where digital traces of the price, payment method, and time of purchase create a digital record that can be useful to both the buyer and seller while reducing the uncertainty of interpretation of the transaction (Weber and Mayer, 2014).

Digital transactions significantly reduce transaction costs, especially in the context of their role in social networks. Indeed, social networks offer free digital transactions to their users in order to grow their user base more quickly, which has fueled the emergence of the "platform economy," which generates revenue through higher payments from advertisers willing to pay more for an ad on a platform with a larger user base. These opportunities offer the potential for a growing number of independent contractors and freelancers who can now offer their services through digital payment platforms based on their self-determined work price, with the quality of their success judged by the reputation of the system. This is developing what is known as the democratization of entrepreneurship (Nagle, Seamans, and Tadelis, 2020), where independent contractors and freelancers become self-employed and offer their services and earn their own income, as opposed to the situation where they do the same work as employees and receive a salary for their work set by their employers, which is lower in their position as employees than it would be if they were working as freelancers.

Digitalization affects the emergence of the idea of self-employment from two perspectives. The first arises from the context of the potential of digitalization, which has a great impact on the intention of individuals to become self-employed. The second aspect is that startups today are increasingly entering the market as companies that base their operations mainly on digital

technologies. By virtualizing their business, operating costs have decreased, barriers to entry have been lowered, and new business opportunities are available to them. Youssef et. al (2020) point out that the widespread use of digital technologies in business is creating new consumer needs and, in this context, requires new forms of self-employment and entrepreneurial activities. For example, the 3D printing paradigm enabled new business opportunities for the self-employed (Rayna and Striukova, 2016), and current business trends are increasingly oriented toward artificial intelligence (McAfee and Brynjolfsson, 2017), blockchain (Iansiti and Lakhani, 2017), and virtual and augmented reality (Porter and Heppelmann, 2017). The context described above has changed the nature of the uncertainty of self-employment as one of the main constraints and has enabled new and positive outcomes for the self-employed, raising new questions about digital self-employment through the synergy of digitalization and self-employment and facilitating problems related to the process of starting one's own business.

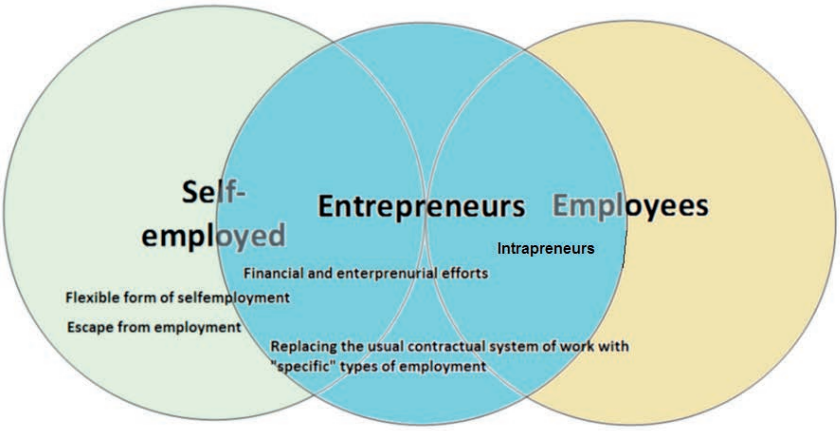
4. Disccusion and conclusion

For a long time, the issue of self-employment and its development trends was only sporadically investigated in the scientific literature. Earlier research was concerned only with the extent of their representation in world economies and the observation of their growth trends (Bögenhold et al., 2017; Holmes and Schmitz, 1990; Banerjee and Newman, 1993). The reasons for this can be found in certain organized social structures that emphasize state ownership over private sector and entrepreneurship (Weber, 1978; Hollingsworth, 1998).

The exponential progress of technology, the structure of industry, the reform of tax regulations, and the improvement of social benefits and security have also contributed to the growth of self-employment (Blau, 1987). As self-employment has increased, so has scholars' interest in the topic, resulting in more recent sources on self-employment in the literature (Antunes and Cavalcanti, 2007; Faria et al., 2010; Bogenhold and Kandutsch, 2018; Horwath and Szabo, 2019; Satalkina and Steiner, 2020; Kraus, 2022) than in the first half and middle of the 20th century (Weber, 1978; Blau, 1987).

In the current literature, a multitude of terminology and heterogeneity of different forms of self-employment is still present due to intensive digitalization, and this division is expected to deepen. Different forms of employment also condition changes in the differentiated economic and social impacts. Based on the research findings obtained, Figure 5 shows the relationship between the terms self-employed, entrepreneur and employee.

Figure 5: Diversification of self-employment and entrepreneurship categories



Source: made by the author

Here, entrepreneurs represent a category that, with its specific characteristics such as creativity, innovation, risk and intention to grow, includes part of the category of the self-employed, but also part of the category of employees who possess such characteristics and are referred to in the literature as intrapreneurs (Antoncic and Hisrich 2003. Therefore, the authors believe that the two concepts of self-employment and entrepreneurship cannot be equated, but must be considered in terms of their specificities, common and distinguishing characteristics. The need to measure and monitor issues of self-employment and, in particular, its relationship to the concept of entrepreneurship in this context and for the purpose of measuring the economic and social impact of different forms of self-employment becomes imperative.

Digitalization as a process of using digital technologies and data to generate income (Kraus et al., 2022) requires new ways of working and as such can improve business and transform business processes, creating a stimulating environment for digital businesses. The concept of change associated with the application of digital technology (Stolterman and Fors, 2004) has only been seriously explored in the early 21st century. Its major impact on generating economic growth in the context of facilitating business activities led to a sharp increase in scholars' interest in the topic of digitization in the 21st century (Brennen and Kreiss, 2016; Castells, 2010), while research on digitization in the mid-20th century and later is only sporadic in the literature (Wachal, 1971).

The emergence of digitalization in the modern economy has enabled the progress of self-employment (Sabbagh et al., 2012; Parvianian et al., 2017), but also a greater application of digital skills in the process of self-employment (Figureoa - Armijos and Motta Veiga, 2019; Eppler - Hattab, 2021). Digitalization has opened many new opportunities for modern entrepreneurs,

as new customer needs and new business forms have emerged (Youseff et al., 2020), the work of the self-employed is much less limited in time, space, function and organisation (Fossen and Sorgne, 2018), and new models for analysing work processes have emerged (Bonet, 2012; Bogenhold, 2016).

Digitalization is changing the business processes of the self-employed, bringing independence and freedom of work, flexibility and a challenge that includes the possibility of creativity, success and personal satisfaction (Bonet, 2012; Bogenhold, 2016.). It is necessary to highlight the economic and social impact of self-employment: the establishment of new business models, the emergence of the platform and gig economy, the flexibility of work, less space and time constraints (Figureoa - Armijos i Motta Veiga, 2019.). This leads to an even greater heterogeneity of forms of self-employment and the need to measure the economic and social impact.

The expansion of technology and changes in the industrial structure and tax regulations led to an increase in self-employment, as well as digitalization as a phenomenon of computer-assisted research on humans, which greatly facilitated entrepreneurial activities. The impact of digitization on self-employment can be seen in the context of reducing labour constraints, establishing new business models, the emergence of the platform economy (Parvianian et al., 2017; Sabbagh et. al., 2012) and the gig economy (Nagle et. al., 2020), reducing the operating and transaction costs of entrepreneurs, and facilitating many business activities.

The limitations of the conducted research are determined in the framework of the insufficiently presented statistical data on the development of self-employment in the last 40 years, as well as on the impact of digitalization on self-employment. The undifferentiated nature of statistical data on the concept of self-employment, the unavailability of databases, an insufficient sample of previous research results, and the focus on certain fundamentals of scientific research are evident.

The research findings offer guidelines for future research in the field of self-employment and digitalization and its implications for self-employment perspectives. Thus, they may represent significant potential for improving future research on the impact of digitalization on self-employment.

References

Books:

1. Anderson, C. (2014) „Makers: the new industrial revolution“, London: Crown Business. 10.1093/jdh/ ept048.
2. Aronson R. (1991) „Self-Employment: A Labour Market Perspective“ Ithaca, New York: ILR press
3. Birch, D. (1979) „The Job Generation Process“, Cambridge MA.: Centre for the Study of Neighbourhood and Regional Chang’, Cambridge, MIT Press.

4. Bögenhold, D., Bonnet, J., Dejardin, M., García Pérez de Lema, D. (eds.) (2016) „Contemporary Entrepreneurship: Multidisciplinary Perspectives on Innovation and Growth“, Cham: Springer.

5. Bonnet, J., Dejardin, M. and Madrid-Guijarro, A. (eds.) (2012) „The Shift to the Entrepreneurial Society: A Built Economy in Education“, Support and Regulation, Cheltenham, UK and Northampton, MA, USA: Edward Elgar Publishing.

6. Brynjolfsson, E., McAfee, A. (2011) „Race against the machine: How the digital revolution is accelerating innovation, driving productivity, and irreversibly transforming employment and the economy“, Digital Frontier Press. Lexington, MA

7. Butković, H., Samaržija, V. (2019) „Digitalna transformacija tržišta rada u Hrvatskoj“, Institut za razvoj i međunarodne odnose – IRMO, Zagreb.

8. Castells, M. (2010) „The Information Age. Economy, Society and Culture“, Vol. I: The Rise of the Network Society, Oxford: Wiley-Blackwell

9. Castells, M. (2010) „The rise of the network society“, Malden, MA: Wiley Blackwell.

10. Brynjolfsson, E., McAfee, A. (2014) „The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies“, W. W. Norton & Company: New York

11. Frey, C.B., Osborne, M.A. (2013) „The future of employment: how susceptible are jobs to computerisation?“ Oxford University Press: London

12. Geroski, P.A., Schwalbach, J. (1991) „Entry and Market Contestability: An International Comparison“. Blackwell Publishing: Oxford, UK

Journals:

1. Abou-Warda, S.H. (2016) „New educational services development: framework for technology entrepreneurship education at universities in Egypt“, Int. J. Educ. Manag, Vol. 30, No. 5, pp. 698–717, doi: 10.1108/IJEM-11-2014-0142

2. Ahmad, N., A., Hoffman, A. (2008) „A framework for addressing and measuring entrepreneurship“, OECD Statistics Working Papers 2008/02, pp. 1 – 37, doi: https://doi.org/10.1787/18152031

3. Aloulou, W.J. (2016) „Predicting entrepreneurial intentions of final year Saudi university business students by applying the theory of planned behavior“, J. Small Bus. Enterpr. Dev., Vol. 23, No. 4, pp. 1142–1164, doi: 10.4236/ojbm.2017.54051

4. Amorós, J.E., Bosma, N. (2013) „Global Entrepreneurship Monitor: 2013 Global Report“, Babson College, Universidad del Desarrollo 2013 University Tun Abdul Razak 2014“, available at: http://www.unirazak.edu.my/images/about/GEM_2013_Global_Report.pdf

5. Antoncic, B., Hisrich, R. D. (2003) „Clarifying the intrapreneurship concept“. Journal of Small Business and Enterprise Development, Vol. 10, No. 1, pp. 7–24.

6. Antunes, A. R., Cavalcanti, T. V. de V. (2007) „Start up costs, limited enforcement, and the hidden economy“. European Economic Review, Vol. 51, No. 1, pp. 203–224, doi: https://doi.org/10.1016/j.euroecorev.2005.11.008

7. Arauzo-Carod, J. M., Segarra-Blasco, A. (2005) „The determinants of entry are not independent of start-up size: some evidence from spanish manufacturing“, Rev. Ind. Org. Vol. 27, No. 2, pp. 147–165, doi: 10.1007/s11151-005-8321-z

8. Audretsch, D. B., Carree, M. A., Thurik, R. (2001) „Does self-employment reduce unemployment?“, Discussion paper T101-074/3 Retrieved from https://pdfs.semanticscholar.org/7b33/3bfff107ca29fcff6bfbb491ab698324d735.pdf

9. Audretsch, D., Callejon, M. and Aranguren, J. (2008) „Entrepreneurship, Small Firms and Self-employment. In: M.D. Parrilli, P. Bianchi and R. Sugden (eds.), *High Technology, Productivity and Networks-A Systemic Approach to SME Develop*, https://doi.org/10.1057/9780230583726_6

10. Banerjee, A., and A. Newman (1993): “Occupational Choice and the Process of Development,” Journal of Political Economy, Vol. 101, No. 2, pp. 274 – 298, doi: http://dx.doi.org/10.1086/261876

11. Barefoot, K. et. al. (2018): „Defining and Measuring the Digital Economy“, Working paper, Bureau of Economic Analysis, available on https://www.bea.gov/sites/default/files/papers/defining-and-measuring-the-digital-economy.pdf, str. 1 – 18

12. Ben Youssef, A., Boubaker, S., Dedaj, B., Carabregu-Vokshi, M. (2020) „Digitalization of the economy and entrepreneurship intention“, Technological Forecasting and Social Change, 120043., pp. 1 – 14, doi: 10.1016/j.techfore.2020.120043

13. Ben Youssef, A., Dahmani, M. (2008) „The impact of ICT’s on students’ performance in higher education: direct effects, indirect effects and organizational change“, RUSC Univ. Knowl. Soc. J. (RUSC), Vol. 5, No. 1, pp. 45–56, Available on http://www.redalyc.org/pdf/780/ 78011203014.pdf

14. Blau, D. (1987) „A Time-Series Analysis of SelfEmployment in the United States“, The Journal of Political Economy, No. 95, pp. 445-67, doi: http://dx.doi.org/10.1086/261466

15. Block J., Sandner P. (2009) „Necessity and opportunity entrepreneurs and their duration in self-employment: evidence from German micro data“, J Ind Compet Trade, No. 9, pp. 117-137, doi: 10.1007/s10842-007-0029-3

16. Bogenhold, D. (2018) „From Hybrid Entrepreneurs to Entrepreneurial Billionaires: Observations on the Socioeconomic Heterogeneity of Self-employment“, American Behavioral Scientist, Vol. 63, No. 2, pp. 129-146, doi: 10.1177/0002764218794231

17. Bögenhold, D., Fachinger, U. (2017) „How to explain gender differences in self-employment ratios: Towards a socioeconomic approach“, In J. Bonnet, M. Dejardin, & D. Garcia-Perezde- Lema (Eds.), Exploring the entrepreneurial society: Institutions, behaviors and outcomes (pp. 155-167). Cheltenham, England: Edward Elgar.

18. Bogenhold, D., Kandutsch, F. (2018) „Self-employment on the way in a digital economy: A variety of shades of grey“, IfS Discussion Paper 01/2018, Institut für Soziologie, Alpen-Adria-Universität Klagenfurt, Department of Sociology, Alpen-Adria-Universität Klagenfurt, Vol. 2018, No. 01, pp. 1-25

19. Bokhari, A., Alothmany, N., & Magbool, S. S. (2012) „Entrepreneurship and unemployment in the Kingdom of Saudi Arabia. Saudi Economy Conference: Challenges and Opportunities“, available on https://www.researchgate.net/profile/Nazeeh_Alothmany/publication/235751134_Entrepreneurship_and_Unemploymentin_The_Kingdom_of_Saudi_Arabia/links/0912f51319eda567ef000000/Entrepreneurship-and-Unemployment-inThe-Kingdom-of-Saudi-Arabia.pdf

20. Borremans, A. et. al. (2018) „Digital economy. IT strategy of the company development“, International Science Conference SPbWOSCE-2017 “Business Technologies for Sustainable Urban Development”, Vol. 170, pp. 1 – 13, doi: 10.1051/matecconf/201817001034

21. Brennen, J. S., & Kreiss, D. (2016) „Digitalization“, The International Encyclopedia of Communication Theory and Philosophy, 1–11. doi:10.1002/9781118766804

22. Bukht, R., & Heeks, R. (2017) „Defining, Conceptualising and Measuring the Digital Economy.“, SSRN Electronic Journal, doi:10.2139/ssrn.3431732

23. Carlsson, B. (2004) „The Digital Economy: what is new and what is not?“ Structural Change and Economic Dynamics, Vol. 15, No. 3, pp. 245–264, doi: https://doi.org/10.1016/j.strueco.2004.02.001

24. Castells, M. (2010). The rise of the network society. Malden, MA: Wiley Blackwell.

25. Coletto, D., Pedersini, R. (2009) „Self-Employed Workers: Industrial Relations and Working Conditions“, European Foundation for the Improvement of Living and Working Conditions, available on https://www.researchgate.net/publication/268448326_Self-Employed_Workers_Industrial_Relations_and_Working_Conditions

26. Congregado, E., Golpe, A.A. and Carmona, M. (2010) „Is it a good policy to promote self-employment for job creation? Evidence from Spain“, Journal of Policy Modeling, Vol. 32, No. 6, pp. 828–842, doi: https://doi.org/10.1016/j.jpolmod.2010.09.001

27. De Stefano, V. (2015) „The rise of the “just-in-time workforce”: On-demand work, crowdwork and labour protection in the “gig-economy,” No. 71. Geneva, Switzerland: International Labour Organization, available on https://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---travail/documents/publication/wcms_443267.pdf

28. Demerouti, E. (2020) „Turn Digitalization and Automation to a Job Resource“, Applied Psychology, Vol. 0, No. 0, pp. 1 – 6, doi: https://doi.org/10.1111/apps.12270

29. Henriette, E., Mondher E., Boughzala, I. (2015) “The Shape of Digital Transformation: A Systematic Literature Review,” in Ninth Mediterranean Conference on Information Systems (MCIS), Samos, Greece, 2015.

30. Stolterman, E., A. C. Fors, A. C. (2004) “Information Technology and the Good Life,” in Information Systems Research: Relevant Theory and Informed Practice, B. Kaplan et al. (eds), London, UK: Kluwer Academic Publishers, 2004

31. EGSO – Europski gospodarski i socijalni odbor (2017) „Impact of digitalisation and the on-demand economy on labour markets and the consequences for employment and industrial relations“. Luxembourg: Publications Office of the European Union. Brussels: European Economic and Social Committee.

32. Elia, G., Margherita, A., Petti, C. (2016) „An operational model to develop technology entrepreneurship EGO-system“, Int. J. Innov. Technol. Manag., Vol. 13, No. 5, 1640008, doi: 0.1142/S0219877016400083

33. Eppler-Hattab, R. (2021) «From lifelong learning to later life self-employment: a conceptual framework and an Israeli enterprise perspective», Journal of Enterprising Communities: People and Places in the Global Economy, Vol. ahead-of-print No. ahead-of-print, doi: https://doi.org/10.1108/JEC-01-2021-0014

34. EU Commission. (2017) „Labour market policy“, available on http://ec.europa.eu/eurostat/ web/labour-market/labour-market-policy

35. EU SWD (2016) „European Commission Proposal for a Directive of the European Parliament and the Council on the conditions of entry and residence of third-country nationals for the purposes of highly skilled employment and repealing Directive 2009/50/EC“, available on https://ec.europa.eu/home-affairs/sites/homeaffairs/files/what-we-do/policies/european-agenda-migration/proposal-implementation-package/docs/20160607/directive_conditions_entry_residence_third-country_nationals_highly_skilled_employment_impact_assessment_part_1_en.pdf

36. Fayolle, A., Gailly, B., (2015) „The impact of entrepreneurship education on entrepreneurial attitudes and intention: hysteresis and persistence“,. J. Small Bus. Manag., Vol. 53, No. 1, pp. 75–93, doi: 10.1111/jsbm.12065

37. Fetzer, J. (1998) „Who is Likely to Become Self Employed in Vietnam?“, available at https://ssrn.com/abstract=1161152 or http://dx.doi.org/10.2139/ssrn.1161152

38. Fichter, F., Tiemann, I. (2018) „Factors influencing university support for sustainable entrepreneurship: Insights from explorative case studies“, J. Cleaner Prod. 175, pp. 512–524, doi: 10.1016/j.jclepro.2017.12.031

39. Figureoa – Armijos, M., Motta Veiga, S. (2019) „Predictors of Early-Career Self-Employment among Millennials in the Digital Economy: The Role of The Great Recession, Proceedings of the 52nd Hawaii International Conference on System Sciences“, pp. 4501 – 4510,

40. Fossen, F., Sorgner, A. (2019) „The Effects of Digitalization of Work on Entry into Entrepreneurship“, Academy of Management Annual Meeting Proceedings, No. 1, pp. 1 – 31, doi: 10.1016/j.jbusres.2019.09.019

41. Goetz, S., Fleming – Munoz, D. A., Rupasingha, A. (2012) „The Economic Impacts of Self-Employment“, Journal of Agricultural & Applied Economics, Vol. 44, No. 3, str. Pp. 315 -321, doi: 10.1017/S1074070800000432

42. Grey, R., Rumpe, B. (2015) „Models for digitalization“, Softw Syst Model, No. 14, pp. 1319–1320, doi: 10.1007/s10270-015-0494-9

43. Haake, G. (2017) „Trade unions, digitalisation and the self-employed – inclusion or exclusion?“, Transfer, Vol. 23, No. 1, pp. 63 – 66, doi: 10.1177/0022185620979337

44. Hausen, T., Schlegel, M. (2020) „Unemployment reduction through solo self-employment: A gender question?“, Empirical Economics, Vol. 59, No. 1, pp. 1-21, doi: 10.1007/s00181-019-01754-w

45. Hess, T., Benlian, A., Matt, C., & Wiesb¨ock, F. (2016) „Options for formulating a digital transformation strategy“, MIS Quarterly Executive, Vol. 15, No. 2, pp. 123–139.,URI: https://boris.unibe.ch/id/eprint/105447

46. Hollingsworth, J. Rogers (1998) „New perspectives on the spatial dimensions of economic coordination: tensions between globalization and social systems of production“, Review of International Political Economy, Vol. 5, No. 3, pp. 482-507, doi: https://doi.org/10.1080/096922998347499

47. Holmes T. J., Schmitz J. A. (1990) „A theory of entrepreneurship and its application to the study of business transfers“, The Journal of Political Economy, Vol. 98, No. 2, pp. 265-294, doi: http://dx.doi.org/10.1086/261678

48. Holzinger, A. (2018) „From Machine Learning to Explainable AI“, 2018 World Symposium on Digital Intelligence for Systems and Machines (DISA), pp. 55 – 66, doi: 10.1109/DISA.2018.8490530

49. Horv´ath, D., & Szab´o, R. Z. (2019) „Driving forces and barriers of Industry 4.0: Do multinational and small and medium-sized companies have equal opportunities?“ Technological Forecasting and Social Change, No. 146, pp. 119–132, doi: https://doi.org/10.1016/ j.techfore.2019.05.021

50. Iansiti, M, Lakhani, K.R. (2017) „The truth about blockchain“, Harv. Bus. Rev., Vol. 95, No. 1, pp. 118–127, available at https://enterprisersproject.com/sites/default/files/the_truth_about_blockchain.pdf

51. Jacobs G. (2007) „An occupational choice model for developing countries“, available at http://www.iza.org/conference_files/worldb2007/jacobs_g3384.pdf

52. Jensen, K. B. (2013). Definitive and sensitizing conceptualizations of mediatization. Communication Theory, 23(3), 203–222

53. Krasniqi B. A. (2009). Personal, household and business environmental determinants of entrepreneurship. Journal of Small Business and Enterprise Development, Vol. 16, No. 1, 146-166

54. Kraus, S. et. al. (2022): Digital transformation in business and management research: An overview of the current status quo, International Journal of Information Management, No. 63, str. 1 – 18

55. Kuusisto, M. (2017). Organizational effects of digitalization: A literature review. International Journal of Organization Theory & Behavior, 20(3), 341–362.

56. Lane, N., 1999. Advancing the digital economy into the 21st century, Information Systems Frontiers, 1(3), 317-320.

57. Liu, D.-Y., Chen, S.-W., & Chou, T.-C. (2011). Resource fit in digital transformation: Lessons learned from the CBC Bank global e-banking project. *Management Decision, 49*(10), 1728–1742. https://doi.org/10.1108/00251741111183852

58. Lofstrom M., Bates T. (2009). Latina Entrepreneurship. Small Business Economics, 1-13.

59. Matt, C., Hess, T., & Benlian, A. (2015). Digital transformation strategies. *Business & Information Systems Engineering, 57*(5), 339–343.

60. McAfee, A., Brynjolfsson, E., 2017. Machine, Platform, Crowd: Harnessing our Digital Future. WW Norton & Company.

61. McCloskey, D. N. (2010). *The Bourgeois dignity: Why economics can't explain the modern world*. Chicago, IL: University of Chicago Press.

62. McKeown, T. and Phillips, K. (2014). *Self-employment or entrepreneurship: What's in a name? (Perhaps quite a lot?)*. Small Enterprise Association of Australia and New Zealand 27th Annual SEAANZ Conference Proceedings, http://www.seaanz.org/sites/seaanz/documents/2014SEAANZConference/SEAANZ-2014-McKeown-Phillips.pdf (11.09.2017).

63. Moretti, E. 2010. Local Multipliers. American Economic Review. No. 100. pp. 1-7.

64. N Bouranta, M Tsampra, G Sklavos (2019): Digital Practices of Greek Small Entrepreneurship: Social Media and Self-Employment, Economic and Financial Challenges for Eastern Europe pp 297–311

65. Nagle, F., Seamans, R., Tadelis, R. (2020): Transaction Cost Economics in the Digital Economy: A Research Agenda, Working Paper 21-009, Harvard Business Schol, str. 1 - 27

66. OECD – Missing Entrepreneurs (2015). Self-employment and Entrepreneurship. Paris: OECD Publishing

67. OECD (2000) Employment Outlook. Paris: OECD

68. OECD (2015). OECD Labour Force Statistics 2014, Paris: OECD Publishing.

69. OECD (2022): Self-employment rate, dostupno na https://data.oecd.org/emp/self-employment-rate.htm, pristupljeno 07.04.2022.

70. OECD Employment Outlook (2016). Paris: OECD Publishing.

71. OECD, 2013. The Digital Economy, OECD, Paris. http://www.oecd.org/daf/competition/The-DigitalEconomy-2012.pdf

72. OECD. (2014). Digitization. In OED Online. Retrieved November 10, 2014 from http://www.oed.com/view/Entry/240886?rskey=EbrxYN&result=6

73. Oggero, N., Rossi, M. C., & Ughetto, E. (2019). Entrepreneurial spirits in women and men. The role of financial literacy and digital skills. Small Business Economics.

74. P. Parviainen, M. Tihinen, J. Kääriäinen and S. Teppola, “Tackling the digitalization challenge: how to benefit from digitalization in practice,” International Journal of Information Systems and Project Management, vol. 5, no. 1, pp. 63-77, 2017.

75. Parida, V. (2018): Digitalization, In: Addressing Societal Challenges / [ed] Editors Johan Frishammar Åsa Ericson, Luleå: Luleå University of Technology, 2018, p. 23-38

76. Porter, M.E., James, E.H., 2017. Why every organization needs an augmented reality strategy. Harv. Bus. Rev. 95 (6), 46–57

77. Poschke M. (2009). Who becoms an entrepreneur? Labor market prospects and occupational choice

78. Rayna, T., Striukova, L., 2016. From rapid prototyping to home fabrication: how 3D printing is changing business model innovation. Technol. Forecast. Soc. Change 102, 214–224

79. Rippa, P., & Secundo, G. (2018). Digital academic entrepreneurship: the potential of digital technologies on academic entrepreneurship. Technological Forecasting and Social Change. https://doi.org/10.1016/j.techfore.2018.07.013.

80. Sabbagh, R. Friedrich, B. El-Darwiche, M. Singh, S. Ganediwalla and R. Katz. (2012). Maximizing the impact of digitization (Strategy&) [Online]. Previously published in the Global Information Technology Report 2012: Living in a Hyperconnected World, pwc, pp. 68-73, 2012

81. Satalkina, L., & Steiner, G. (2020). Digital Entrepreneurship and its Role in Innovation Systems: A Systematic Literature Review as a Basis for Future Research Avenues for Sustainable Transitions. Sustainability, 12(7), str. 1 – 28

82. Schumpeter, J. A. (1942). Capitalism, Socialism and Democracy, New York: Harper & Row.

83. Sheehan, M, Mc Namara, A. (2015): Business Start-Ups & Youth SelfEmployment A Policy Literature Review Synthesis Report, STYLE Working Papers, WP7.1. CROME, University of Brighton, Brighton. http://www.style-research.eu/publications/working-papers

84. Singh G., Crump M. (2007). Educational attainment: a key factor for improving the lagging rate of black entrepreneurship. Rev Black Polit Econ 34, 217-229

85. Statista (2022): Number of self-employed taxpayers in Spain as of March of 2021, by type of economic sector, dostupno na https://www.statista.com/statistics/947219/self-employment-taxpayers-by-type-of-professional-sector-spain/

86. Storey, D. (1987). 'The Small Firm: An International Study', London: Croom Helm

87. Szaban, Y., Skrzek-Lubasińska, M. (2018). Self-Employment and Entrepreneurship: A Theoretical Approach, „Journal of Management and Business Administration. Central Europe", Vol. 26, No. 2/2018, p. 89–120

88. Terry, E., Marks, A., Dakessian, A., & Christopoulos, D. (2021). Emotional Labour and the Autonomy of Dependent Self-Employed Workers: The Limitations of Digital Managerial Control in the Home Credit Sector. Work, Employment and Society, 095001702097950.

89. The Economist Intelligence Unit.2013. [Online] Available at: https://www.eiuperspectives.economist.com/sites/default/files/EIU_Zuora_WEB_Final.pdf. 2013.

90. Todoli-Signes, A. (2015). The end of the subordinate worker: Sharing economy, on-demand economy, Crowdsourcing, Uber economy and other ways of outsourcing. 21. 10. 2015. Dostupno na: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2719772

91. Tradineconomics.com (2022). Croatia - Self-employed; Total (% Of Total Employed), dostupno na https://tradingeconomics.com/croatia/self-employed-total-percent-of-total-employed-wb-data.html

92. Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *Journal of Strategic Information Systems, 28*(2), 118–144. https://doi.org/10.1016/j. jsis.2019.01.003

93. von Briel, F., Davidsson, P., and Recker, J.C. (in press): Digital Technologies as External Enablers of New Venture Creation in the IT Hardware Sector. Entrepreneurship Theory and Practice.

94. Wachal, R. (1971). Humanities and computers: A personal view. North American Review, 8, 30–33.

95. Weber, L., & Mayer, K. (2014). Transaction cost economics and the cognitive perspective: Investigating the sources and governance of interpretive uncertainty. *Academy of Management Review*, *39*(3), 344-363

96. Weber, M. (1978). Economy and Society: An Outline of Interpretive Sociology, Berkeley:University of California Press.

97. Weber, M. (2003). The Protestant Ethic and the Spirit of Capitalism, New York: Dover Publications.

98. Wegman, L.A., Hoffman, B.J., Carter, N.T., Twenge, J.M. and Guenole, N. (2016) Placing job characteristics in context: Cross-temporal meta-analysis of changes in job characteristics since 1975. Journal of Management, 20(10), 1–35

99. Y Georgellis & J G Sessions & N Tsitsianis, 2005. "Self-Employment Longitudinal Dynamics: A Review of the Literature", Economic Issues Journal Articles, Economic Issues, vol. 10(2), pages 51-84

Internet sources:

1. Apsolon (2020) Digital transformation in Croatia, www.apsolon.com, Zagreb: Apsolon

2. Babaginda, M. M., Semasinghe, D. M. (2013) „Entrepreneurship and unemployment: A literature review", International Conference on Business & Information. Retrieved from http://www.academia.edu/5322204/Entrepreneurship_and_Unemployment_A_Litrature_Review

3. Bréchemier, D., de Panafieu, O., & Alami, M.El. (2016) „Think act of robots and men - in logistics: Towards a confident vision of logistics in 2025", available on https://www.rolandberger.com/publications/publication_pdf/of_robots_and_men___in_logistics.pdf

4. Coletto, D., Pedersini, R. (2009) „Self-Employed Workers: Industrial Relations and Working Conditions", European Foundation for the Improvement of Living and Working Conditions, available on https://www.researchgate.net/publication/268448326_Self-Employed_Workers_Industrial_Relations_and_Working_Conditions

5. Daheim, C., Wintermann, O., Glenn, J., Korn, J., & Schoon, C. (2019) „Work 2050: Three scenarios: New findings of an international Delphi study by the Millennium Project" Bertelsmann Stiftung, Gutersloh, available on https://www.bertelsmann-stiftung.de/en/publications/publication/did/work-2050-three-scenarios/

6. De Stefano, V. (2015) „The rise of the “just-in-time workforce”: On-demand work, crowdwork and labour protection in the “gig-economy,” No. 71. Geneva, Switzerland: International Labour Organization, available on https://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---travail/documents/publication/wcms_443267.pdf

7. Du Rauseas, M. P., Manyika, J., Hazan, E., Bughin, J., Chui, M., Rémi, S. (2011) „Internet matters: The Net’s sweeping impact on growth, jobs, in Hrvoje Butković, Višnja Samardžija and prosperity. McKinsey Global Institute, available on https://www.mckinsey.com/~/media/McKinsey/Industries

8. EU Commission. (2017) „Labour market policy“, available on http://ec.europa.eu/eurostat/ web/labour-market/labour-market-policy

9. EU SWD (2016) „European Commission Proposal for a Directive of the European Parliament and the Council on the conditions of entry and residence of third-country nationals for the purposes of highly skilled employment and repealing Directive 2009/50/EC“, available on https://ec.europa.eu/home-affairs/sites/homeaffairs/files/what-we-do/policies/european-agenda-migration/proposal-implementation-package/docs/20160607/directive_conditions_entry_residence_third-country_nationals_highly_skilled_employment_impact_assessment_part_1_en.pdf

10. European Commision (2012) „Europe 2020: Europe’s growth strategy“, available on https://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf

11. Fetzer, J. (1998) „Who is Likely to Become Self Employed in Vietnam?“, available at https://ssrn.com/abstract=1161152 or http://dx.doi.org/10.2139/ssrn.1161152

12. Gartner Glossary (2015). „Digitalization“, available at https://www.gartner.com/en/information-technology/glossary/digitalization

13. ILOSTAT (2022) „Indicator description: Employment by status in employment“, available at https://ilostat.ilo.org/resources/concepts-and-definitions/description-employment-by-status/

14. Jacobs G. (2007) „An occupational choice model for developing countries“, available at http://www.iza.org/conference_files/worldb2007/jacobs_g3384.pdf

CHAPTER 15

Dealing with risk in (post)COVID-19 pandemic era; the case of Croatia[1]

Timotej Jagrič[2], Ana Malnar[3]

ABSTRACT

The aim of this study is to analyse the risk management process in Croatian companies during the pandemic period COVID-19 and to present the forecasts for the following two-year period. The research is based on primary data and presents the results of a risk management survey conducted among 115 Croatian non-financial companies in the first quarter of 2022. The focus of the survey is on medium and large companies. The main findings of this study show the extent to which the COVID-19 pandemic has led companies to make operational changes that have impacted resilience and revealed new and unknown types of risks. In addition, the study shows the extent to which the pandemic has helped companies place more importance on and invest more in risk management. The current trends of deregulation and globalization of markets increase the impact of risks on the company's operations, while recognizing and managing various forms of risks by achieving the basic objective increasingly contributes to a company's greater ability to survive and operate successfully in the modern economic environment.

Key words: *risk management, COVID-19 pandemic, business environment, Croatian entrepreneurship*

JEL classification: *D81, G32, C83, G41*

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1. Introduction

Operating in today's turbulent environment is characterized by, among other things, significant risks. The current trends of deregulation and globalization of markets increase the impact of risks on the company's operations and, consequently, on its value, as they represent a source of potential unforeseen losses due to changes in market prices, financial difficulties or other difficulties of the company. As business practices, environments, and trends change, some areas of risk management are of increasing importance. When distinguishing between the concepts of risk and uncertainty, it can be said that they are related but different. While uncertainty is unknown and changing, risk is the result of uncertainty (Mun, 2021). All of these factors can have a significant impact on a company's cash flow, earnings, and enterprise value. The nature of risk has geared risk management to protect companies from financial difficulties, and recognizing different categories of risk, such as credit, market, or ESG risk, can become an important step to ensure uninterrupted business operations and protection of company assets. By achieving its fundamental objective, identifying and managing various forms of risk increasingly helps the company to better survive and operate successfully in the modern economic environment, and ultimately contributes to higher enterprise value. In addition, the COVID -19 pandemic has caused organizations to make enormous operational changes that have impacted resilience, created new cyberrisks, and turned business models on their head. Organizations now face a radical shift in risk management, and many are working to understand the new and unknown risks they face (Westby & Lamb, 2020). In addition, not all companies are equally exposed to the different types of risk. Exposure can depend on many different characteristics of the company, especially the industry it belongs to, its size, and many other factors. Changes in the external and internal environment of the company place demands on the responsible employees to deal with various risks, thus reducing the possibility of negative events, but also taking advantage of possible opportunities for further development (Kardos et al., 2021). This should be the case not only in business, but also in public administration or self-government organizations, sports and cultural institutions (Dvorsky et al., 2020).

Today, real-world business conditions tend to be more complex than can be captured by a simple cost-benefit analysis, which means that any business strategy or project involves multiple paths. When making a business decision, one should be able to evaluate and prioritize all available paths (Jagrič et al., 2021). Dealing with risks implies creating a methodical framework for risk management that aims to achieve an organization's goals and thereby protect existing value and create new value for its stakeholders. This includes, among other things, identifying risks, assessing their probability of occurrence and the extent of their impact, mitigating risks, developing a response strategy, monitoring risks, and controlling risks (Mun, 2015).

The aim of this study is to analyze how Croatian companies dealt with different types of risks during the pandemic period COVID -19 and to present the forecasts for the following two-year period. It also analyzes the

macroeconomic factors that affected the risk management process of the companies, as well as the expectations regarding the risk management costs. The findings are compared to a recent risk survey conducted by Federation of European Risk Management Associations (FERMA European Risk Manager Report 2020).

2. Literature review

According to Lima and Verbano (2019), risk is defined as the impact in the form of a positive or negative deviation from the expected outcome resulting from uncertainty about the intended objectives. Risk can affect economic performance, business continuity, reputation, and environmental and social consequences for the organisation. Therefore, risk management assists organisations in achieving their goals, reducing potential losses, and exploring new opportunities in an environment full of uncertainties (Radner & Shepp, 1996). Consequently, all types of organisations show a greater interest in risk management as they recognize the benefits it provides with the goal of reducing the potential for risk and mitigating the impact of potential losses (Bajo et al., 2012). Risk monitoring represents a continuous process of defining objectives, identifying sources of uncertainty, measuring the likelihood and severity of potential consequences, and formulating management responses to risks and opportunities (Henschel, 2006).

Various authors identify risk categories that play an important role in today's business environment. Miloš Sprčić (2013) defines market risk as a type of risk arising from events such as changes in market interest rates, exchange rates, commodity prices on commodity exchanges, and the market value of capital, while interest rate risk is composed of price risk, which affects all investments, and reinvestment risk, which does not affect all investments (Mikić et al., 2011). Another segment that companies should recognize and manage is currency risk, which represents the unfavorable exchange rate fluctuations that companies face in foreign trade transactions (Tuškan, 2009). To identify and manage potential issues across this spectrum, companies should be aware of external developments and market conditions that could affect the business and be prepared to react quickly and change plans if necessary. Interest rates and exchange rates can affect the overall trading climate and are not just a matter of direct costs. In addition, interest rates can affect certain industries more than others and at different times, and exchange rates can affect how easy or profitable it is to do business with another country. All companies are affected at some point by changes in the general sales environment. These changes may affect the entire economy - for example, a recession or economic downturn - or they may affect only a specific industry or sector. It is important to be alert to potential changes and adjust forecasts and plans accordingly to avoid potential cash flow problems.

Credit risk represents not only the likelihood that a creditor (e.g., a bank or lender) or another party (e.g., a supplier) will not be able to pay, but can also arise from granting credit to customers due to the possibility that they will default on payment. If the mentioned case occurs, companies have

few options to promote timely payment (Koulafetis, 2017). Operational risk focuses on the way the organization performs various aspects of its business, usually related to internal business operations, and mainly includes the following categories: Fraud (e.g., bribery, misuse of assets, and tax evasion), other criminal activities (e.g., data theft, hacking, etc.), workplace policies and safety (e.g., discrimination, staff health and safety), products and business practices (e.g., product defects or market manipulation), property, plant, and equipment (e.g., vandalism, natural disasters, equipment maintenance, etc.), business interruptions (e.g., power outages, IT system failures, etc.), and process management (e.g., accounting errors, data entry errors, reporting failures) (Milkau, 2021). When operational risks materialize, they can cause significant harm to businesses, including losses (e.g., costs of managing system failures or processing errors), regulatory burdens (e.g., costs of audits or mandated investigations), and reputational damage (e.g., as a result of fraudulent activities or unfair practices). Unlike other types of business risk, operational risks are generally not revenue-driven or taken voluntarily. Some companies accept them as an unavoidable cost of doing business. Legal risk, on the other hand, is caused by an event, such as the inability to execute an important business contract because it was not drafted in accordance with applicable laws or because the partners do not have the legal capacity to execute the agreed transaction (Miloš Sprčić et al., 2019).

Legal risk includes changes in laws and regulations controlling financial markets, as well as changes in the company's operations.

The challenge is to achieve continuous improvement by aligning the business with value, as legal decisions are usually made at the strategic level and not only at the operational level. Recent studies (Muthuri et al., 2022) suggest an approach to managing legal risk in the context of business model development that uses a value-based modeling approach for strategic planning and legal reasoning. Digitization, as an important part of today's work environment, is changing international business in many ways and poses a new challenge for research (Yadong, 2022). Change and digitalization have brought gaps in cybersecurity and threats that can lead to maritime failures. Therefore, companies should be prepared for cyber threats through holistic risk assessments to develop proactive measures. In addition to the types of risk already mentioned, researchers have also highlighted the importance of environmental risk, which can be significantly reduced through various environmental aspects of the business process, such as efficient energy use, use of recycled materials, and green business practices in general (Campiglio et al., 2019).

3. Methodology

Content of this paper comes from the available domestic and foreign literature, i.e., from the works of relevant authors engaged in research on risk management practices. The small number of such studies in the Republic of Croatia has imposed the need for further investigation of risk management practices in real sector companies. Due to the priory mentioned, the analysis

is based on primary data collected by a survey conducted among 115 Croatian non-financial companies during the first quarter of 2022. The focus of the survey is on medium and large companies.

The study is based on medium and large companies due to the fact that the results of previous empirical research (Allayannis & Weston, 2001) have shown that medium and large firms are more inclined to manage risk and use derivatives. Indeed, for small firms, the cost of establishing a function and risk management activities can be a significant barrier. In addition, the sample is based on companies outside the financial sector, since financial institutions primarily take financial risks, i.e., by taking and managing these risks, they fulfil their core business. The instrument used to conduct the research is a questionnaire designed to achieve the research objectives. The survey addresses, among other things, the priority given to risk management and the organisation of the risk management process in the company, including the classification of the different types of risk and the methods used in the risk management process.

The companies surveyed distributed as shown in Table 1. Around two thirds of the companies in the sample were medium enterprises, about a third of them were large companies.

Table 1: Distribution of companies according to the size

	Frequency	**Per cent**
Medium	73	63,48
Large	42	36,52
	115	100,00

Source: Author's survey data.

Table 2 illustrates the percentages and the division of the regional companies surveyed. More than one third of the surveyed companies is based in the capital city, Zagreb, following with other important and entrepreneurially significant regions of Zagrebačka county, Primorsko – goranska county and Splitsko – dalmatinska county.

Table 2: Regional distribution of companies

Regions	Frequency	Per cent
Zagrebačka county	13	11,3
City Zagreb	41	35,65
Varaždinska county	3	2,61
Primorsko – goranska county	10	8,7
Istarska county	5	4,35
Virovitičko – podravska county	4	3,47
Vukovarsko – srijemska county	3	2,61
Osječko – baranjska county	5	4,35
Splitsko – dalmatinska county	10	8,7
Brodsko – posavska county	2	1,74
Krapinsko – zagorska county	4	3,47
Bjelovarsko – bilogorska county	3	2,61
Zadarska county	5	4,35
Dubrovačko – neretvanska county	2	1,74
Karlovačka county	3	2,61
Sisačko – moslavačka county	2	1,74
	115	**100,00**

Source: Author's survey data.

Based on the data shown in the Table 2 and on the division of entrepreneurial activity along the territory of Croatia, it can be concluded that the survey correctly represents the actual Croatian and regional entrepreneurship space.

Data collected through this survey will be benchmarked to FERMA's European Risk Manager Survey whose data was collected from an anonymous web-based survey distributed through FERMA's 22 member associations and the PwC European network between January and March 2020. Responses were received from respondents in 34 countries aggregated into 3 clusters; Western Europe (Belgium, Cyprus, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Monaco, Netherlands, Portugal, San Marino, Spain, Switzerland, UK and Vatican City), Central and Eastern Europe (Albania, Armenia, Austria, Bulgaria, Czech Republic, Georgia, Hungary, Kazakhstan, Lithuania, Romania, Russia, Slovenia and Turkey) and Northern Europe (Denmark, Finland, Norway and Sweden) (FERMA, 2020). FERMA's European Risk Manager Survey has taken place every other year since 2002 and represents the widest available picture of views of professional risk managers across Europe (FERMA, 2020). Even though Croatia is not represented among FERMA's surveyed countries, it can be interesting to compare both surveys' findings to see whether there are large gaps between the answers of Croatian risk managers when compared to FERMA's

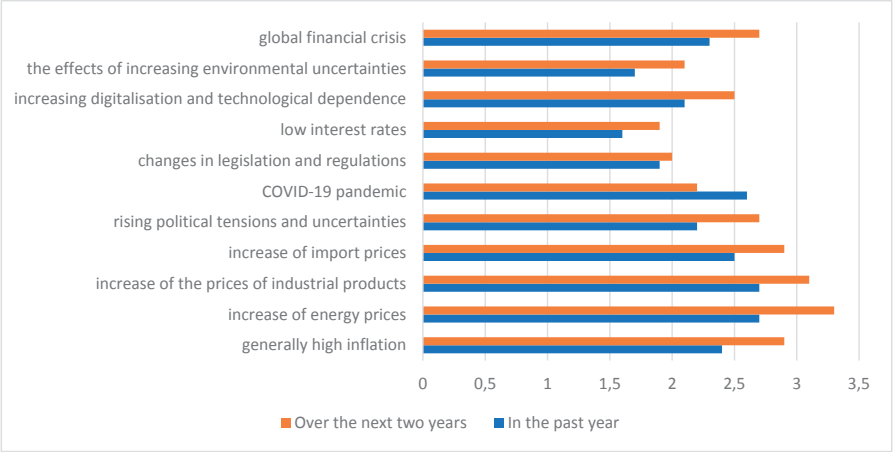
wider picture of the views of professional risk managers across Europe. Although FERMA survey differs from this study in terms of methodological approach, sample size and geographic focus, a comparison between two risk management surveys may provide a new perspective on the field and set the grounds for future researches in this direction.

1. Results and discussion

The results are presented according to several dimensions of questions, such as the macroeconomic factors that affected the company's risk management, the impact of the pandemics COVID - 19 on the process, and the projections regarding the forms of risk and their costs in the following period.

Figure 1 provides information on the presence and intensity of macroeconomic factors that have significantly affected the company's risk management over the past year, as well as a forecast of which factors will have a significant impact over the next two years. Responses are presented on a scale of 1 to 4, with 1 representing "was not affected at all" or "will not be affected at all" and 4 representing "had a very strong impact on" or "will have a very strong impact on." It can be seen that in the last year Croatian companies had to deal mainly with the problem of rising prices for industrial products, the increase in energy prices and with the pandemic COVID - 19. In the next two years, the increase in energy prices is probably the factor that is expected to have an impact on the risk management process, followed by the increase in prices for industrial products and generally high inflation.

Figure 1: Macroeconomic factors with impact on company's risk management processSource: Author's survey data.



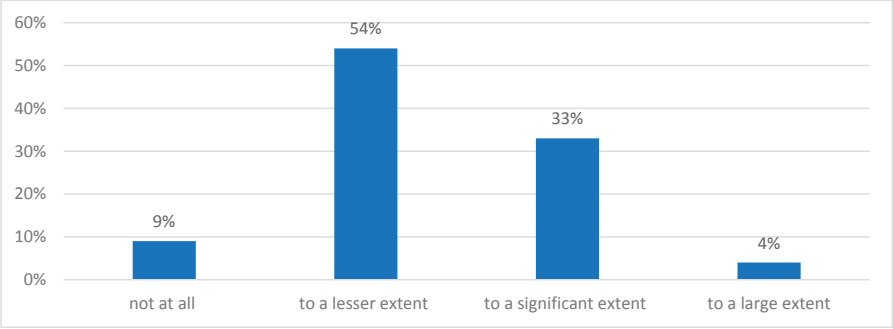
Given the limitations, the results are compared to some of the FERMA survey results. FERMA respondents cited cyber threats, uncertain economic growth, availability of key skills, data fraud or theft, and overregulation as the top five risks over the next 12 months (FERMA, 2020). Key skills availability draws

attention to the difficulty of attracting, developing, and retaining the skills needed to adapt to new technologies and ways of working, while data fraud or theft highlights threats related to the expansion of data management and use. In addition, cyber threats, the pace of technological change and uncertain economic growth are seen as the top three risks within the next three years, and climate change and environmental damage, changing customer behavior and extreme weather events within the next ten years (FERMA, 2020). Compared to the survey of Croatian companies, it can be seen that the top risks vary, which can be explained by the fact that the FERMA survey was conducted before the pandemic period.

The Covid 19 crisis heightens the importance of key concerns for risk managers: there has been a rise in cyberattacks that exploit the increasing number of digital connections during the descent and the potential vulnerability of people working from home (FERMA, 2020).

Further on, Figure 2 demonstrates to what extent the pandemic has contributed to an increase in the importance of risk management in companies and more investment in time, money, etc. The data show that more than half of the companies surveyed indicated that the pandemic had contributed to the importance of investment to a lesser extent, while 33% of them indicated that it had contributed to a significant extent. Only a smaller number of companies didn't recognize the pandemic period as the time when the risk management process should receive greater attention.

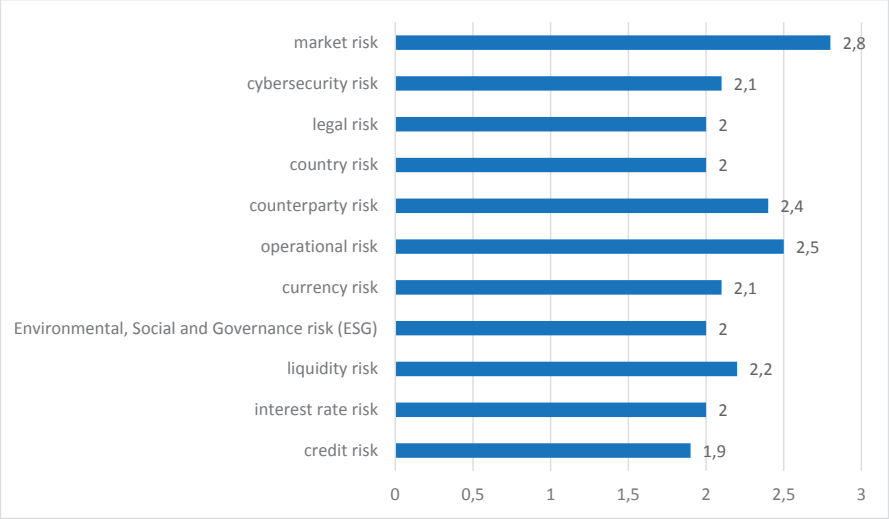
Figure 2: The extent to which the pandemic has contributed to greater importance and investment in risk management



Source: Author's survey data.

The data in Figure 3 indicate that market risk and operational risk, followed by counterparty risk, tend to increase the most for the surveyed companies over the next two years. For the different types of risk shown in Figure 3, companies indicated whether the risk "will not increase at all," which is marked 1 on one side of the scale, and whether it "will increase very much," which is marked 4 on the other side.

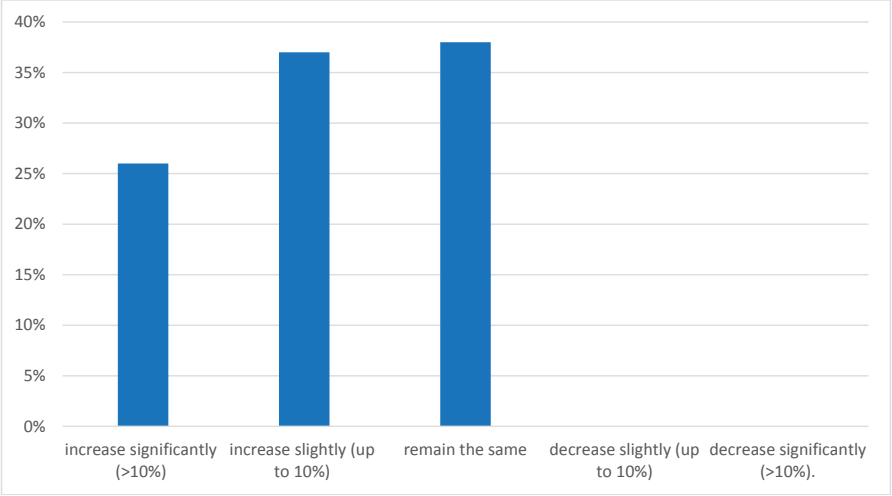
Figure 3: Types of risk to increase over the next two years



Source: Author's survey data.

Moreover, after examining the factors that impact the risk management process, the extent of COVID - 19 pandemics on dealing with various forms of risk, the types of risks that tend to increase in the near term, the data in Figure 4 represent projections for the cost of risk management over the next two years, based on the company's current environment. Of the companies surveyed, 38% believe costs will remain the same, while 37% expect costs to increase slightly. In addition, 26% of the companies indicate that their projections foresee a significant increase in risk management costs, while none of the companies anticipate a decrease in the above costs in the near future.

Figure 4: Change of risk management costs over the next two years



Source: Author's survey data.

Based on the figures presented in this chapter it can be seen that, among various other factors, COVID – 19 pandemic influenced company's risk management process and affected the costs related to it. However, it is not expected that pandemic will have such a strong influence in the upcoming period.

5. Conclusions

While the world faces the greatest social, economic and environmental challenges, risk management remains a multidimensional science, where the understanding and quantification of risk types is only a starting point. From a risk management perspective, changes in the composition of the global economy are an important issue, especially since some changes may persist and become permanent features. Therefore, risk management is now not about the 2020 health crisis as such, but about new types of risks created by the new business environment triggered by the pandemic. The persistence of change is a common feature of economic activity, and over the past decade, risk managers have already become more aware of the increasing volatility and complexity of the global business environment.

The results of the research conducted among medium and large companies on risk management practices provide answers to the research questions. The following conclusions can be drawn from the research results. Croatian companies are exposed to significant risks. Risk management practices are widespread in Croatian companies, but their level of development is questionable. In addition to increasing awareness and knowledge in the area of risk management, it is expected that risk management practices in Croatian companies will be improved and company resources and assets will be better

protected. With the increasing visibility of risks and the growing number of tools for protection in risk management, it is now easier to protect companies from their harmful effects. The scientific contribution of the research conducted arises from the importance of primary data collected based on the 115 surveyed companies and on the insight in the risk management process they conduct, as well as their projections regarding the following two-year period. Based on the priory mentioned, risk and risk assessment should be an important element of the decision-making process within Croatian companies.

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References

1. Allayannis, G., & Weston, J. P. (2001). The use of foreign currency derivatives and firm market value. *Review of Financial Studies*, *14*(1). https://doi.org/10.1093/rfs/14.1.243
2. Bajo, J., Borrajo, M. L., de Paz, J. F., Corchado, J. M., & Pellicer, M. A. (2012). A multi-agent system for web-based risk management in small and medium business. *Expert Systems with Applications*, *39*(8). https://doi.org/10.1016/j.eswa.2012.01.001
3. Campiglio, E., Monnin, P., & von Jagow, A. (2019). *Climate Risks in Financial Assets*.
4. Dvorsky, J., Belas, J., Novotna, I., Fero, M., & Petrakova, Z. (2020). QUALITY of BUSINESS ENVIRONMENT of the SME: A SECTORAL VIEW. In *Communications - Scientific Letters of the University of Zilina* (Vol. 22, Issue 4). https://doi.org/10.26552/com.C.2020.4.163-172
5. FERMA. (2020). *FERMA European Risk Manager Report 2020*. FERMA European Risk Manager Report 2020.
6. Henschel, T. (2006). Risk management practices in German SMEs: An empirical investigation. *International Journal of Entrepreneurship and Small Business*, *3*(5). https://doi.org/10.1504/IJESB.2006.010543
7. Jagrič, T., Fister, D., Jagrič, V., & Mun, J. (2021). *Slovenian Corporate Risk Monitor 2021*.
8. Kardos, P., Lahuta, P., & Hudakova, M. (2021). Risk Assessment Using the FMEA method in the Organization of Running Events. *Transportation Research Procedia*, *55*. https://doi.org/10.1016/j.trpro.2021.07.143
9. Koulafetis, P. (2017). *Modern Credit Risk Management*. Palgrave Macmillan.
10. Lima, P. F. de A., & Verbano, C. (2019). Project risk management implementation in SMEs: A case study from Italy. *Journal of Technology Management and Innovation*, *14*(1). https://doi.org/10.4067/S0718-27242019000100003

11. Mikić, M., Orsag, S., Pološki Vokić N., & Švaljek, S. (2011). *EKONOMSKI leksikon*. Leksikografski zavod Miroslav Krleža.

12. Milkau, U. (2021). Operational resilience as a new concept and extension of operational risk management. *Journal of Risk Management in Financial Institutions*, *14*(4).

13. Miloš Sprčić, D. (2013). *Upravljanje rizicima – temeljni koncepti, strategije i instrumenti*.

14. Miloš Sprčić, D., Puškar, J., & Zec, I. (2019). *PRIMJENA MODELA INTEGRIRANOG UPRAVLJANJA RIZICIMA*. Ekonomski fakultet.

15. Mun, J. (2015). *Certified Quantitative Risk Management (CQRM): Readings*. IIPER Press.

16. Mun, J. (2021). *Quantitative Research Methods Using Risk Simulator and ROV BizStats Software: Applying Econometrics, Multivariate Regression, Parametric and Nonparametric Hypothesis Testing, Monte Carlo Risk Simulation, Predictive Modeling and Forecasting, and Optimisation* (4th ed.). ROV Press.

17. Muthuri, R., Capecchi, S., Sulis, E., Amantea, I. A., & Boella, G. (2022). Integrating value modeling and legal risk management: an IT case study. *Information Systems and E-Business Management*, *20*(1). https://doi.org/10.1007/s10257-021-00543-2

18. Radner, R., & Shepp, L. (1996). Risk vs. profit potential: A model for corporate strategy. *Journal of Economic Dynamics and Control*, *20*(8). https://doi.org/10.1016/0165-1889(95)00904-3

19. Tuškan, B. (2009). Upravljanje rizicima upotrebom financijskih derivata u RH. *Zbornik Ekonomskog Fakulteta u Zagrebu*, *7*(1), 107–120.

20. Westby, J. R., & Lamb, L. (2020). Rethinking Risk in a Post-Pandemic World. *Risk Management*, *67*(11), 8–9.

21. Yadong, L. (2022). A general framework of digitization risks in international business. *Journal of International Business Studies*, 344–361.

CHAPTER 16

Construction Sector in Latvia: E-Governance General Lines and CO_2 Emissions' Reduction

Ludmila Lozova[4], Biruta Sloka[5]

ABSTRACT

The "Green" policy requirements in construction sector in European Union are becoming higher and higher – construction materials' producers, all type of subcontractors, general contractors and other involved parties should follow the environment targets including CO_2 reduction tasks. In this regard the E-Governance different solutions are reviewed in this article, both in EU and in Latvia. It was discovered that Latvia is quite afore in use of Internet for interacting with public authorities in comparison to the EU average as well as that CO_2 emissions are reducing in Latvia in the analysed period in 2000 till 2020. Research results indicate that there are significant CO_2 emissions reductions and there are introduced several activities for further CO2 emissions reduction in Latvia.

Key words: *Construction, CO2, E-governance, CO2 emissions reduction*

JEL classification: *Q5, P48, Q52*

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1. Introduction

The “Green” policy requirements in construction sector in European Union are becoming higher and higher – construction materials’ producers, all type of subcontractors, general contractors and other involved parties should follow the environment targets including CO2 reduction tasks. Many steps are realised in situation of active work of e – governance: lot of countries indicated their achievements as well as problems and narrow places in their academic research have. The aim of this paper is to discover possible developments of CO2 reduction by e – governance effective work and take into account good and bad experience of other countries. The tasks of the current paper are to analyse scientific publications related to CO2 reduction in respect of e – governance; analysis of situation of e – governance in Latvia; analysis of situation of CO2 development in Latvia. The requirements of CO2 emissions reduction of international institutions are becoming more exigent in a construction sector, and Latvian and EU authorities are underlining the importance of use of “greener” building materials. Researchers in many developed EU and non-EU countries are paying a lot of attention to a low-carbon target in a construction sector on reduction of the CO2 emissions in construction material production and by application of contemporary e-governance systems for the processes and projects management. In current paper are presented reviews of recent scientific publications related to CO2 emissions reduction in a construction, analysis of some of best practices of e-governance systems in Latvia in construction sector and analysis of tendencies of statistical indicators.

2. Literature review

Recent results in scientific analysis on CO2 emissions reductions in construction with special attention on application of different models in construction (Liu et al., 2022; Zeng et al., 2022), different construction materials (Benhelal et al., 2022), different systems (Chen et al., 2022) and application of several specially developed models (Yang et al., 2022) realizing and discussing several innovative approaches and findings and comparing several approaches and results (Pokhrel et al., 2022). Researchers have analyzed findings in scientific publications where the primary research areas for this topic on CO2 emissions reductions in construction are sustainable construction materials, information technology, sensitivity analysis of environmental impact, building type and composition, life cycle energy use of buildings, estimation methods, and life cycle analysis (Marzouk, Elahaboury, 2022). Researchers have stressed that research results indicate synergies mainly on the construction stages but also on the project process especially during conceptual design for decision making (Saieg et al., 2018) as the situations are very complicated and require innovative and specific solutions. Academic researchers have performed detailed analysis in Japan (Choi et al., 2022), in Australia (Daljit Singh et al., 2022) and European Union (Dębkowska et al., 2022). Researchers have discussed on several aspects on intelligent initiative to reduce CO2 emissions in construction (Farahzadi, Kioumarsi,

2022) suggesting several innovative solutions and approaches. Researchers have suggested application of machine learning initiatives and intelligent perspectives for CO2 emissions reduction in construction (Farahzadi and Kioumarsi, 2023) – such approaches have raised big researchers and professionals interest and hope in wide possible use in future. Researchers are finding ways "…to assist decision-makers to identify the trade-off solution between construction cost and CO2 emission" (Shin and Kim, 2022) where as result of their research a particle swarm optimization model is proposed for further use and development.

Talking about e-governance formulation: according to Kumbhar (Kumbhar et al., 2010), e-Governance is the application of Information and Communication Technology (ICT) such as Internet, Local Area Networks, mobiles etc. by Government for delivering Government Services - exchange of information, communication transactions, integration various stand-alone systems. It also used to improve the effectiveness, efficiency, service delivery, transparency and to promote democracy of information and transactional exchange between government to government (G2G), government to employee (G2E), government to citizen (G2C) and government to business (G2B).

In the frame of this paper e-governance systems can be divided in several groups:

1. G2everyone – the ones mandatory by state legislation,
2. G2everyone - implemented by local authority/organization or prescribed by a specific project,
3. and third B2B (even though not mentioned at Kumbhar) – NGO, private initiatives of the entrepreneurs.

More specifically described by Mishra (Mishra et al., 2006) – the e-governance projects call for "usability and user-centered design", since the ultimate beneficiary is the "user" and need to underline also the difference between users – rural development or business process consumers. But the real task of e-governance shall be focalized on a real "demand driven" concept and be aware of possible information "incubators" and frameworks where he might be in because of the bureaucratic set-ups or development agencies leading pilot projects.

An "e-governance architecture" notion may be applied meaning a solution conceptualization, leading to sustainable information system planning and implementation strategies (Mishra et al., 2006) pointing out and indicating several challenges. In United Nations Environment Program (2022) the e-governance via smart and digital control systems in construction is mentioned together with the materialistic things like low-cost insulation materials, high efficiency heating and cooling systems and other. However, authors are also mentioned that some of energy intensity improvements needed to be done in order to achieve the target of zero emissions by 2050 (United Nations Environment Program, 2022) where important aspects related to environment are noted.

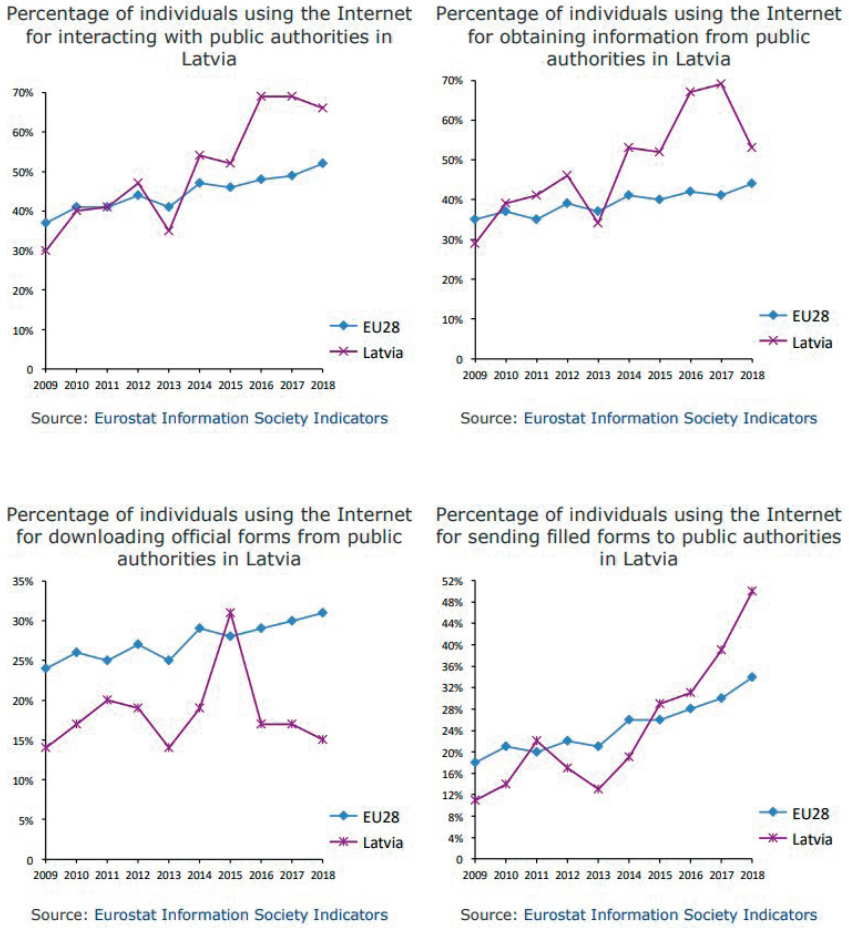
3. Some of “e-governance” cases Some of European experience in “e-governance” solutions

“Smart Buildings”, “Smart Cities”, “Smart Road Traffic” and similar initiatives are becoming widely spread recent years, and actively implemented by local authorities. A large-scale Internet innovation can be just mentioned as examples - the application of IoT in the management of Smart Buildings (“Smart Buildings” - a building that uses various technological solutions to automatically control the processes taking place in the building) (Droegehorn, et al, 2019). Such a solution is aimed at a more effective and useful use of resources (both residents’ time, energy, electricity, etc.), which at the same time allow to talk about the Smart Building community - the development of a complex approach Smart City. Without going into details, it can be mentioned that many theoretical studies have been carried out regarding this concept as well as practical initiatives like in Zaragoza, Spain 150 sensors for real-time traffic management, or Cologne Klima Strasse project in Germany (project for reducing CO2 emissions), or Stockholm Royal Harbor known for data collection and its smart analysis and further preventive management (Alkis, et al, 2019). Such findings are getting more and more attention for possible practical use in future.

4. Some of Latvian experience in “e-governance” solutions

Generally, Latvia and Baltics are quite progressive and afore in “e-governance” solutions: beginning from a possibility to sign electronically documents, manage administrative issues in a remote mode and finishing with e-Health system. In figure 1 below included information shows higher indicators of Latvian citizens using the Internet for interacting with public authorities in comparison to the EU average (The Digital Government Factsheet Latvia prepared for the European Commission, 2019).

Figure 1: Indicators of Latvian citizens using the Internet for interacting with public authorities in comparison to the EU average



Source: The Digital Government Factsheet Latvia prepared for the European Commission (2019)

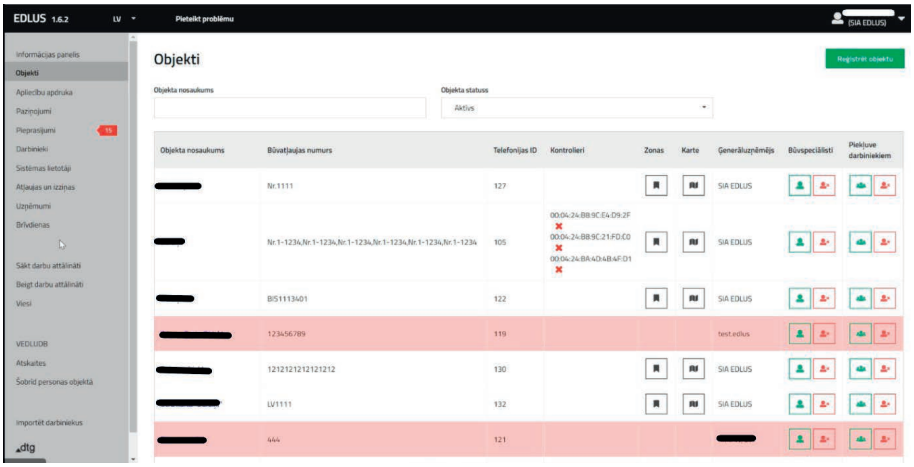
On this point can be added that according to Chapter XIV of the Latvian Law "On Taxes and Duties" (Paragraph 192 of the transitional provision of the Law "On Taxes and Duties" stipulated in Chapter XIV) some of e-governance systems are mandatory to apply at the construction sites.

For example:

1. EDLUS ("Elektroniskā darba laika uzskaites sistēma") – electronic work hours registration system. The system is provided by state controlling authority, is mandatory at projects higher than 2 mio euro value and is also connected with State Tax Service ("VID"). The main idea is that all employees from a construction project are officially signed and paid, and State Tax Services receives full information about it (see Figure 2 below).

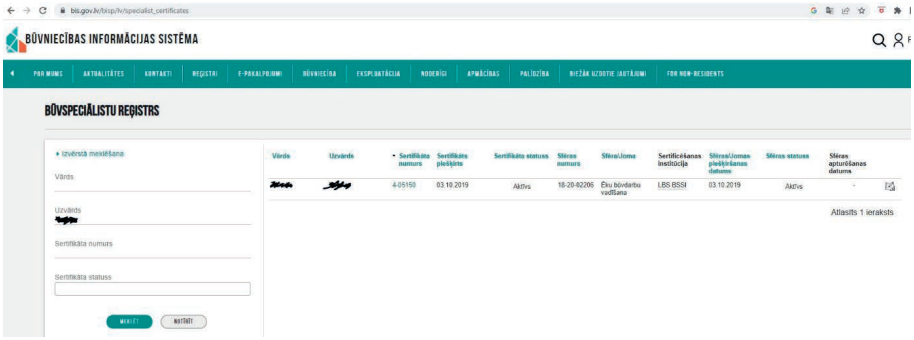
2. BIS (“Būvniecības Informatīvā Sistēma”) – construction information system. As in Latvia the civil engineering is a regulated sphere (i.e., to be able to work a specialist must pass regular certification), this system provides a base of professional certificate of each specialist and possibility to verify it. By that, each citizen may check on-line if a selected specialist has rights to perform the specific civil responsibility work (see Figure 3 below).

Figure 2: Screenshot from “EDLUS” on-line system, shows employees attendance at the construction site and connects this data to the State Tax Services. The screenshot shows the name of the project, construction permit number, ID, controller, access to check the attendance of the employees.



Source: www.latvijasbuvnieki.lv

Figure 3: Screenshot from “BIS” on-line system, showing the rights of the specific specialist perform respective works. The screenshot shows the name, surname, number of the certificate, status (active), type of the specific works, issue date.



Source: Būvnievības Infprmācijas sistēma (Construction Information System) available at bis.gov.lv

Some other systems are not mandatory however are frequently applied:

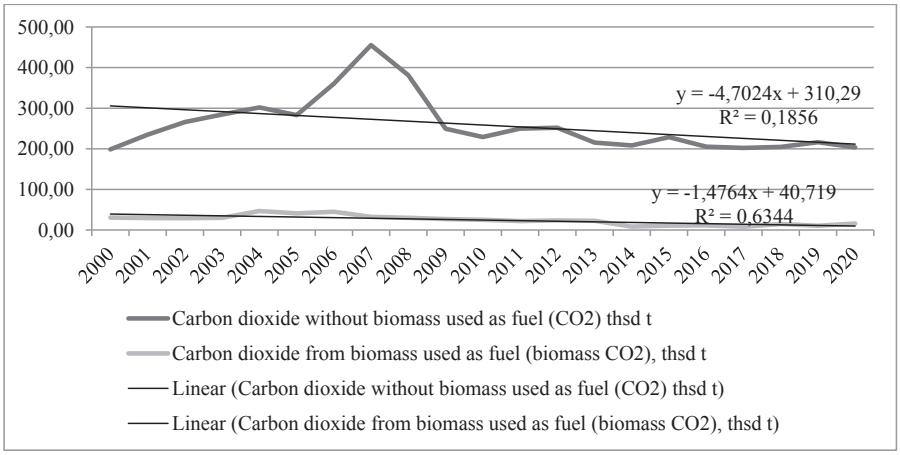
1. For example, project e-governance systems, allowing to conduct construction project management, processes and procedures, document flow on an electronic platform (e.g., “Bentley Project Wise”, “Aconex” etc.). In Latvia such solutions are most frequently applied in big-scale projects, providing transparency of carried activities. Usually, their application is mandatory not by state law, but by tender conditions which have to be respected for successful involvement in construction activities.

2. Implementation of BIM (“building information modelling”), which is defined as a modelling technology and a related set of processes that serve to create, communicate and analyse building models. BIM in construction project management should significantly improve the process and cover all areas of management (Ahmed, et al., 2022). BIM is widely used all over the world and in Latvia this software is actively promoted by State Real Estate bureau (“VNĪ”), who has elaborated a unified guidelines and requirements to be fulfilled in projects and tenders where BIM is applied.

5. Empirical data (documentation background) and analysis

Data are collected from database of Official statistics (Data are collected with the help of information from United Nations Framework Convention on Climate Change and Convention on Long-Range Transboundary Air Pollution reports as well as CSB data, emissions accounts are broken down by NACE Rev. 2 sections and households) (Official Statistics Portal, 2022) and analysed the tendency of development of carbon dioxide without biomass used as fuel (CO2) thsd t and carbon dioxide from biomass used as fuel (biomass CO2), thsd t. Data and trends of development are reflected at Figure 4.

Figure 4: Air emission accounts in construction (NACE Rev. 2) by air pollutants in 2000-2020 in Republic of Latvia



Source: Authors construction and calculations based on data of Official Statistics portal of

Data of Figure 4 indicate that indicators of CO2 emissions are reducing in Latvia in the analysed period in 2000 till 2020 in average annually by 1.48 thsd t from biomass used as fuel and by 4,7 thsd t without biomass used as fuel, but here were big fluctuations in the period of 2005 till 2009. As data indicate - in recent years situation is becoming for stable reduction of CO2 emissions in Latvia.

6. Results and discussion

Researchers have suggested several innovative and efficient approaches in CO2 emissions reduction in construction requiring deeper analysis of advantages and challenges as the best solutions could not been reached overnight and best shared findings could be adopted also in other countries.

The analyzed and evaluated in research results e-governance projects call for “usability and user-centered design”, since the ultimate beneficiary is the “user” and need to underline also the difference between users – rural development or business process consumers. But the real task of e-governance shall be focalized on a real “demand driven” concept and be aware of possible information “incubators” and frameworks where he might be in because of the bureaucratic set-ups or development agencies leading pilot projects.

7. Conclusions

Recent research results in CO2 emissions reduction in construction most are increasing activities and are discussed in theoretical and practical application results in China, Japan, South Korea, Sweden, Germany and some results are discussed also in Australia and in many European Union countries. Intensity of good practice sharing is increasing in recent years as the requirements of cleaner environment requires innovative and efficient solutions for CO2 emissions reduction in construction.

The analyzed and evaluated in research results e-governance projects call for “usability and user-centered design”, since the ultimate beneficiary is the “user” and need to underline also the difference between users – rural development or business process consumers. But the real task of e-governance shall be focalized on a real “demand driven” concept and be aware of possible information “incubators” and frameworks where he might be in because of the bureaucratic set-ups or development agencies leading pilot projects.

Several important steps are implemented in Latvia to get better organization of processes in construction with planned more efficient decrease of CO2 emissions in construction.

Indicators of CO2 emissions are reducing in Latvia in the analysed period in 2000 till 2020 in average annually by 1.48 thsd t from biomass used as fuel

and by 4,7 thsd t without biomass used as fuel, but here were big fluctuations in the period of 2005 till 2009.

References

1. Abanda, F.H., Oti, A.H., Tah, J.H. (2017). “Integrating BIM and new rules of measurement for embodied energy and CO2 assessment”. Journal of Building Engineering, Vol. 12, pp. 288–305.
2. Ahmed, M.E., Moataz, A.M. F., Abd El-hafez, L.M. (2022). “Using BIM as a lean management tool in construction processes – A case study”, Ain Shams Engineering Journal, Vol. 13, No. 2, 101556.
3. Alkis, N., Caldag, M.T., Gokalp, E. (2019). “An Integrated Holistic Success Model for Evaluating Smart City Initiatives”. Proceedings of the 2019 International Conference *Internet Computing and Internet of Things*, CSREA Press.
4. Benhelal, E., Shamsaei, E., Rashid, M.I. (2021). “Challenges against CO2 abatement strategies in cement industry: A review”, Journal of Environmental Sciences (China), Vol. 104, pp. 84-101.
5. Chen, F., Yang, Q., Zheng, N., (...), Chen, G., Kleissl, J. (2022). “Assessment of concentrated solar power generation potential in China based on Geographic Information System (GIS)”, Applied Energy, Vol. 315, No. 119045.
6. Choi, Y., Kobashi, T., Yamagata, Y., Murayama, A. (2022). “Assessment of Waterfront Office Redevelopment Plan on Optimal Building Arrangements with Rooftop Photovoltaics: A Case Study for Shinagawa, Tokyo”, Energies, Vol. 15, No 3, 883.
7. Daljit Singh, J.K., Molinari, G., Bui, J., (...), Rajarathnam, G.P., Abbas, A. (2021). “Life cycle analysis of disposed and recycled end-of-life photovoltaic panels in Australia”, Sustainability, Vol, 13, No. 19, 11025.
8. Dębkowska, K., Dymek, Ł., Kutwa, K., (...), Ryciuk, U., Szewczuk-Stępień, M. (2022). “The Analysis of Public Funds Utilization Efficiency for Climate Neutrality in the European Union Countries”, Energies, Vol. 15, no. 2, 581.
9. Droegehorn, O., Sarmento, H.R. (2019). “Improving Smart Buildings by integrating User contexts”. Proceedings of the 2019 International Conference *Internet Computing and Internet of Things*, CSREA Press, pp. 3-9.
10. Farahzadi, L., Kioumarsi, M. (2022). “Intelligent Initiative to Reduce CO2 Emissions in Construction”, Proceedings of World Congress in Computational Mechanics and ECCOMAS Congress. Oslo, June 5-9, 2022.
11. Farahzadi, L., Kioumarsi, M. (2023). “Application of machine learning initiatives and intelligent perspectives for CO2 emissions reduction in construction”. Journal of Cleaner Production, Vol. 384, 135504.

12. Kumbhar, M.A., Kumbhar, A.D., Gavekar, V. (2010). “Semantic Web for E-Governance” Journal of Algorithms & Computational Technolog*y*. Vol. 4, No. 4, pp. 533 – 553.

13. Liu, S., Tao, R., Tam, C.M. (2013). “Optimizing cost and CO2 emission for construction projects using particle swarm optimization”, Habitat International, Vol. 37, pp. 155-162.

14. Liu, Y., Wang, J., Wang, X., (...), Guo, F., Song, Y. (2022). “A study of CO2 emissions in China’s domestic construction industry based on non-competitive input-output”, Sustainable Production and Consumption, Vol. 22., pp.743-754.

15. Marzouk, M., Elahaboury, N. (2022). “Science mapping analysis of embodied energy in the construction industry”, Energy Reports, Vol. 8, pp. 1362-1376.

16. Mishra, H., Hiremath, B. N. (2006). “Citizen-Led Participatory E-Governance Initiatives: An Architectural Perspective”, Metamorphosis, Vol. 5, No.2, pp. 133–148.

17. Official Statistics Portal of Republic of Latvia (2022) “Air emission accounts (NACE Rev. 2) 2000 – 2020”, Available at < https://data.stat.gov.lv/pxweb/en/OSP_PUB/START__ENV__GP__GPE/GPE010/> [Accessed May 15,.2022]

18. Ogungbile, A.J., Shen, G.Q., Xue, J., Alabi, T.M. (2021). “A hypothetical extraction method decomposition of intersectoral and interprovincial CO2 emission linkages of China’s construction industry”, Sustainability, Vol. 13, No. 24, 13917.

19. Pokhrel, S., Amiri, L., Poncet, S., Sasmito, A.P., Ghoreishi-Madiseh, S.A. (2022). “Renewable heating solutions for buildings; a techno-economic comparative study of sewage heat recovery and Solar Borehole Thermal Energy Storage System”, Energy and Buildings, Vol. 259, No. 111892.

20. Saieg, P., Sotelino, E.D., Caiado, R.G.G. (2018). “Interactions of Building Information Modeling, Lean and Sustainability on the Architectural, Engineering and Construction industry: A systematic review”, Journal of Cleaner Production, Vol. 174, pp. 788-806.

21. Shin, B., Kim, S. (2022). “CO2 emission and construction cost reduction effect in cases of recycled aggregate utilized for nonstructural building materials in South Korea”, Journal of Cleaner Production, Vol. 360, 131962.

22. The Digital Government Factsheet Latvia prepared for the European Commission, 2019. Available at <https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_Latvia_2019.pdf> [Accessed 19.06.2023]

23. United Nations Environment Program (2022). 2022 Global Status Report for Buildings and Construction: Towards a Zero-emission, Efficient and Resilient Buildings and Construction Sector. Nairobi, p.52. Available at <https://www.unep.org/resources/publication/2022-global-status-report-buildings-and-construction> [Accessed 19.06.2023]

24. Yang, Z., Fang, H., Xue, X. (2022). “Sustainable efficiency and CO2 reduction potential of China’s construction industry: application of a three-stage virtual frontier SBM-DEA model”, Journal of Asian Architecture and Building Engineering, Vol. 21, No.2, pp. 604-617.

25. Zeng, T., Jin, H., Geng, Z., Kang, Z., Zhang, Z. 92022). “The Effect of Urban Shrinkage on Carbon Dioxide Emissions Efficiency in Northeast China”, International Journal of Environmental Research and Public Health, Vol. 19, No. 9, 5772.

CHAPTER 17

Agency in Pharmaceuticals

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ABSTRACT

In recent decades, due to the growing problems of information asymmetry and measurement of work performance, the agency problem has become even more evident than before and is also present in many business relationships, not only between owner (principal) and manager (agent). This is particularly evident in companies where business success depends on intellectual labor, teamwork, and other forms of hard-to-measure work, where the agency problem can be recognized between managers (as principals) and key sales representatives (account managers) (as agents). In addition to the familiar cases of insurance salespeople and account managers in B2B telecommunications, this is certainly the case in the pharmaceutical industry, where key customers, such as pharmacies and physicians, are persuaded or pressured by competing pharmaceutical companies. Agents who deal with key customers on behalf of a pharmaceutical company work very autonomously, are relatively difficult to monitor by their superiors (principals), and the best of them are difficult to retain (bond). Therefore, dealing with the agency problem that occurs in this industry is key to their business success and a good showcase for several similar situations. The objective of this article is to determine the relationship between the level of agency costs, both monitoring and bonding, and the motivation and satisfaction of the employees of a pharmaceutical company. Thirty sales representatives of a pharmaceutical company were surveyed. Data were collected on employee motivation and key motivators, various influences on job performance, possible reasons for changing companies, etc. The results provide insight into the impact of the company's investment in monitoring and bonding sales force employees on their motivation and performance.

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JEL classification: *D82, M54*

1. Introduction

This paper focuses on the relationship between manager and sales agent in the pharmaceutical industry, viewed through the theoretical framework of agency theory. Although the initial focus of agency theory was on the relationship between the owner (principal) and the manager (agent) in the firm, it was later extended to other types of relationships, including the relationship between supervisors and subordinate employees.

The basic premise of the agency relationship and the occurrence of agency costs is the imperfect alignment of interests between the principal and the agent, which leads to potentially opportunistic behavior due to information asymmetry. In the pharmaceutical industry, the typical focus of the sales agent is on maximizing sales, since his personal income depends on the sales he generates. The manager's perspective on success is more complex, as he or she seeks various other goals in addition to sales (cost efficiency, profitability, market share, etc.). In this particular relationship, agency problem can still arise due to the manager having limited ability to control the sales agent's behavior, and therefore there is a possibility that he may overspend or shirk while on the job. Thus, the sales agent maximizes his utility while the company bears unnecessary costs that could be eliminated or reduced with minimal loss of sales efficiency.

For this research, we conducted a survey involving 30 sales agents in a pharmaceutical company in Croatia. Based on agency theory, the aim of this paper is to examine some of the factors that influence the relationship between manager and sales agent and to determine whether agency costs, if they can be identified, influence the reduction of potential opportunistic behavior by the sales agent.

This paper is organized as follows. After a brief introduction, we provide a literature review of agency theory with the special emphasis on pharmaceuticals. The third part of the paper describes the methodology used, while the fourth part introduces the data used and then presents the results of the conducted research. The paper ends with a discussion and a conclusion.

2. Literature review

The theoretical background for this study lies in agency theory, i.e., the relationship between two contracting parties, the company manager (principal) and the sales agent (agent) in the pharmaceutical industry.

Agency theory from the perspective of Jensen and Meckling (1976) interprets the principal-agent relationship through the relationship between the owner and the manager of the company. According to Jensen and Meckling, the agency relationship implies a relationship in which the principal delegates a certain level of decision-making authority to an agent. The problem with agency relationships lies in the information asymmetry in favor of the agent, which can lead to the agent's potentially opportunistic behavior. Opportunism is expected due to the theoretical assumption of self-interest behavior and

the notion that it could be resolved through careful and deliberate contracting (Cohen & Holder-Webb, 2006). The focus of agency theory is therefore on creating a relationship that minimizes opportunistic behavior on the part of the agent, i.e., ensures behavior on the part of the agent that is consistent with the interests of the principal.

Also, agency theory expects that contract between principal and the agent will be incomplete. From the theoretical point of view, all contracts are incomplete due to bounded rationality, which disables pre-forecasting all potential future events, and information asymmetry (Hart, 2017).

According to Jensen (1986), the principal cannot ensure that the agent makes decisions that are in the best interest of the principal at zero cost. Therefore, the principal-agent relationship is governed by a compensation mechanism through which the principal maximizes its utility by optimally structuring three types of agency costs: monitoring costs, bonding costs and residual losses. Through monitoring costs, the principal attempts to limit the agent's opportunistic behavior. In addition, the principal may allow the use of firm resources to minimize the agent's behavior that is incompatible with the principal's interests.

Monitoring and bonding expenditure move in opposite directions, i.e., the increase in control costs is accompanied by a decrease in bonding costs and vice versa. Even with control and bonding, there is still the possibility of divergence between the principal's and the agent's decisions, resulting in residual losses-costs that cannot be eliminated or their elimination is not economically justified.

The principal-agent model has been widely accepted and discussed in academia and has been extended over time to apply the classical position, where the principal is the owner and the agent is the manager, to other relationships. Hill and Jones (1992) argue that agency theory can be used to explain the nature of contractual relationships among a firm's stakeholders such as employees, customers, suppliers, and others. This idea arises from the central position that a manager occupies in a nexus of contracts, that is, in a collection of contracts between parties (stakeholders) that together constitute a firm. In their argument, managers of a firm occupy a unique role because they stand in the nexus of contracts that constitutes the firm and are the only party who enter into contractual relationships with all other stakeholders. The stakeholder-agency approach represents a generalization of the principal-agent problem, where the maximization of utility demanded by employees, customers, or suppliers reduces the pool of resources that could be used to maximize the growth rate of the firm. Therefore, this view emphasizes a conflict between managers and all other stakeholders. Therefore, other authors following this approach have applied the agency problem in analyzing the relationships between the parent company and its subsidiaries (Mudambi & Pedersen, 2007), the relationships between manufacturer and distributor (Lassar & Kerr, 1996; Katunar et. al., 2022), and the relationships between buyer and supplier (Mishra et al., 1998; Whipple, Roh, 2010; Steinle et al., 2014; Yan, Kull, 2015; Yang, 2016), where the supplier has the advantage of information asymmetry.

In this paper, the analysis focuses on conflicts of interest between managers and sales agents, the most influential group of employees in the wholesale of pharmaceutical products. Recent relevant research addressing agency costs in the pharmaceutical industry has taken several directions: Xujin, Shuxing, and Jing (2020) use the model to compare direct sales, resale, and agency sales; Hasan, Molla, Khan (2019) analyzed the relationship between corporate governance elements and audit committee characteristics (audit committee size, independence, and expertise) with profitability, Yoon (2017) analyzed the relationship between the pharmaceutical industry and the medical profession in the stakeholder agency theory argument explained above, while Tang (2016) and Tang and Wo (2020) addressed double agency problem between physicians, patients, and pharmacists.

Our focus on the relationship between sales agents and the management of their firms stems from the specific power relations between these groups in firms and in industries where financial outcomes are strongly influenced by salespeople's motivation and skills. We believe that there are commonalities between sales agents share with prize fighters. Prize fighter is a term commonly associated with professional boxers, kickboxers, mixed martial artists, and athletes in other professional combat sports. Their distinctive feature is that their income is directly dependent on their individual in-ring results in a fight with a competitor. In the business world, similar rules apply to sales agents (salesmen in the real estate, insurance, telecommunications, pharmaceutical industries, etc.): unlike most of their colleagues in stores, their prize (salary and other benefits) is a direct result of their individual sales success. This specificity is the result of their involvement in a highly competitive environment, where field work with their clients (visiting their clients and potential customers) that selling agents do have the largest contributions to their performance. High work performance in a described environment is not easy for most workers to learn and maintain, so the performance of selling agents is usually directly related to their earnings. Therefore, we can consider sales agents as prize sellers.

However, although their earnings are the direct result of their sales performance, sales agents in the pharmaceutical industry usually cannot be efficiently managed by work performance alone as a coordination mechanism. The high proportion of field work performed by sales agents makes it at least partially impossible for their supervisors to coordinate through direct supervision - i.e., the effectiveness of monitoring their work is more limited than for most other positions within a company (hierarchy). This increases the likelihood of undesirable behavior by salespeople, such as on-the-job consumption, shirking, etc. Differences in utility maximization goals between selling agents and their management therefore lead to agency problems and, consequently, agency costs.

3. Methodology

Although agency theory is well established in academia, attempts to conduct an empirical analysis of inefficiency that is the result of misalignment

of interests between principal and agent are always challenging. In this research, we conducted a series of interviews with managers and other employees of the Croatian branch of a multinational pharmaceutical company and then created a questionnaire covering all sales agents within this branch. The interviews with the managers allowed us to shed light on their perspectives regarding the effectiveness of their control mechanisms and the establishment of a balance between monitoring and bonding costs. The survey of sales agents conducted through the questionnaire allowed us to better understand their perspectives on the same issues. The data obtained from the questionnaire were analyzed using appropriate descriptive statistics methods, some of which are presented in the following part of this paper. Although all 30 sales agents in the branch participated in the survey, some of the methods we used (Mann-Whitney and Kruskal-Wallis nonparametric tests) unfortunately did not yield statistically significant results due to the relatively small sample size.

4. Empirical data and analysis

For this research, we have chosen a foreign pharmaceutical company that has been in existence for over 120 years, while its branch in Croatia has been operating for over 10 years. The company's branch has experienced constant growth since its arrival in Croatia. In the last 4 years, operating revenues increased by more than 250%, while operating expenses increased by almost 270% due to the COVID-19 situation. During the same period, the number of employees increased by only 22%. The company has made a profit during the entire period under review.

During our research, 30 sales agents filled out our questionnaire, while interviews were conducted with a manager. 60% of the respondents are women and 40% are men. 60% of the respondents are between 31 and 40 years old, 23% are younger than 30 years and only 17% are older than 41 years. Most of the employees (40%) have been working in the Croatian establishment between 6 and 10 years, 33% have been working there for less than 5 years, while only 24% have been working for more than 10 years. These data are not surprising, considering that the company branch is constantly growing and hiring new employees, while it has been operating in Croatia for just over 10 years. All employees have a college degree (bachelor's or master's), while only one employee has a scientific master's degree or PhD.

In discussions with the branch manager, after explaining the theoretical idea of agency costs, we jointly tried to identify these costs in their branch. As the main contributors to the costs of monitoring the sales agents, we identified their two complementary IT systems, the cost of hiring IT an expert to maintain the systems, and the cost of hiring four area managers whose main task is to monitor the work of their 30 sales agents. In addition, there are the costs of maintaining cycle meetings, which the manager considers to be a control cost rather than a bonding oriented cost. As expected, bonding costs were much fuzzier and therefore more difficult to determine. In the end, in estimating

bonding costs, we included the bonuses that sales agents receive, as well as leasing costs and the ongoing costs of the cars that sales agents use. It is easy to argue that a car is not a bonding cost for a sales agent's work, but a normal car. However, since a car is automatically provided to each sales agent regardless of their current needs, and this car is available for both work and personal use (with very few restrictions), it can be considered a bonding cost. Otherwise, if the company were seeking cost-effective use of its vehicles, it could limit their number and availability to only those instances when an agent needs a vehicle for field work. However, the company does not have data on the cost portions of its vehicles that can be associated with sales efforts as opposed to bonding costs. Some residual agency costs for on-the-job consumption have been overlooked because they are difficult to estimate and monitor. These costs include unnecessary representation expenses and similar inefficiencies.

Comparing the average annual amount of identified representation costs to the operating costs of the Croatian office in 2019 (the last year before the Covid-19 outbreak and the irregularities it caused), their share is up to 7.4% of all expenses. The share of monitoring costs amounts to 3.45%. It should be noted that the cost of hiring four area managers accounts for more than half of these costs, which is doubtful, since undoubtedly not all the work of area managers can be related to the monitoring of sales agents. The cost of bonding reaches up to 3.98% of the total expenses of the branch. If dubious motor vehicle costs were converted so that only one-third of their total value was attributable to real bonding costs (meaning that ⅔ of motor vehicle costs are regular business-related expenses), the percentage of the bonding cost in total operating expenses would drop to 3%. Although these percentages for agency costs seem modest and acceptable, it should be noted that they do not include the above-average salaries of sales agents, as they are considered regular business expenses for the demanding tasks of prize sellers.

In the second part of the empirical research we conducted a questionnaire among sales agents (the structure of the sample is shown in Table 1). The questionnaire was created via Google Forms in April 2021 and answered by all sales agents (account managers) at the same hierarchical level in the Croatian branch. All respondents have higher education, most of them (28) have a master's degree.

Table 1: Structure of respondents in the survey

Total	**30**
male	12
female	18
Average overtime (weekly)	
2-4 h	19
4-8 h	9
8-10	2
Age	
25-30	7
31-40	18
>40	5

The lack of statistically significant differences among the analyzed subgroups of respondents indicates that the size of the sample limits the depth of the possible analysis. Although we are aware of this limitation, increasing the size of the sample in this research was not possible. Expanding the research to other companies, even in the same industry, would mean analyzing other contractual relationships (different nexus of contracts), which would not serve the intended purpose.

5. Results and discussion

Job satisfaction among sales agents is high, with more than half of the respondents giving it the highest rating (Figure 1). Although some differences were observed between the groups on selected criteria (Table 2), the nonparametric statistical tests performed showed no statistically significant differences.

Figure 1: Work satisfaction

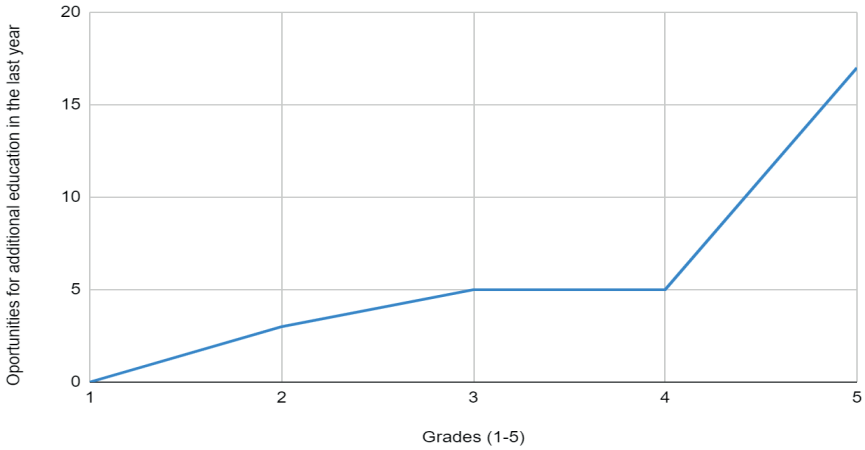


Table 2: Work satisfaction (grades 1-5 with 5 being the highest)

Average all	4.07
St. dev.	0.83
Male	4.17
Female	4.00
2-4 h of overtime	4.05
4-8 h of overtime	4.22
8-10 of h overtime	3.50

In evaluating their motivation for work assignments, respondents still chose high scores, with the highest score again being mode (Figure 2), but on average across the general sample and all but one subgroup, the results were slightly lower than for overall job satisfaction (Table 3).

Figure 2: Motivation for work assignments

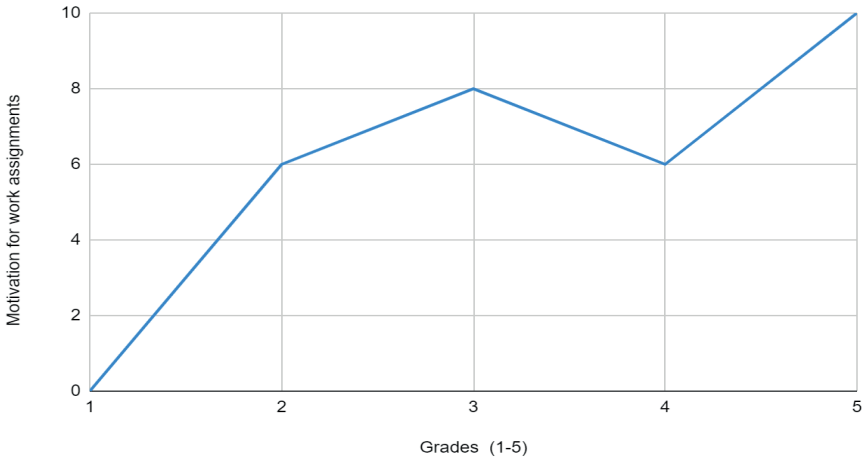


Table 3: Motivation for work assignments

Average all	3.67
St. dev.	1.15
Male	3.92
Female	3.50
2-4 h of overtime	3.32
4-8 h of overtime	4.44
8-10 of h overtime	3.50

The lowest average value (3.17) in this set of questions was found in the evaluation of opportunities for personal development (Figure 3 and Table 4). The results between the groups are very similar, so it seems that although prize sellers are satisfied with their job, they do not perceive it as good for their own development.

Figure 3: Opportunities for personal development

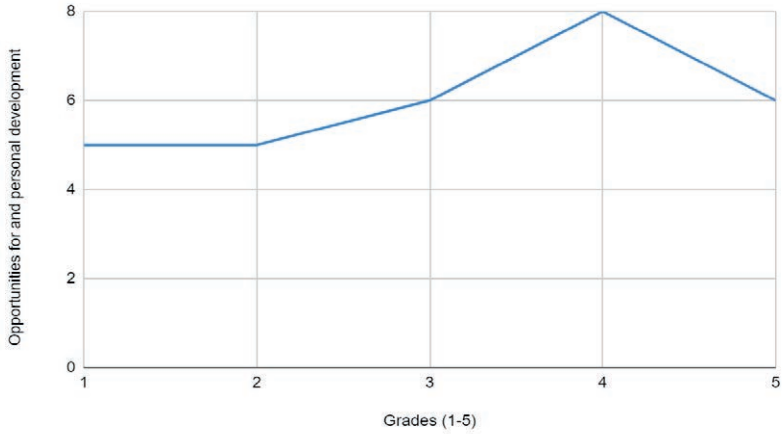
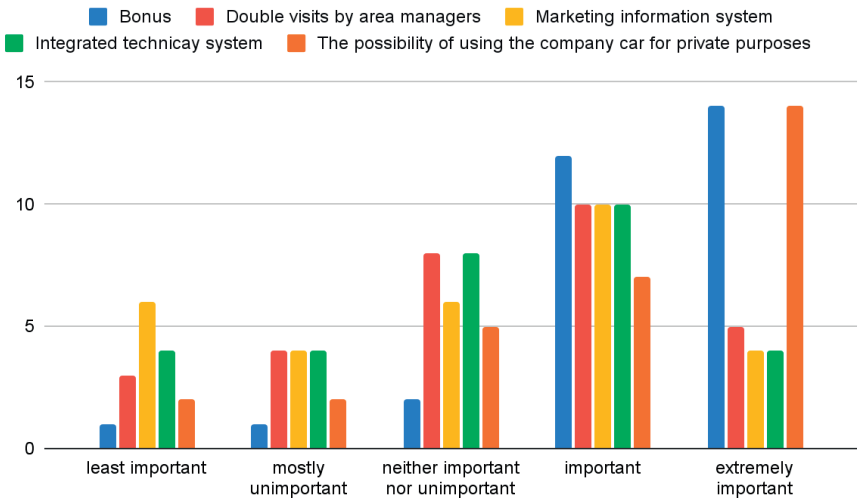


Table 4: Opportunities for personal development

Average all	3.17
St. dev.	1.39
Male	3.17
Female	3.17
2-4 h of overtime	3.05
4-8 h of overtime	3.44
8-10 of h overtime	3.00

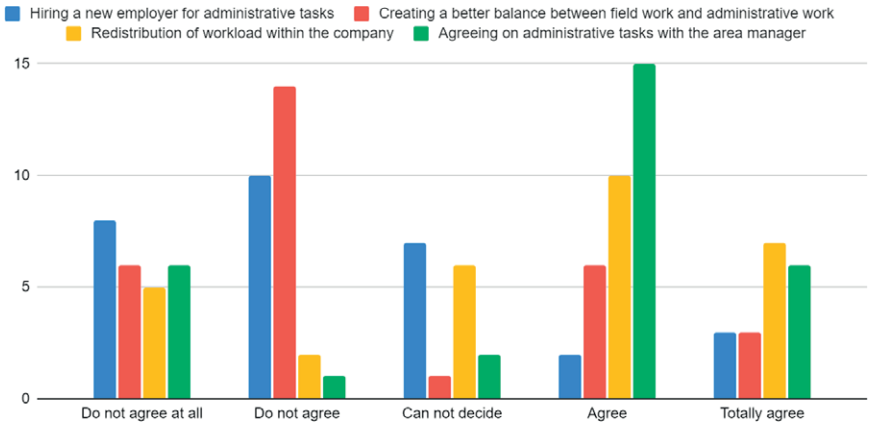
The perceptions of various mechanisms that we identified as part of the agency costs are shown in Figure 4. The bonus and the possibility to use the company car also for private purposes were part of the identified bonding costs, while IT systems and monitoring are part of the control costs. It can be seen that all mechanisms were perceived as at least important (with mode being either important or extremely important to all). However, the bonus and vehicle use mechanisms (i.e. bonding mechanisms) were rated as at least as important (i.e. important or very important) by 87% and 70% of respondents, respectively, while other mechanisms were rated as important (or more) by 50% of respondents or less.

Figure 4: The perceived importance of various bonding and monitoring mechanisms



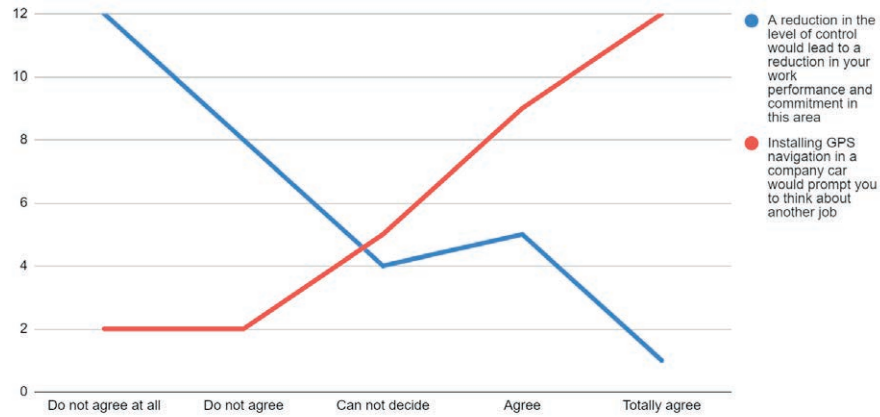
Since the interview results showed that sales agents find administrative work to be the least satisfying part of their job and work that limits their potential sales performance, a number of questions in the questionnaire were directed at weighing possible solutions to reduce their administrative workload. It may come as something of a surprise that 70 and 57 percent of respondents, respectively, cited “agreeing on administrative tasks with the area manager” and “redistributing workload within the company” as options they agreed (or strongly agreed) with. At the same time, the majority of respondents rejected the proposed options of hiring additional administrative staff and creating a better balance between field and administrative work. This suggests that sales agents do not think there is too much administrative work in general, but simply that some of their administrative work should be reallocated to their area managers. This conclusion could be consistent with the fact that area managers are perceived by managers as having primarily the function of supervising rather than supporting the sales staff.

Figure 5: Weighing the proposed options to decrease the amount of administrative workload



The curves in Figure 6 show sales agents' perception of being monitored. The sloping curve (blue line) shows that respondents do not believe that decreasing levels of supervision would lead to lower job performance, i.e., they do not believe that their job performance is affected by supervision. At the same time, although they previously indicated high job satisfaction, they would consider switching if the company installed GPS tracking systems in the company cars they use.

Figure 6: The perception of monitoring



6. Conclusions

The theoretical contribution of this paper stems from the identification of monitoring and bonding costs in the relationship between sales agents and managers in the pharmaceutical industry. The results of our research show that the manager (principal) employs monitoring and bonding mechanisms to align his interests with the interests of the sales agents on whose job performance he also depends.

To conduct this research, we have chosen the pharmaceutical industry because of its specificity. As mentioned earlier, the sales agent's earnings are directly related to his efficiency (by maximizing sales), which could lead to the conclusion that the interests of the sales agent and the manager are identical. However, maximizing sales is not the manager's only interest, leading to potentially opportunistic behavior by the sales agent. Considering the fact that field work, which constitutes the majority of the sales agent's work, entails a lower possibility of direct control and a greater degree of freedom for a sales agent, we concluded that agents in this industry are not used to control mechanisms and are not willing to accept them without disapproval. Because of the special nature of the work, the sales agent responds better to bonding mechanisms. Effective control is more meaningful and easier to enforce in simpler technical occupations where contracts are more complete due to standardization of procedures. In the observed pharmaceutical company, the manager relies more on bonding mechanisms, the most important of which for sales agents are bonuses and the use of cars for personal purposes. Recognizing the relative inefficiencies of monitoring results in significant savings for the manager and an increase in employee satisfaction.

These results are inconclusive due to the limited sample size, but to some extent confirm our assumption that sales agents are prize sellers, i.e., that their job performance is primarily incentivized by prize rather than monitoring. It could be reasonably argued that most workers would rather receive a prize than a control for their efforts. However, sales agents who want to be successful at their jobs must have above-average persistence and social intelligence. In addition, in the pharmaceutical industry and other industries that require knowledge and education to sell products, along with the need for field operations, effective supervision could prove difficult and expensive. Therefore, in an effort to minimize the overall agency cost in a relationship between managers and sales agents, it is beneficial for all parties to opt for bonding. This is especially true for successful companies in profitable industries.

Our recommendations for further research include selecting a larger company for analysis (to increase the sample size) and conducting a survey on more than one company. Also, to draw better conclusions about the impact of agency costs on aligning the interests of principals and agents, data for more than one year could be beneficial. Increasing the size of the sample within a firm and increasing the number of included firms would allow the use of better statistical and econometric tools.

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References

1. Cohen, J. R. & Holder-Webb, L. (2006) “Rethinking the Influence of Agency Theory in the Accounting Academy”, Issues in Accounting Education, Vol. 21, No. 1, pp. 17-30.
2. Hill, C.W. & Jones, T. M. (1992) “Stakeholder-agency Theory”, Journal of Management Studies, Vol. 29, No. 2, pp. 131-154.
3. Hasan, M.T., Molla, M. S. & Khan, F. (2019) “Effect of Board and Audit Committee Characteristics on Profitability: Evidence from Pharmaceutical and Chemical Industries in Bangladesh”, Finance & Economics Review, Vol. 1, No. 1, pp. 64-76.
4. Hart, O. D. (2017) “Incomplete Contracts and Control”, American Economic Review, Vol. 107, No. 7, pp. 1731-1752. DOI: 10.1257/aer.107.7.1731.
5. Jensen, M.C. & Meckling, W.H. (1976) “Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure”, J. Financ. Econ., Vol. 3, pp. 305–360.
6. Jensen, M.C. (1986) “Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers”, Am. Econ. Rev., Vol. 76, pp. 323–329.
7. Katunar, J., Kaštelan Mrak, M. & Zaninović, V. (2022) “Implications of Mediated Market Access—Exploring the Nature of Vertical Relationships within the Croatian Wine Industry”, Sustainability, Vol. 14, No. 645, pp. 1-16, https://doi.org/10.3390/su14020645
8. Lassar, W. M. & Kerr, J. L. (1996) “Strategy and Control in Supplier – Distributor Relationship: An Agency Perspective”, Strategic Management Journal, Vol. 17, pp. 613-632.
9. Mishra, D. P. et. al. (1998) “Information Asymmetry and Levels of Agency Relationships”, Journal of Marketing Research, Vol. 35, No. 3, pp. 277-295.
10. Mudambi, R. & Pedersen, T. (2007) “Agency Theory and Resource Dependency Theory: Complementary Explanations for Subsidiary Power in Multinational Corporations”, SMG Working Paper No. 5.
11. Steinle, C. et. al (2014) “Information Asymmetries as Antecedents of Opportunism in Buyer-Supplier Relationships: Testing Principal Agent Theory”, Journal of Business-to-Business Marketing, Vol. 21, No. 2, pp. 123- 140.

12. Thang, M. C. (2016) “Medical Provider Agency and Pharmaceutical Demand with Universal Coverage: Evidence from Taiwan”, Available at SSRN: https://ssrn.com/abstract=2872116, http://dx.doi.org/10.2139/ssrn.2872116

13. Thang, M. C. & Wu, Y. N.(2020) “Medical providers as double agents in a universal health care system: evidence from generic pharmaceutical adoption in Taiwan”, Empire Econ, Vol. 59, No. 1, pp. 169–203, https://doi.org/10.1007/s00181-019-01674-9

14. Whipple, J. M. & Roh, J. (2010) “Agency Theory and Quality Fade in Buyer Supplier Relationships”, The International Journal of Logistics Management, Vol. 21, No. 3, pp. 338-352.

15. Xujin, P., Shuxing, S. & Jing, S. (2020) “Direct Selling, Reselling, or Agency Selling? Manufacturer’s Online Distribution Strategies and Their Impact”, International Journal of Electronic Commerce, Volume 24, No. 2, pp. 232-254, https://doi.org/10.1080/10864415.2020.1715530

16. Yan, T. & Kull, T. J. (2015) “Supplier Opportunism in Buyer-Supplier New Product Development: A China - U.S. Study of Antecedents, Consequences, and Cultural/Institutional Contexts”, A Journal of the Decision Sciences Institute, Vol. 46, No. 2, pp. 403-456.

17. Yang, Y. (2016) “Reframing Buyer-Supplier Agency Problems Beyond the Dyad”, doctoral dissertation, Arizona State University

18. Yoon, P. K. (2004) “An Agency Theory Perspective On Physician Interactions With The Pharmaceutical Industry”, Academy of Management Proceedings, Published Online:13 Dec 2017, https://doi.org/10.5465/ambpp.2004.13863045

CHAPTER 18

The analysis of the application of digital marketing in shipping companies[1]

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ABSTRACT

The opportunities offered by digital marketing are beneficial to all parties involved, both providers and users. Through various forms of digital marketing, shipping companies can grow their business and attract future employers and customers. Although the shipping industry is not always visible to customers, its services enable smooth and efficient international trade. The large amount of activity in international trade and shipping makes it necessary to take advantage of digitization, which enables direct connection and seamless communication within the supply chain. Shipping companies operate in the B2B sector. However, the question arises whether the application of digital marketing, both B2B and B2C, can be beneficial to their business. Therefore, the aim of this study is to investigate the application of digital marketing in the case of shipping companies operating in global international trade. A qualitative analysis is used as the research method to investigate the application of digital marketing in practice. The analysis is based on the case studies of five global shipping companies that use different digital marketing tools to promote their business, target customers and increase their visibility. The findings show that, as in marketing theory, digital marketing benefits companies, in this case shipping companies. Furthermore, the findings show us that most successful shipping companies build their digital marketing on social media platforms and use a B2C marketing approach that proves successful. This work contributes to the existing knowledge of digital marketing in the shipping industry, which has been underestimated

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in academic literature and practice. The promotion of shipping companies would not be possible and successful without the existence of various forms of digital marketing.

Key words: *digitalization; digital marketing; shipping industry; international trade*

JEL classification: *M160, M310, M370*

1. Introduction

Shipping companies deal with the transport of a parcel to its destination. They are working with different kinds of products, which are sold to consumer, business or government organizations. Basically, the whole process of their activities goes through three major stages: receiving the order – processing the order – fulfilling the order (Ortolani, 2022). The shipping industry provides benefits to consumers that can't get ignored. As a result, the international shipping industry is booming, largely to the ever-increasing e-commerce business. It has grown hand-in-hand with the amount of online shopping consumers are doing. Professional and experienced full-service shipping companies wear many hats. These fill gaps and act as the glue that holds the entire supply chain together (BR Williams, 2022).

According to Deccan Chronicle (2022) more than 80% of world trade relies on ocean shipping to transport goods from one port to another and from one country to another. Also, according them the shipping industry will need about 4.5 trillion to achieve net zero-emission by 2050 and around $500 billion by 2030. While under more ordinary circumstances the role of transportation remains somewhat invisible, new research is finding how the market for shipping services can influence trade flows, the products that countries sell abroad, and the way in which price shocks reverberate through trade (Kalouptsidi, 2021).

Digital marketing, that is, online marketing, helps the company in its promotion, communication with consumers via the Internet and other forms of digital communication, which also applies to shipping companies. Every digital presence of the company is benefit for them, and nowadays there are more and more forms for them to show themselves. Digital marketing is becoming more popular among shipping companies. More recently, shipping companies have a practice of hiring digital marketers to help develop and implement marketing strategies on social networks, websites, and other online platforms. They use social media to collect data from their clients and use it as a forum for providing improvement recommendations. This improved transparency demonstrates the company's willingness to communicate with its customers, enhancing its authority.

Although the analysis of digital marketing is very present in research, there is little literature that examines the application of digital marketing in the case of shipping companies. Considering the importance of the shipping industry from a business perspective, but also from an ecosystem sustainability perspective, it is important to communicate their business with an audience, and the best channel to do so is digital. Thus, the aim of this study is to investigate the application of digital marketing in the case of shipping companies operating in global international trade. Through the analysis of five shipping companies, i.e., the analysis of their digital presence, it can be observed how much the digital presence of the companies as well as the quality content of the digital marketing strategy help to improve the visibility, recognition of the brand as well as the connection with the end consumers, both businesses and end consumers.

The paper consists of five parts; after the introduction, the literature is reviewed. The third part explains the main advantages that shipping companies have in their existence by using digital marketing tools and strategies. The fourth part provides an overview of the methodology used in the research. The last part gives an overview of the findings obtained and their implications.

2. Literature review

Digital marketing is the process of marketing products or services to potential customers via digital channels and the internet. Digital marketing has the same goals as traditional marketing, however the only difference is the medium used to convey the marketing message. Because of the larger potential reach at affordable prices, the scope of digital marketing is quite promising with abundant opportunities in the future. Digital marketing goes beyond traditional marketing and permeates almost all business activities and is becoming more strategic (Backhtieva, 2017). Companies have the opportunity to use various digital marketing tools, such as search engine optimization (SEO), social media marketing (SMM), email marketing, search engine marketing (SEM), content creation, and more, to promote their brand to their potential consumers or to engage their customers (Shah, 2020). As Oz mentions, digital marketing has allowed brands to emerge and gain momentum faster than ever before (Oz, 2019). By using various digital marketing tools, they are able to communicate with potential and existing customers and, more importantly, increase the visibility of their brand. Thomas (2022) cites a number of benefits that digital marketing offers to businesses, from lowering advertising costs, reaching a larger audience, targeting the ideal consumer, and communicating with consumers on a daily basis. Considering all the possible digital marketing tools available to businesses, their use is imperative.

According to Salo (2022), the consumer buying experience is very important and something that companies will have to pay special attention to in the future. Therefore, digital marketing will help create this customer experience with the help of various tools.

The online presence of consumers, as with other businesses, requires that shipping companies prepare and implement a digital marketing strategy that will allow them to achieve most of the goals they have set. When preparing their digital marketing strategy, it is very important to pay attention to social media as a tool. Recently, many companies have used social media as a tool to support their marketing activities and have realised the benefits of two-way online communication (Michaelidou et al., 2011). It is important for companies to revise and change the digital marketing strategy once it has been established, i.e., to update it with the new developments in the world. (Katsikeas et al., 2020).

3. Digital Marketing techniques in shipping companies

The shipping industry is the main link between consumers and producers. Most producers of various products have an online presence, which means they apply a digital marketing strategy. As part of the digital marketing strategy, companies have a variety of techniques and tools at their disposal to achieve different goals, such as: Brand recognition and increased visibility; constant communication with consumers (consumers and companies); targeting the ideal consumers.

As mentioned earlier, there are a number of marketing techniques and tools a company can use, but the best and most useful digital marketing strategies for shipping companies have proven to be search engine optimization and social media marketing. Search engine optimization is about increasing the quality and quantity of website traffic by manipulating keywords and search terms that potential customers use. SEO-optimised websites appear as “organic” search results. An organic search result is one that ranks high because of its content and not because it is a paid advertisement (MarineSeo, 2020).

Social media marketing, the most widespread form of digital marketing, is now the norm. To make your customers feel like they know you up close, you need to share stories about your business on social media in the form of infographic videos and creatively presented static posts. The logistics and shipping industry benefits tremendously from social media platforms like LinkedIn, YouTube, and Instagram. In fact, 91% of B2B marketers distribute content on LinkedIn (Digichefs, 2022).

RealMedia Factory (2022) offers ideas for social media content that shipping companies can share on their platforms to achieve multiple goals. Some of these ideas are listed in Table 1.

Table 1: Ideas for social media content at shipping companies

IDEA (tips for realizing)
1.Increase brand awareness with engaging visuals on social media » Use high-quality images » Use motion graphics » Tell a story with your visuals » Keep your visuals simple
2.Share industry news on social media platforms » Information from webpages » Information from newspapers » Information from magazines
3.Include pictures of employees in your social media platforms » from captain » from officer » ships engineer
4.Highlight company values and history » show who you are and what you stand for » show how shipping companies achieve this
5.Showcase customer testimonials » trust is much higher when they see the real stories
6.Post funny shipping memes and jokes » memes and jokes can make followers laugh

Source: Author's elaboration

One of the biggest problems with shipping companies is that they just randomly post articles on social media sites. This should be avoided at all costs, because the lack of a social media strategy automatically means that it is impossible to measure results and attract new customers (because that is the goal in most cases). You also need to create a strategy that includes all the tasks to be done and SMART measurable goals (Cruce, 2022).

What will follow in the near future is the presence of LinkedIn as a social network, i.e., a platform where shipping companies can connect directly with consumers and especially with other companies. This platform will enable greater online communication and connectivity in the B2B sector.

4. Methodology

To examine digital marketing by shipping companies in practice, the authors follow the published literature on quality analysis in marketing. According to Branthwaite & Patterson (2011) in Crick 2020, qualitative research is better suited for topics that have not been adequately explored in the existing body of knowledge, such as those that require theory development rather than theory testing. In this article, qualitative research is used to achieve the research objective, which is to examine the application of different types of digital marketing tools in the case of shipping companies engaged in global international trade. According to Birkinshaw et al. (2011, p. 574), qualitative research, if conducted properly, "should play a critical role in understanding and capturing the complex diversity of contexts-institutional, cultural, organizational, etc. - play - to understand and capture. Qualitative research is used to gain a comprehensive and thorough understanding of specific ideas, concepts, and constructs, such as why organizations pursue their chosen strategies and how managers make decisions (Bansal & Corley, 2011; Ji et al., 2019). Ultimately, the broader management literature refers to how stakeholders-including customers, competitors, employees, management teams, supply chain partners, and governments-interact with organizations (Felzensztein et al., 2019; Crick, 2021).

The research method used is qualitative analysis to explore the application of digital marketing in practice. It is based on the case studies of five global shipping companies that use various digital marketing tools to promote their business, target customers, and increase their visibility. Case study analysis is commonly used in marketing research (Crick, 2020). The data comes from online sources, i.e., social media platforms and official websites of the studied companies. The choice and criteria for selecting the case were that the company is engaged in international trade, is involved in shipping activities, has a presence on social media, and uses digital marketing tools to engage with audiences and promote its business. Case study analysis is an appropriate research method for describing real-world processes and business models (Yin, 2014). For this research, we selected A.P. Moller Maersk, CMA CGM, Cosco, Evergreen, and MSC. In the following sections, we describe the companies and analyze their examples of digital marketing.

5. Findings and discussion

In this part of the paper are briefly introduced five studied shipping companies after which are presented the findings of their digital marketing tools and applications. A.P. Møller – Maersk is a Danish company, a part of A.P. Møller – Mærsk A/S group, a collection of companies that also included APM Terminals, Svitzer, twill by Maersk, Sealand, Hamburg Sud, Alianca, Maersk container industry, Maersk training, Maersk supply services and Maersk H2S safety services. Maersk is a global leader in shipping services. It is an integrated container logistics company with an aim to connect and simplify its customers' supply chains. Maersk operates in 130 countries and employs approximately 70,000 people. The company offers end-to-end supply chain

solutions for their clients. It heavily relies on digital technologies and digital marketing to promote their products but also the industry, awareness, environmental concerns etc. It is a leading shipping company that embraces decarbonized shipping and serves as a role model in contemporary business.

CMA CGM S.A. is a French container transportation and shipping company. The company offers a range of containers such as reefer containers, multipurpose containers, standardized containers, oversized cargo and refrigerated containers. CMA CGM also offers intermodal and logistics services. CMA CGM operates in Europe, Asia Pacific, Middle East, North America, Oceania, Mediterranean and Africa. CMA CGM is headquartered in Marseille, France. The company employs 155,000 people and had revenues of $74.5 billion in 2022. CMA CGM relies on digital technologies and promotes digital solutions in business and uses websites and social media presence to promote its business, its industry, and its strong human and entrepreneurial values: Initiative, Boldness, Integrity and Imagination (CMA CGM, 2023). China Ocean Shipping Company, Limited, is one of the major holding companies for COSCO Shipping, one of the world's largest shipping companies. It operates worldwide but is headquartered in Beijing (Cosco 2023). Mediterranean Shipping Company (MSC) is also one of the leading companies in container transportation and provides various transportation and logistics services. It has a long history of over 300 years. The company is headquartered in Geneva, Switzerland, but operates all over the world. The company employs over 30,000 people (MSC, 2023).

Ocean Network Express (ONE) Holdings, Ltd. is a Japanese container transportation and shipping company founded in 2017. The company employs 14,000 people. Behind the name ONE is a corporate philosophy, namely, to face every challenge together with its customers and partners as ONE to find and offer optimal solutions. And they will work with the world as ONE and continue to unite countries and regions through our activities, because the power of ONE drives them. Company ONE operates in Europe, Africa, North America, Latin America, East Asia, South Asia and Oceania (ONE, 2023).

All of the above companies are focused on business (B2B), so is their digital marketing. They all have contemporary websites that include company profiles, mission, vision, organizational structure and the services they offer, as well as sections with important social issues such as sustainability and decarbonization. All companies have a social media presence, namely on Facebook, Instagram, Twitter, LinkedIn, and YouTube (Table 2), but the number of their followers/subscribers varies, as can be seen in Figure 1 and Figure 2. It is obvious that A.P. Møller - Maersk leads in the number of followers, subscribers and posts. However, it is not only the quantity that matters, but also the content of A.P. Møller - Maersk's social media, which shows the company's philosophy towards a sustainable, inclusive, digital and decarbonized future. Among all the companies studied, it can be said that A.P. Møller - Maersk is a role model in terms of digital marketing strategy for a shipping company and beyond. Therefore, in the following part, we mainly focus on A.P. Møller - Maersk's digital marketing.

Table 2: The usage of internet and social media platform

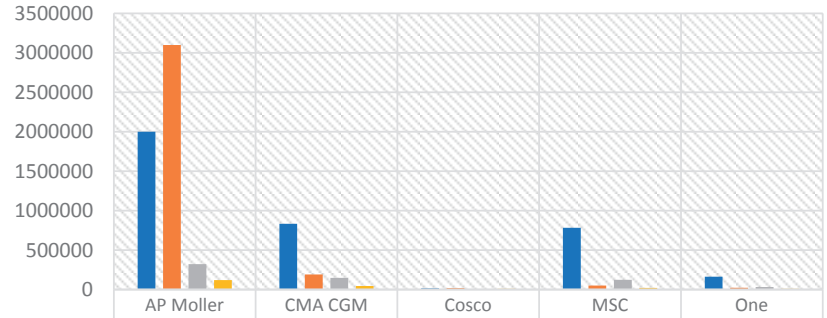
	AP Moller	CMA CGM	Cosco	MSC	One
Web page	Yes	Yes	Yes	Yes	Yes
LinkedIn	Yes	Yes	Yes	Yes	Yes
Facebook	Yes	Yes	Yes	Yes	Yes
Instagram	Yes	Yes	Yes	Yes	Yes
Twitter	Yes	Yes	Yes	Yes	Yes
YouTube	Yes	Yes	Yes	Yes	Yes

Source: Author's elaboration

A.P. Møller – Maersk digital marketing strategy is mainly oriented towards business (B2B).

Traditionally, social media has been more widely and frequently used by business-to-consumer (B2C) companies than by business-to-business (B2B) companies. B2C online communities usually emerge to promote brands for products or services. Some B2C communities allow customers to interact with each other to achieve a goal, improve a skill, etc. But with the increasing importance of social media, B2B online communities have begun to grow. Such communities can be professional networks that contain content and opportunities for collaboration around a shared business experience. B2B social media users and followers include corporate employees, customers, industry professionals, and other general consumers (Katona & Sarvary, 2014).

Figure 1: Number of followers on social media up till April 2023



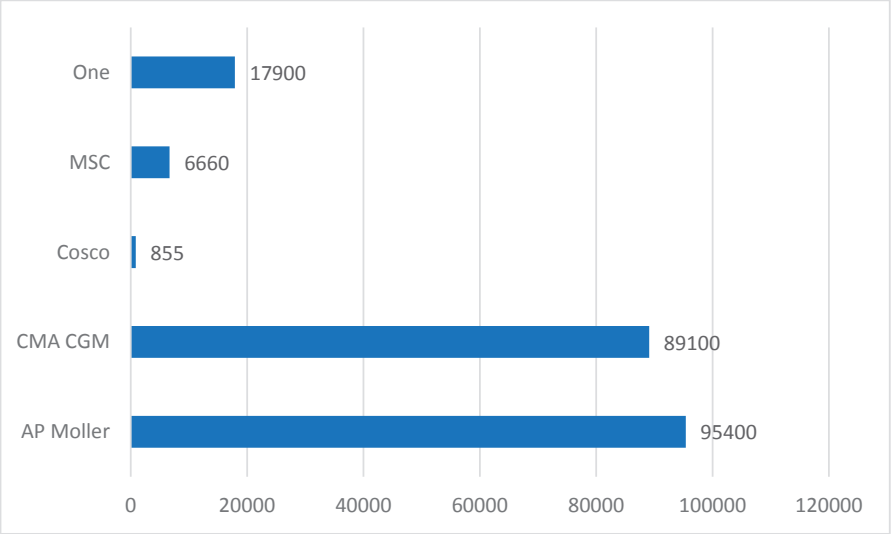
	AP Moller	CMA CGM	Cosco	MSC	One
LinkedIn	2000000	834000	15000	784000	164000
Facebook	3100000	191000	20000	51000	24000
Instagram	322000	149000	1.320	124000	32200
Twitter	120200	45200	10600	21100	10000

LinkedIn Facebook Instagram Twitter

Source: Author's elaboration

In 2011, A.P. Moller Maersk began experimenting with the use of social media to see if its customers would interact with them in the same way they would in the business-to-customer (B2C) industry. Now B2B companies have joined social media platforms, even though they are disconnected from their customers. Maersk launched a social media campaign focused on the company's authenticity, led by Jonathan Wichmann who was the Maersk head of social media at that time. He began with spontaneous Facebook posts with photos and stories, and eventually responded to engagement from his followers with polls and audience contributions. While the initial support came mainly from a niche group of shipping enthusiasts, experts and employees, the company's Facebook presence grew to 400,000 likes within eleven months. Wichmann's campaign eventually earned the company European Digital Communications Awards in both 2012 and 2013, among other prestigious recognitions (Dastur, 2016).

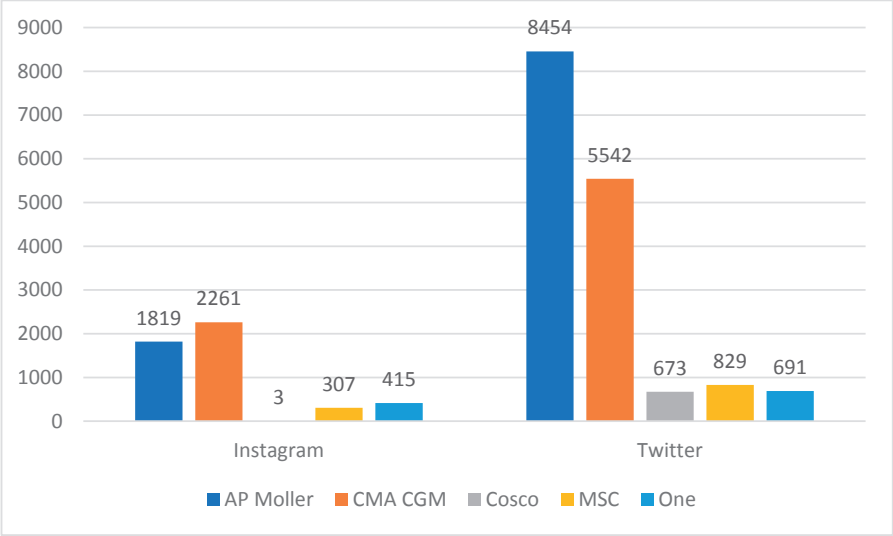
Figure 2: Number of YouTube subscribers up till April 2023.



Source: Author's elaboration

Maersk wanted to test its social media strategy and see if customers would respond to it the same way they would to a B2C company. Maersk Line's goals included increasing brand awareness, gaining customer insights into the market, reaching out to customers, and increasing employee satisfaction. Using a Facebook campaign focused on stories from the company, they were able to attract 150 unique leads. By giving away a free eBook about the company's antifreeze services, they managed to get more leads. Whether by commenting on posts for its 1.15 million fans at that point on Facebook or tweeting with the tag #maersk to over 12,000 followers on Twitter at the time, Maersk was on the right track with its tailored strategies for each social media platform (Dastur, 2016).

Figure 3: Number of Instagram posts and Tweets up till April 2023.



Source: Author's elaboration

The Maersk, i.e., Wichmann's social media strategy was the opposite of other big companies which are oriented more top-down, because they build up a business case, get it signed off by management, outsource the actual work to agencies, plan their posts weeks ahead, and get them approved by legal, et cetera. Wichmann took a more explorative approach and focused on getting the culture and the organization onboard which resulted in a broad presence in social media across more than ten platforms.

Maersk uses each digital platform differently, namely Facebook, Instagram and YouTube to engage with its followers in a visual and entertaining way, Twitter as a news channel and LinkedIn as a platform to reach its customers (Katona & Sarvary, 2014).

Maersk rejected the idea of using social media exclusively for lead generation or customer acquisition. Instead, the brand focused on offering intriguing and relevant material in the form of powerful stories. Maersk's Facebook followers include non-governmental organizations, employees, potential employees, competitors, suppliers, regulators and a large number of shipping professionals and enthusiasts. For the 7,000 seafarers among Maersk Line's 25,000 employees, Facebook has become an important platform for communicating with colleagues and family and keeping up with company activities. The Maersk crew posts a large number of photos of their daily work at sea.

Digital marketing at A.P. Moller Maersk is led by regional marketing managers. According to the job description (A.P. Moller Maersk, 2022), the Digital Marketing Manager's main responsibilities are to build and successfully execute innovative and effective marketing programs to increase awareness,

attention, conversion, lead generation and growth. Marketing manager plan, develop and implement multi-channel marketing campaigns, events and nurture programs primarily targeting the SME segment and personas. The marketing manager also measures campaign performance by monitoring and tracking campaign results using analytics and reporting tools. Their digital marketing is data-driven, optimizing campaigns based on customer interactions and needs, and summarizing campaign results succinctly for business and marketing leaders. Maersk has established a Maersk Line Social Homebase on social media, where articles and stories about the company are published in a less official form (Katona & Sarvary, 2014).

For B2B organizations, a campaign may seem rather irrelevant to the general audience, especially considering how distant the consumer is from the company's activities. However, it has become a necessity to capture the critical increase in connectivity that comes from cultivating influence in consumer campaigns. As information spreads and ethics evolve, companies seeking a positive public reputation must seek to promote transparency and engagement. Social media humanized the Maersk brand. Although the benefits of social media in terms of long-term growth for B2B companies are still unclear, communication remains important, and the investment far outweighs the low cost. Other B2B companies should follow Maersk's lead if they are not already doing so (Dong, 2015).

5. Conclusion

The importance of digital marketing in today's living conditions is enormous and invaluable. It helps any business to access consumers more easily, save money, measure its results on a daily basis and, of course, achieve greater success. The contribution that each of the digital marketing tools makes to the company's marketing strategies helps it evolve into a successful business. If we consider the findings of the study of five examinate shipping companies, we can conclude that digital marketing, in particular, had a significant impact on the creation of their success stories. The success of the companies is due to a number of factors, one of which is digital marketing. With this modern marketing strategy, the companies manage to reach audiences all over the world and, of course, facilitate their way of working. It can be concluded that the use and application of digital marketing tools helps them to achieve good results and strengthen their brands. Special attention is being paid to social media as one of the many digital marketing tools that shipping companies can use. In this regard, the opportunities available to companies are vast and should be exploited to achieve their goals.

However, we must acknowledge that this study has its limitations, namely that the analysis is based on secondary data from the Internet. However, a more in-depth analysis would give a better insight into the role of digital marketing in the shipping industry and shed light on digital marketing from the perspective of the "customer".

This work contributes to the theory of digital marketing and shows that different digital marketing strategies can be successfully applied in different

industries, whether business-to-business or business-to-customer. Future research should conduct an in-depth analysis or mixed-methods analysis to gain a better understanding of the benefits and strengths and weaknesses of digital marketing in the shipping industry.

The conducted research aims to show how digital tools can help shipping companies in the realization of their marketing campaigns. That is, based on the analysis of a large number of researches that have been previously done and mentioned within our paper, many benefits can be seen from the use of these digital platforms.

This paper aims to show the positive implications of the use of digital tools such as Facebook, Instagram, LinkedIn, Twitter on the daily operations of shipping companies. In fact, to show the positive practices and examples of how the daily communication of this type of companies with their potential and existing customers can help them and promote their brand. Another important aspect that this paper will point out is the positive practice of how digital tools also help to increase brand awareness.

References

1. A.P Moller Maersk (2022) Available at: <https://www.maersk.com/careers/vacancies/sp/MA-299808/jt-regional-digital-marketing-manager> [Accessed: June 1, 2022]
2. Backhtieva, E. (2017) “B2B digital marketing strategy: a framework for assessing digital touchpoints and increasing customer loyalty based on Austrian companies from heating, ventilation and air conditioning industry”, Oeconomia Copernicana, 8(3), 463–478. Doi: 10.24136/oc.v8i3.29
3. Bansal, P., & Corley, K. G. (2011) “From the editors: The coming of age for qualitative research: Embracing the diversity of qualitative methods”, *Academy of Management Journal*, vol. 54, no. 2, pp. 233–237. Doi: https://doi.org/10.5465/amj.2011.60262792
4. Birkinshaw, J., Brannen, M. K., & Tung, R. L. (2011) “From a distance and generalizable to up close and grounded: Reclaiming a place for qualitative methods in international business research”, *Journal of International Business Studies*, vol. 42, no. 5, pp. 573–581. Doi: https://doi.org/10.1057/jibs.2011.19
5. Branthwaite, A., & Patterson, S. (2011) “The power of qualitative research in the era of social media”, *Qualitative Market Research: An International Journal*, vol. 14, no. 4, pp. 430–440. Doi: https://doi.org/10.1108/%2013522751111163245
6. BR Williams (2022) 5 Services provided by shipping companies. Available at: https://www.brwilliams.com/blog/what-shipping-companies-do/ [Accessed on: 10 May, 2023]

7. CMA CGM (2023) “Mission and Values”. Available at: <https://www.cmacgm-group.com/en/group-and-vision/mission-and-values> [Accessed: April 28, 2023]

8. Crick, J.M. (2020) “Qualitative research in marketing: what can academics do better?”, *Journal of Strategic Marketing*, Vol. 29, No. 5, pp. 1-40. DOI: https://doi.org/10.1080/0965254X.2020.1743738

9. Crick, J. M. (2021) “The dimensionality of the market orientation construct”, *Journal of Strategic Marketing,* vol. 29, no. 4, pp. 281-300. Doi: https://doi.org/10.1080/0965254X.2019.1677747.

10. Cosco (2023) Available at: <https://lines.coscoshipping.com/home/> [Accessed: April 28, 2023]

11. Cruce, A. (2022) 5 Effective social media tips for the shipping industry. Available at: https://www.businessbusinessbusiness.com.au/5-effective-social-media-tips-for-the-shipping-industry/ [Accessed on: 9 May, 2023]

12. Dastur, Z (2016) Available at: <https://lucep.com/blog/case-studies-digital-marketing-strategies-of-b2b-powerhouses-like-maersk-pixar-and-fisher-tank> [Accessed: June 1, 2022]

13. Deccan Chronicle (2022) Shipping business benefits and statistics. Available at: https://www.deccanchronicle.com/in-focus/130122/shipping-business-benefits-and-statistics.html [Accessed on: May 12, 2023]

14. Digichefs (2022) Best digital marketing strategies for shipping & logistics industry. Available at: https://digichefs.com/best-digital-marketing-strategies-for-shipping-logistics-industry/ [Accessed on: 8 May, 2023]

15. Dong, L. (2015) “Maersk: The Value of Social Media”, *California Management Review.* Available at: <https://cmr.berkeley.edu/assets/documents/pdf/2015-10-maersk.pdf> [Accessed: June 1, 2022]

16. Felzensztein, C., Deans, K. R., & Dana, L.-P. (2019) “Small firms in regional clusters: Local networks and internationalization in the Southern Hemisphere”, *Journal of Small Business Management*, vol. 57, no. 2, pp. 496–516. Doi: https://doi.org/10.1111/jsbm.v57.2

17. Ji, J., Plakoyiannaki, E., Dimitratos, P., & Chen, S. (2019) “The qualitative case research in international entrepreneurship: A state of the art and analysis”, *International Marketing Review*, vol. 36, no. 1, pp. 164–187. Doi: https://doi.org/10.1108/IMR-02-2017-0052

18. Kalouptsidi, M. (2021) The role of shipping in world trade. Available at: https://econofact.org/the-role-of-shipping-in-world-trade [Accessed on: 10 May, 2023]

19. Katona, Z. & Sarvary, M. (2014) “Maersk Line: B2B Social Media - It’s Communication, not Marketing”, *Berkeley-Haas Case Series,* Vol. 56, No. 3, pp. 142 – 156.

20. Katsikeas, C., Leonidou, L. and Zeriti, A. (2020) «Revisiting international marketing strategy in a digital era: Opportunities, challenges, and research directions», *International Marketing Review*, Vol. 37 No. 3, pp. 405-424. https://doi.org/10.1108/IMR-02-2019-0080

21. MarineSeo (2020) Digital marketing for shipping businesses. Available at: https://marineseo.com/news/digital-marketing-for-shipping-businesses/ [Accessed on: 10 May, 2023]

22. Michaelidou, N., Siamagka, N.T. and Christodoulides, G. (2011), "Usage, barriers and measurement of social media marketing: an exploratory investigation of small and medium B2B brands", Industrial Marketing Management, Vol. 40 No. 7, pp. 1153-1159.

23. MSC (2023) Available at: <https://www.msc.com/en/about-us> [Accessed: April 28, 2023]

24. ONE (2023) Available at: <https://www.one-line.com/enr> [Accessed: April 25, 2023]

25. Ortolani, A. (2022) How shipping companies work (& the best list in 2023). Available at: https://www.easyship.com/blog/how-shipping-companies-work [Accessed: 10 May, 2023]

26. Oz, S. (2019) Digital Marketing in the Shipping Industry. Available at: https://www.morethanshipping.com/digital-marketing-in-the-shipping-industry/ [Accessed on: 9 May, 2023]

27. RealMedia Factory (2022) 15 Social Media ideas for Trucking and Freight Companies in 2022. Available at: https://rmf.marketing/en/15-social-media-ideas-for-trucking-and-freight-companies-in-2022/ [Accessed on: 9 May, 2023]

28. Salo, J. (2022) Framing the Future of Research in the Digital Marketing Domain with Digital Marketing Framework. FAIMA BUSINESS & MANAGEMENT JOURNAL. Special Issue 10 years after. p.129

29. Shah, K. (2020) "Top 11 benefits of Digital marketing along with insights for businesses and students", *IIDE.* Available at: <https://iide.co/blog/benefits-of-digital-marketing/> [Accessed: May 8, 2022]

30. Thomas, M. (2022) Types of digital marketing and how digital marketing works. Available at: https://www.bluehost.com/blog/types-of-digital-marketing-and-how-digital-marketing-works/ [Accessed on: 9 May, 2023]

CHAPTER 19

Sports events: dealing with uncertainty

Ivan Prudky[1]

ABSTRACT

The crisis caused by the COVID-19 pandemic has influenced many (economic) activities. Sports and sports events are one of the most affected activities - the inability to accurately assess the emergence of future events and frequent changes to the conditions, rules and regulations lead to uncertainty, significantly aggravating event organisation and execution possibilities. Operational and strategic uncertainty has urged sports- and other establishments involved in sports events to conduct prompt analyses and adjustments to sports event organisation, reducing negative influences on desired benefits. Questioning the aim and scope of sports event organisers' adaptation to uncertain work conditions, and the impact of uncertain conditions on achieving sports events' desired socio-economic benefits, the research aims to display the types of operationalised transformation to sports events while facing uncertain work conditions and highlight examples of achieving the best results. The analysis of relevant academic and sector reports found that the sports industry faced high losses in future values of projections before the emergence of a crisis caused by the COVID-19 pandemic. Sports event organisers attempted to transform sports events and associated products and services by incorporating digital, eSports or virtual reality elements to various degrees. The annulation of negative impacts had short-term mixed results. Still, the selfless sharing of knowledge led to a faster-than-projected industry recovery. The industry benefited on multiple levels, developing possibilities through virtualisation and gamification of (pro) sports events, media content diversification, enhancing fan engagement in commercial activities, and establishing new collaboration models amongst industry stakeholders.

Keywords: *sports economics, sports events, COVID-19, uncertainty, digital transformation*

JEL classification: *JEL_Z20, JEL_Z21*

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1. Introduction

Delays, shifts or cancellations of sports events during the turbulent COVID-19 pandemic brought numerous setbacks to sports event organisers, participants, customers and associated subjects and institutions. The problem is recognised by global decision-making institutions, researchers and sports (event) industry stakeholders. Sharing knowledge of timely and appropriate reactions and opportunities for the unforeseen environmental state in which stakeholders in sports competitions are critical. Therefore, a comprehensive overview of the industry's state analysis results and presenting the best countermeasures and actions found by institutions (i.e., UN, WHO, Council of Europe), scientific researchers, sports events stakeholders and commercial research (i.e., PwC, Nielsen Sports, Research and Market, Statista) helps accelerate the sector's recovery.

COVID-19 influence on sports (Council of Europe, 2020) carries dire consequences for (1) athletes preparing for competitions, (2) organisers and sports clubs providing sufficient funds for business in conditions of uncertainty, and (3) people who were denied practising physical activity to ensure a healthy lifestyle. The highest governing bodies recognise the extreme global pandemic effects on the sports industry. The United Nations Department of Economic and Social Affairs (UN DESA) (2020a, 2020b), in their policy series response to COVID-19, point out that the pandemic's implications on sports events affect overall social development. The exceptional impacts on the entire sports sector are recognised by the European Parliament (2020) as well, headlining dire economic and social consequences on society as an extended result. The danger of losing jobs and reducing business, amongst other economic activities, threatens professional athletes and sports retailers. A significant decrease in organised sports events directly endangers related industries and activities – transportation, travel and tourism, food and drink industry are just a few examples. Adverse consequences are economic and social since sports events contribute to social cohesion, creating and strengthening connections between social groups. The effects are unattainable in their absence.

Research and analysis on the pandemic's impacts on the sports event sector become important, aiming to find ways to diminish and negate the unforeseen consequences, structuring a corpus of knowledge about means of adjustment and resistance building towards conditions of uncertainty (Parnell et al., 2020). Keshkar et al. (2021) highlight the need for new business structures in the sports (event) industry together with easier adjustable processes management combined with product and service adjustment. More importantly, the authors underline the importance of crisis management incorporation and knowledge sharing, which will help the industry recovery curve to take a positive slope. Martins et al. (2021) suggest a partial conversion of sports events to eSports events, and Thibaut et al. (2021) share evidence that people with previous eSports experience adjust better to lockdown conditions, helping to soothe the overall poor socio-economic conditions. Other virtual technology opportunities are helpful to all sports event stakeholders, from the investment companies, over sport event

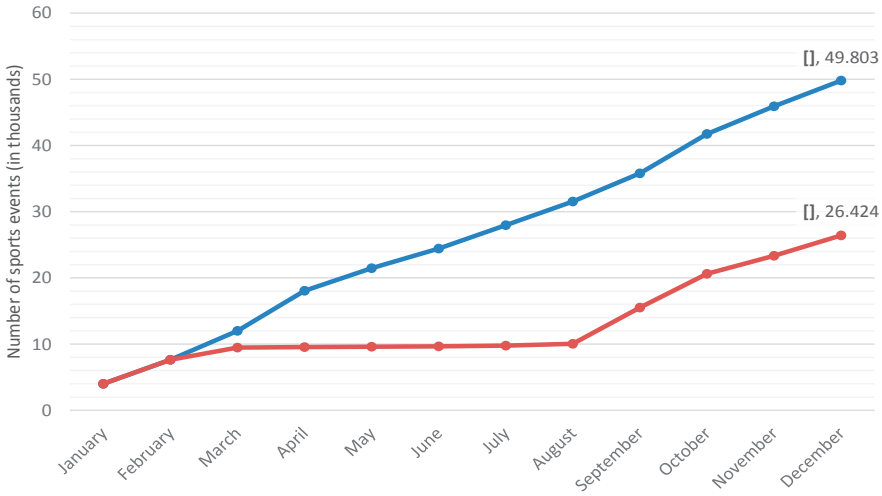
organisers, to the sport event end-users (Hayes, 2020). The virtualisation of sports events motivates sports participants to engage, reaching an even broader audience than the sports event physically could do (Helsen et al., 2021). The virtualisation process of sports events also benefits athletes, making them physically active, gaining financial earnings (for athletes, event organisers, media, and sponsors), and providing entertainment to spectators (Westmattelmann et al., 2020). The imposed digitalisation of sports events enabled progress in event customer experience and opened new forms of cooperation and activities for sports organisations. The digitisation of sports events also represents a trap, as excessive digitisation can compromise the essential qualities of sports events and, therefore, should be avoided. The utilised commercial research, concluding on the current state of the sports event industry derived from all stakeholders' opinions, gives a clear insight into the most significant obstacles. Such a precise examination of the current state makes it easier to make effective decisions to achieve the desired positive impact of successfully organised sports events.

A combined overview of the most significant effects of the global pandemic as an unforeseen issue, together with countermeasures of adjustment of the sports events sector to conditions of uncertainty, are valuable contributions of this scientific research. Our research aims to present effective resilience-building methods of sports events coping with situations of uncertainty, highlighting possibilities and potential traps brought by digitalisation.

2. Global pandemic implications for the sports industry

The spread of the COVID-19 pandemic brought uncertainty to various business sectors, and social, cultural, and economic limitations occurred at all societal levels. The sports industry was not exempted from the negative influences, and due to the nature of the products and services it offers, it became one of the most affected sectors. Cancellation of all public events gathering a more significant number of people in one place has been a worldwide trend, a phenomenon mainly reflected in the number of sports events held (Figure 1). Before the global pandemic outbreak, during the starting months of 2020, the planned number of sports events and the number of held sports events overlapped. From March till August, the cumulative number of sports events discloses almost no upwards movement, as nearly no sports events worldwide were organised. Following August, the number of organised sports events on a cumulative scale started to rise again. Still, the damage done was already too significant, as only 53.06% of the number of initially planned sports events at the world level was held. Almost six months of inactivity and a high drop in the overall number of held sports events indicates a high level of rigidity in, or inability to adapt to, unforeseen circumstances.

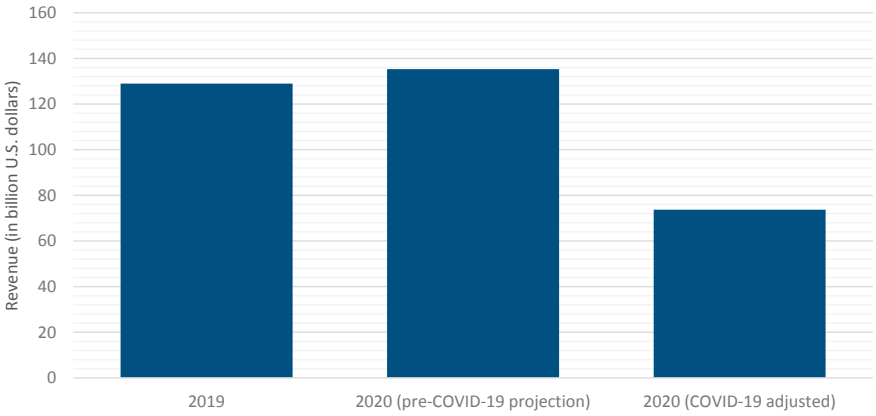
Figure 1: Number of sports events worldwide in 2020



Source: Statista (2020a)

The impact of the global pandemic was not only reflected in the number of sports events but also in the overall business success of the sports industry. Although the sports industry's worldwide revenue (Figure 2) in 2020 was predicted to be 135.3 billion U.S. dollars (+4.88% compared to 2019), the revenue generated reached 73.7 billion U.S. (-45.53% relative to predictions) (Statista, 2020b). As soon as of May 2020, different segments of the sports industry worldwide were affected by significant losses: fan spending on professional sports of 3.25 billion U.S. dollars; tourism related to youth sports of 2.4 billion U.S. dollars, national TV revenue of 2.2 billion U.S. dollars and wages for ticket takers, beer vendors and other stadium and arena employees in 0.37 billion U.S. dollars (Statista, 2020c).

Figure 2: COVID-19 influence on the sports industry revenues



Source: Statista (2020b)

The negative impacts of uncertainty on the sports sector and the activities of sports events are recognised at all levels of decision-making. The most significant world organisations relatively quickly present general, almost uniform guidelines to preserve the industry. The EU (European Parliament, 2020) consider available support and recovery instruments that will help the industry in the short term, referring to the Member States to guard various funds and plans for recovery and resilience to help the sports sector (e.g., Erasmus+ program, European Rural Development Fund, Cohesion Fund, European Social Fund Plus, EU4Health). UN DESA (2020b) presents instructions for sports events focused on two levels: (1) sports federations and organisations and (2) the professional sports ecosystem. Action at both levels should contribute to extinguishing the COVID-19 pandemic's negative impacts on the industry. At the sports federation and organisation level, the main goal is to strengthen the cooperation of all stakeholders (governments, sports federations, organisations, and clubs) to ensure safe and enjoyable future sports events. The sports ecosystem (athletes, businesses, manufacturers, broadcasters, and fans) should jointly look for innovative solutions (creating new operational models and sports events strategies) to cancel out the negative influences of the pandemic, safely including fans in sports events, with the starting prerequisite of the maintenance of jobs.

Unexpected pandemic conditions on a global scale have a fundamental impact on ways of performing sports events. Due to the frequent limitations on all participatory sports events, they were often cancelled or postponed. Parnell et al. (2020) stress that organisers of sports events and their participants must learn from such cases for future times and emphasise the need for further analysis of such disturbances. Different modes of action by industry stakeholders have led to varying levels of success. Kashkar et al. (2021) point out the various means sports organisers successfully used to adapt to the new crisis conditions. While some adjusted the ways of managing business structures and processes, others adjusted the services and products they offer. Regardless of the direction, different actions brought new knowledge to the field of sports management, which promptly spread among the stakeholders of the sports industry. The need to adjust more efficiently to the new business conditions made the need for crisis management knowledge within the sports industry (Keshkar et al., 2021) much more apparent.

Adapting new knowledge and processes was much quicker adopted in professional and large-business sports organisations, while non-profit, more minor, and (half) amateur organisers (school competitions especially) had more problems adapting to ensure and satisfy the set standards. Regardless of their higher level of adaptability, the bigger, more influential sports industry stakeholders were still encountering significant problems, which at best led to the delay of major sports events, if not to their cancellation (e.g., the 2020 Olympic Games in Tokyo). Consequently, sports event stakeholders faced a big blow to their financial results. Market growth predictions for all industry stakeholders plummeted or were at least cut in half for a 3–5-year period starting in 2020. Most notably, the sports teams and clubs (5.9 PP), league and event organisers (-5.6 PP), and the public sector (-4.8 PP). Society has encountered an even higher loss, which is the reduction of the social value

of all persons directly or indirectly involved. The usage of new technological capabilities as a medium of contact with their customers and encouragement in sports activity (Hayes, 2020) is one of the ways to move forward. Social medial technology is one of the options through which organisations, clubs or professional athletes can create and maintain contact with their followers, encouraging them to engage in sports activity while gaining certain economic earnings. A successful example is the National Olympic Committees (Hayes, 2020) – by using social media, they directly and successfully impacted people's engagement and inspiration for more active sports participation. Participating in digital/online sports events was proven to have multiple advantages for organisers and participants. While analysing the impacts of the pandemic-imposed limitations on individuals' sports activity level, Thibaut et al. (2021) find that people with previous experience in online sports events adapted better to the restrictions in time of participating in sports activity, infrastructure (in)availability, cancellation of sports events and closing of sports clubs, as well as to the fear and duration of illness.

In addition to using digital media technologies and participating in digital sports activities, the transition from standard to eSports competitions represents a further step forward in combating the negative consequences of pandemics on the industry. The problem of lover-level sports competitions, especially school competitions (Martins et al., 2021), has been solved by developing natural alternatives - eSports competitions. The result was to encourage the development of eSport competitions at the school and national levels. Westmattelmann et al. (2020) investigated the differences between sports and eSports competitions. While analysing the level of physical activity of athletes who participated in virtual, mixed-reality competitions during the pandemic, the level stemming from virtual and actual competitions was comparable. While the athletes pointed out some specific risks such competitions carry, many positives arising from the virtualisation of sports were highlighted. The role of virtual sports events proved crucial in mastering the pandemics' conditions of uncertainty. Helsen et al. (2021) state two motivation determinants to participate in virtual events: (1) individual traits, more precisely, individuals' motivation to develop specific skills, and (2) interpersonal determinants in the form of previous participation in virtual events. Due to the possibility of participating in virtual events, the frequency of involvement in sports activity did not decrease; only a decrease in intensity was recorded. The need for physical activity and earnings has opened the door to participating in virtual competitions. Such knowledge of the motives of participating in virtual sports events greatly helps organisers adjust action in future conditions of uncertainty.

3. Dealing with uncertainty: threats or opportunities?

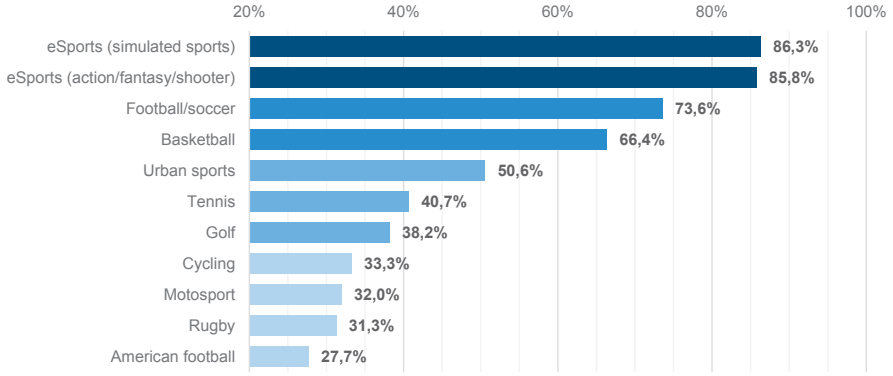
Poor financial results and trends in the sports industry, especially the segment of sports events at the beginning of the global pandemic crisis, brought to the surface the big problem of not being able to adapt quickly enough to unexpected changes in operating conditions. The industry's primary goal was to suppress the highly damaging impacts and return to a growth trajectory

as soon as possible. Research by global institutions (UN, EU) has pointed to the need for such a way of development that will lead to resistance to market shocks. The same is confirmed by other commercial research and market reviews (PwC, Nielson Sports, Market and Research, Statista). Most of the sports industry stakeholders (PwC, 2020) (sports federations, media companies, marketing agencies, sponsors and brands, sports leagues and event organisers, sports clubs, technological companies, scientists and the public sector, and investment and consulting companies) – 56.5%, when asked to analyse the level of preparedness for pandemic conditions compared to other industries (on a scale of 1 – very poor to 5 – excellent), conclude that the level is below average or worse. Roughly a quarter of the surveyed stakeholders (28.4%) claim that the level of preparedness is, on average, the same as all other industries, while only 14.2% of them are optimistic and conclude that the industry is better prepared for the uncertain business conditions, in comparison to other sectors. Additionally, when asked to predict the recovery trajectory (Statista, 2020d), 8.7% of sports industry stakeholders indicate the recovery period will start in 2021, the most, 43.3%, state 2022 will be the turning point, 27.1% of stakeholders agree on the year 2023, and 10.9% think this will happen only just in 2024. Scientific research, presented in the previous part of this paper, also supports the thesis about the need to build the industry's resilience through diversification of forms of activity. Research and markets (2020) also predict a similar timeframe for the recovery process of the sports industry, spanning from 2021 to 2023, accumulating an 8% increase in value. They have a more optimistic view in subsequent research (Research and markets, 2021, 2022a, 2022b) where they see the COVID-19 pandemic as only a "black swan" event for the sports industry that it will overcome quickly, predicting a growth of 10.6% from 2022 to 2026.

Data on the growth rate of the sports industry worldwide from 2016 to 2019 speak of an average increase of 8% in value (PwC, 2020), while the prediction for the period from 2020 to 2023 states an average growth rate of 3.3%. One year later, the predicted global sports industry values increased (PwC, 2021) to a 4.9% growth rate from 2021 to 2024. Within one year (2020 – 2021), as an adaptation to global pandemic conditions improved, the projected growth rates increased drastically: Europe – from 2% to 4,2%, Australasia – from 1,5% to 4%, North America – from 3,6% to 7,4% and South America – from -1,3% to 8,6% in value. Areas where sports events involve large numbers of participants and or spectators traditionally take place were expected to be the most affected. Advances in the suppression of the pandemic and innovations in the performance of sports events lead to the most significant positive changes. The projected sports industry growth rates in Asia (from 7.3% in 2020 to 5.8% in 2021) and the Middle East (from 8.7% in 2020 to 7.1% in 2021) were high even in the starting year of the global pandemic. The reasons can be found in the highly developed and prevalent eSports industry in the Asian market and the giant sports competitions (Olympic Games in 2020, postponed to 2021) held in the area at a specific time. The Middle East owes its high growth rate of the sports industry to the popularisation of sports in general, which is again heavily stimulated by the organisation of significant upcoming sports events (World Cup in 2022).

Sports industry stakeholders were also to evaluate and predict which sports branches could generate revenue during the COVID-19 pandemic (PwC, 2020). Figure 4 shows the ten most pronounced sports branches, graded as having above-average and very high revenue generation potential (in the share of stakeholders).

Figure 3: Sports branches' potential to grow revenues



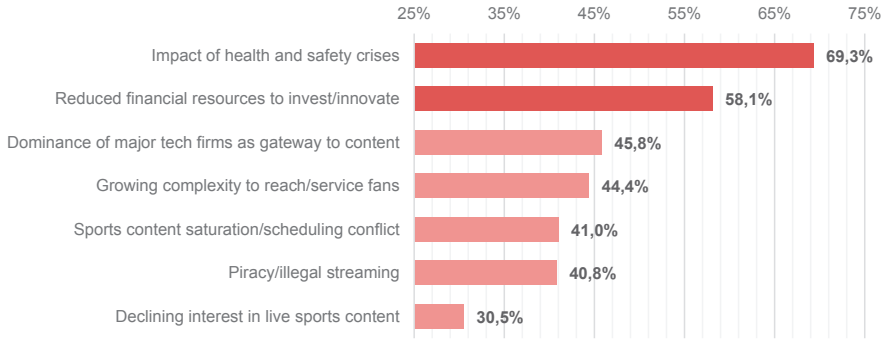
Source: adapted from PwC (2020)

The substantial leaders, the first group, are two categories of eSports, of which the simulation eSports ranks first, having the highest market potential. The second group contains traditional revenue leaders' football (soccer) and basketball, and the third group consists of urban sports, tennis and golf, and the last group consists of cycling, motorsport, rugby and American football. Ascent on the ladder compared to the previous annual research is recorded by simulation esports, golf, cycling and motorsport. The changes are expected and logical: simulation esports are growing because they replace traditional sports during the pandemic, and golf, cycling and motorsport are individual sports with no harsh limitations set to competing athletes by pandemic conditions. Sports with the highest contact level, rugby and American football, record the most significant falls in market potential value.

An overview of the most perceived threats to the sports industry by its stakeholders (PwC, 2020) provides in Figure 4. The impact of the health and safety crisis in which they suddenly found themselves was perceived as the greatest threat to their operations. The reduced ability to operate directly affects stakeholders' available financial resources, limiting their ability to invest in research and development of sports products and services. The new and innovative sports products and services are their principal route to success in the unique operational conditions. Given the restrictions, accessing sports content via a digital source is almost exclusively possible. This makes large technology companies dominant market players since they undisturbedly can dictate the means and conditions of sports content distribution to the end users (sports fans). Sports fans also quickly change their preferences in sports content consumption when sports event organisers cannot follow up with the requested innovations in the conditions of insufficient research and development funding. The imposed restrictions led to a shift in the timing of

organised sports events, which led to frequent overlaps in the schedule of different events, thus depriving the audience of each other. The digitisation of sports content and their higher monetisation have increased the threats of using illegal and pirated streaming services, where both organisers and distributors of sports event content make losses.

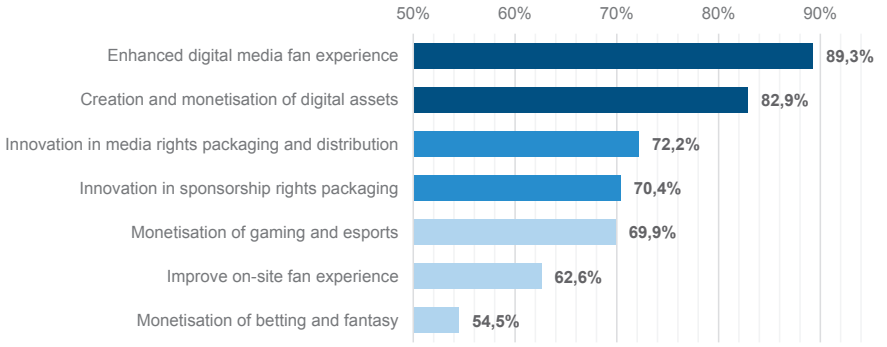
Figure 4: Most recognised threats to revenues in the sports industry



Source: adapted from PwC (2020)

Almost all the advantages perceived by the sports industry stakeholders can also be perceived as potential business opportunities (Figure 5). Users or sports fans primarily get the chance to better content through the digitisation of sports - both through availability and quality. Creators of sports content, in extension, gain the opportunity to monetise their newly created digital assets more efficiently—all the beforementioned open the door to innovations in the contracting and distributing media and sponsorship rights. The digitisation and monetisation of digitised real-world sporting events facilitate the possibility of a higher level of monetisation of eSports and gaming events, as well as the betting aspect of the sports industry. Generally, the digitisation of sports content offers many opportunities to all stakeholders within the sports industry, from consumers to content producers.

Figure 5: Most recognised opportunities to increase revenues in the sports industry

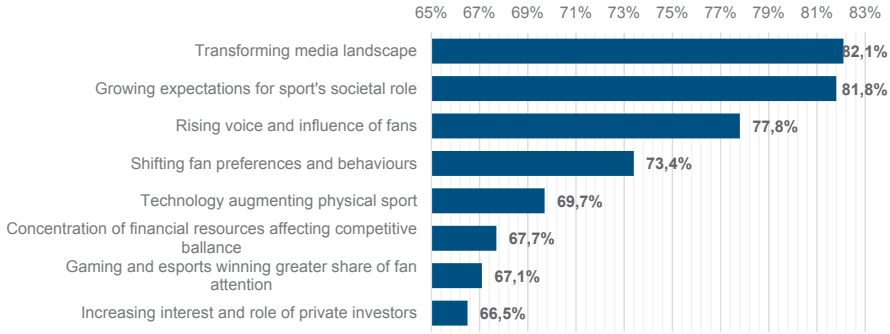


Source: adapted from PwC (2020)

4. Digitalisation of sports: diminishing threats, utilising opportunities

Even before the pandemic-caused crisis, substantial changes in the sports industry have arisen. Several trends have been uncovered in the years before the COVID-19 crisis (Nielsen Sports, 2018): disorders in distribution channels; development of eSports; altering descriptions of desirable content; transforming sponsorship into partnerships and general changes caused by a change in society. These fundamental sports market forces also coincide with the PwC (2021a) research that presented refined and detailed drives (Figure 6): the transformation of media space changes the impact and rank of media offering sports content; sports fans' increased social awareness pressures the sports industry to provide high social benefits it promises, all while respecting the demand of fans; technological modification of physical sports events; advanced growth of the eSports and gaming industry and the diversification of investments and cooperation models in the sports industry. One year into the global pandemic, 58.7% of sports industry stakeholders say they are prepared well (or better) for the new critical determinants in the sports industry. In contrast, only 12% say they are below average (PwC, 2021a), confirming Research and Markets (2021) claims about the rapid recovery of the sports industry.

Figure 6: Key market forces in the sports industry influenced by the COVID-19 pandemic



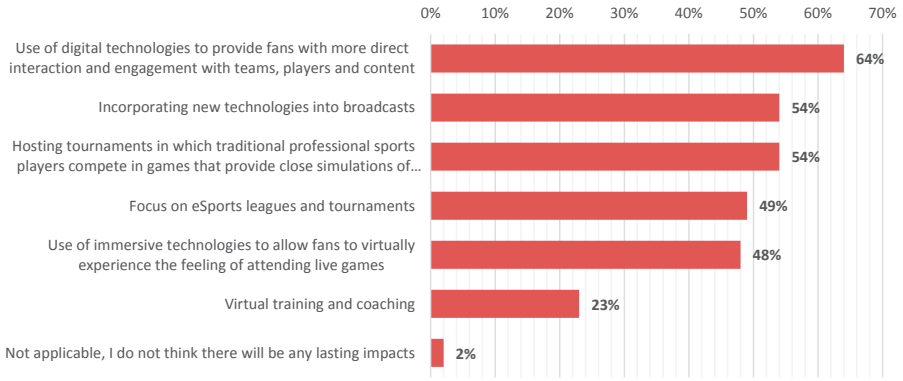
Source: adapted from PwC (2021a)

Disorders in the distribution channels have led to a significant transformation of the media landscape, primarily concerning shifts in the value and distribution of media rights for sports events content. Traditional news media (TV broadcasters, radio and print newspapers) record a decrease in the share of fans' consumption of sports news (60% in 2019 – 53% in 2021), while digital media (websites, video streaming platforms, social media, apps podcasts) attain a higher share of fans consumption of sports news (62% in 2019 – 63% in 2021) (Nielsen Sports, 2021). The development of other technologies and media creates additional pressure on traditional media, and the unfavourable trends are already highly prominent. Expected sports media

business model growth in 2020 (Statista, 2020f) barely hit double digits for traditional media sources: traditional advertising +14.7% and public service broadcast +13.1%. Changes in consumer preferences contribute to the rise of new digital media sources, as they can discover new content possibilities faster and easier than ever before. Therefore, new media sources record high levels of increase in the share of fans' sports news consumption (Statista, 2020f): freemium content +69.1%, pay-per-view content +66.6%, integrated in-line betting content +65.7%, native advertising +64.9%, unbundled subscriptions +58.1% and bundled subscriptions +56.1%. Digital media dominance can best be seen in the fact that every global region (except Australia) gatherers more information about sports events using digital media sources rather than traditional ones (Nielsen Sports, 2021). With credit to the new users they attracted, new media tech giants can continue to increase the prices of premium content, threatening traditional sports media even more.

Traditional sports broadcasters should avoid using the latest technological advancements and try to evolve. The virtual addition of background music during play (Statista, 2020g), artificial or recorded crowd noise (Statista, 2020h), or realistic-looking fans in the stands (Statista, 2020i) made almost no or even worsened the broadcasted sports event experience. Fans showed more enjoyment in the sports broadcasts while hearing the naturally occurring sounds of sports (Statista, 2020j). The way forward for traditional media is to use the best-appreciated features of the eSports industry (Statista, 2020e): incorporating direct communication with and higher user involvement of end users into their business. Personal characteristics of sports fans should also be considered: attention spans are shorter, the content volume is increasing, and the use of mobile technologies to consume content only contributes to the previous two. So, due to the increase in the quality, quantity, and diversity of content, the organisers of sports events will only remain relevant with the use of new technologies to stay visible. The impact of digitisation and technological progress should not be limited to the distribution of sports news and content but also sports events. Figure 7 provides an overview of the technological solutions and impacts for which the sports industry stakeholders assess how they will continue to develop even after the end, i.e. complete adaptation to the new pandemic business conditions.

Figure 7: Use of new technology in professional sports



Source: Statista (2020e)

Stakeholders of the sports industry (Statista, 2020e) estimate that of all the possibilities of digital technologies in sports events, those with the ability to provide sports fans with more direct interaction with sports teams, athletes, and sports content will be the most used.

The growth of eSports leagues and tournaments is expected to continue, and companies aware of the trend are already shaping their business around the customers. Although the association between the sports and eSports industry is more visible, the capitalisation of that synergy is still at the very beginning. It is necessary to go one step further and work on integrating real-life and virtual sports events. Virtualisation of professional sports events by creating hybrid, mixed-reality events during conditions of uncertainty caused by the COVID-19 pandemic allows professional athletes to practice and engage in physical activity in safe conditions provided by the eSport virtual rendering of events. In addition to physical benefits, this way of work also ensures financial benefits to the athletes and the event organisers, sponsors, and other connected entities. Aiming to include the casual fan/participant, the conventional sport will take over the innovative accompaniment models from its digital counterpart and offer users additional live content and experiences. Holding eSports simulation game tournaments where professional athletes will also participate should be a stepping stone for both branches, bringing fans of actual sports events closer to eSports events and vice versa. Statista's data (2022c) shows that from 2019 to 2021, more than half of all eSports viewers were occasional viewers rather than eSports enthusiasts. Because of that fact, the eSports industry is targeting certain benefits from such cooperation, as they will try to transfer the revenue generation models from traditional sports to their own, in which they are very successful. Looking at the global revenue market of eSports by segment in 2021 (Statista, 2022d), from the 1.084 billion US dollars of revenue, 59.13% stem from sponsorships, 17.77% from media rights and only 2.32% from streaming services. Given that the global revenue of the eSports industry (Statista, 2022a, 2022b) is predicted to increase by 49.22% in 2024 compared to 2021 (for comparison,

the difference between revenue in 2021 compared to 2019 is +13.22%), it can be assumed that the eSports industry will continue in its intention to copy of the financing model of traditional sports branches succeeded.

Although more demanding, the further development of interactive technologies can lead to the creation of immersive technological solutions that will allow sports fans the feeling of participating in a live sports event, something that is restricted to many. Such actions can introduce the gamification process to real-life sports events if the event organisers create hybrid disciplines that include the physical activity of fans/participants while using virtual reality. The potential of such events is excellent, primarily in attracting groups of younger participants. Still, they also offer the possibility of creating social benefits by increasing the accessibility and inclusiveness of different groups of fans who would not usually participate in an actual sports event. Sport event organisers must be careful in their decision-making: the goal is to perform the substantial physical activity while using virtual environment potentials rather than turn a sports activity into an e-simulation. The goal is to bring gaming to sports, not sports to gaming.

The digitisation of sports content brings additional opportunities to collect data on sports service users. Only sports businesses that can analyse their fans will be at an advantage in the sports industry market. Sports businesses can realise benefits from both sides of the chain. Sports fans get opportunities to create products and services directly aimed at them. Organisers of sports events who know their fans well gain the upper hand when optimising the distribution of media rights and concluding sponsorship contracts. Knowing your fans well allows you to accurately characterise target groups, which opens the door to arranging short-term marketing campaigns with more favourable results. Such cooperation between sponsors and sports event organisers often leads to long-term partnerships.

During the COVID-19 crisis, new business cooperation models in the sports industry are being realised (Pwc, 2021a, 2021b; Nielson Sports, 2022). Private equity has become a significant source of financing, caused primarily by the insufficient financing resources of sports event organisers and athletes affected by the constraints of the crisis. Joint projects in which providers of sports products and services and sponsors interact, thus creating additional common values in the form of innovative sports products and services, are increasingly popular. Joint ventures with sports marketing agencies with the knowledge and resources to collect and analyse data on sports fans are also realised. With their expertise, they direct sports content owners towards creating sports products and services better adapted to their fans and users. Conditions of uncertainty have pushed sports teams, leagues or federations to share organised, available assets and resources with each other, thus creating new forms of business associations. Various associations were open to more than teams or leagues from the same sports branches. Still, unrelated sports branches came together, for example, conventional forms of sports with eSports events, thus creating cross-sports event formats. Certain providers of sports products and services have decided to operate under the management of corporate owners and thus overcome unfavourable

business conditions through a change in the management model. Given that the benefits of sports events are significant to the public sector, especially the social ones, there has been more pronounced synergistic cooperation between the public and corporate sectors within the sports industry.

The greater incorporation of processes and features of digitisation into the everyday practices of the sports industry's stakeholders has led to numerous opportunities that need to be taken advantage of. When creating digital assets, stakeholders in the sports industry should be aware of all the pitfalls it brings (PwC, 2021a). The first essential element is assessing and analysing the capabilities and assets the sports industry stakeholder controls. They include people, technology, and processes, which are critical to realising the desired positive business results. Sports industry decision-makers should tailor the application of technology according to their already established strategies, and it is technological and human capital will ultimately determine the level and scope of digitisation of individual parts of the business. When selecting a commercial plan and the use of digital assets, decision-makers in the sports industry should aim for the digital assets they have and manage in the future to be a multi-purpose platform that will be able to reach more different end users but also be able to attract more different sponsors and partners. Finally, it is essential to realise that the management of digital assets in general, including in the sports industry, is an operational process that lasts, consists of several stages, and is not a unique product that can be created all at once.

5. Discussion and conclusion

The sports industry (especially sports events) was highly affected by the new and unforeseen uncertainty brought about by the global COVID-19 pandemic. This was most evident in the high drop in the number of sports events held and, consequently, in the decline in the total global revenue of the sports industry in 2020 (Statista, 2022a, 2022b). As the sports industry creates numerous economic and social benefits for societies, global umbrella organisations act quickly to protect the industry (European Parliament, 2020; UN DESA, 2020a, 2020b), offering many mechanisms of assistance, including the redistribution of dedicated funding to aid in the recovery of sports. Industry. Scientific research also indicates the need for the rehabilitation and promotion of the sports industry as soon as possible. They reveal the need to share new knowledge about strategic and operational action (Parnell et al., 2020; Keshkar et al., 2021) and the need to learn from current conditions of high uncertainty. The need for crisis management in the sports industry is more evident than ever. Furthermore, the authors point to the possibility of digitising the content of the sports industry as a step forward (Hayes, 2020; Westmattelman et al., 2020; Martins et al., 2021). The reasons for using digital opportunities and knowledge from the eSports branch of the industry are found by Westmattelman et al. (2020), Thimbaut et al. (2021), and Helsen et al. (2021). They prove that individuals who previously had experience with eSports and other digital sports content better adapt to the restrictions set and, regardless of them, succeed at least to a certain level in satisfying

the need for physical activity. Furthermore, using the example of amateur and professional sports competitions, they determine that combining the natural and virtual aspects of sports is a winning combination. People retain the possibility of exercising because their activity is still genuinely physical. Still, at the same time, they are protected from the harmful environmental influences caused by the global pandemic precisely because of the possibility of using virtual reality. In addition to the opportunity to exercise and maintain physical fitness, professional athletes can also ensure financial security and the goals of the organisers of sports events and other related entities that have multiple interests in the development of sports events, in whatever form they appear.

Commercial research (Statista, PwC, Nielsen Sports, Research and Market) conducted on sports industry stakeholders also explores the impact of the global pandemic and how it has modified the industry's operations. Key trends within the sports industry that began to emerge before the global COVID-19 pandemic only accelerated and strengthened in the new conditions. The most significant impact on the industry was the digitisation process, which included everything from individual smaller parts of the work process to the digital transformation of the entire way of doing business.

There are several significant changes have taken place due to the mentioned conditions. First, the possibility of using virtual reality in professional sports was beneficial for maintaining health, the level of physical fitness required for competition, financial and social security and stability (Nielses Sports, 2021; PwC, 2021a; Nielsen Sports, 2022). Although the growth predictions foresaw dire consequences for all sports industry stakeholders for the 2020-2023 period (PwC, 2020), the growth predictions were much more favourable merely one year later. Still, sports teams and clubs were amongst the most negatively affected but were overtaken by broadcasters and media companies regarding value loss. Brands, sponsors, and investment companies were also facing lower growth rates than previously, but sports marketing agencies, league and event organisers, sports federations and the public sector expected growth compared to the previous year (PwC, 2021). Second, the digital possibilities from the eSports and gaming world can be applied to sports events so that sports fans are supported by their wishes and needs (PwC, 2021; Nielsen Sports, 2022; Statista, 2022a-d). Moreover, the gamification of sporting events can offer a better experience of the sporting events themselves and also creates opportunities to involve a wider circle of fans who might not usually have that opportunity. It should be noted that the gaming process is applied to the sports activity, not that the sports activity is copied into the gaming world. Third, due to the changing habits and needs of users of sports services, the ways of consuming sports content are also changing (Statista, 2020e-i; Pwc, 2021b). This fact is particularly well used by technological giants who very quickly and successfully diversify their services offer and simultaneously manage to gain high levels of users of their services. Traditional media are lagging and stagnating at best, but they are using new digital technologies to keep up with the latest market leaders. Fourth, the digitisation of content and increased digital involvement of sports fans has led to the more accessible collection and the possibility of analysing

data on users of products and services offered by stakeholders in the sports industry. This creates an exceptional competitive advantage in the market because it increases the possibility of concluding media and sponsorship contracts, and often such agreements develop into business partnerships (Research and Markets, 2022b; Nielsen Sports, 2021; PwC, 2021b). Fifth, business cooperation in the sports market has also diversified (Research and Markets, 2022b; Nielsen Sports, 2021; PwC, 2021b). Private investors and prominent corporate players took advantage of the shock. They entered into partnerships with numerous stakeholders in the sports industry who, due to the sudden rigorous restrictions, were left without a source of financing for their business. In the scarcity of funds needed for work, sports clubs and leagues have also decided on a kind of association to use the funds at their disposal better. Joint projects and ventures of organisers of sports events are realised in two directions – the creation of new projects in cooperation with sponsors or marketing agencies. As the sports industry is vital for the public sector, it is not uncommon for the public sector to step up the organisation of sports events in close cooperation with the corporate sector.

Although the creation of digital assets has been identified as extremely important for the future operation of the sports industry, stakeholders must rigorously evaluate their capabilities and the assets they already possess. It is necessary to be guided by already set goals, including the possibility of multiple uses of the created assets. At the same time, we must remember that the creation of digital assets is a process, not a production.

This research was limited exclusively to the impacts of the COVID-19 global pandemic and the effects of the forced accelerated digitisation of sports content as current trends in the sports industry. The research was also limited to secondary data found in institutional and commercial reports regarding the sports industry, combined with findings from relevant scientific research work published. Future research could explore a more in-depth impact of the virtualisation and gamification of sports events and the benefits and specific risks such processes carry to sports activity and events. Since, as seen by recent events, the sports event industry takes comfort in its standardised frames but can quickly respond to new challenges, closely monitoring consumer behaviour is obligatory. Therefore, future research possibilities can be found in research on generational differences as an influence on the sports industry's way of doing business, changes in the behaviour and preferences of sports fans and other users of sports products and services, and the budding need for a sustainable way of doing business in general, specifically in the sports industry.

In conclusion, it should be pointed out that the sports industry was highly affected by unforeseen business conditions and recorded high losses in a brief period, indicating exceptional rigidity in adapting to extraordinary changes. Although the initial shock was great, the first signs of recovery were visible relatively quickly. The spread of new management knowledge across the industry and digitisation has led to rapid advances. The combination of appropriate digital, virtual and eSports segments with actual sports events provides additional benefits to all parties involved in sports events.

At the same time, there should still be physical sports activity in the centre, complementing digital content. Stakeholders in the sports industry should carefully create multidimensional digital assets that will support their business strategies while respecting their internal capacities. Diversification of partners within the sports industry brings new opportunities and capabilities to create content that reaches end users more efficiently. All the mentioned changes led to a strong resilience building of the sports industry, which proved to be a particular problem when operating in conditions of uncertainty.

References

1. Council of Europe (2020), Impact of COVID-19 in Sport, available at: https://www.coe.int/en/web/sport/covid-19-response#
2. European Parliament (2021), The impact of Covid-19 on youth and on sport, available at: https://www.europarl.europa.eu/doceo/document/TA-9-2021-0045_EN.html
3. Hayes, M. (2020). Social media and inspiring physical activity during COVID-19 and beyond. *Managing Sport and Leisure*, 27(1-2), pp.1–8. doi:10.1080/23750472.2020.1794939.
4. Helsen, K., Derom, I., Corthouts, J., Bosscher, V.D., Willem, A. and Scheerder, J. (2021). Participatory sport events in times of COVID-19: analysing the (virtual) sport behaviour of event participants. *European Sport Management Quarterly*, 22(1), pp.1–20. doi:10.1080/16184742.2021.1956560.
5. Keshkar, S., Dickson, G., Ahonen, A., Swart, K., Adeasa, F., Epstein, A., Dodds, M., Schwarz, E.C., Spittle, S., Wright, R., Seyfried, M., Ghasemi, H., Lawrence, I. and Murray, D. (2021). The Effects of Coronavirus Pandemic on the Sports Industry: an Update. *Annals of Applied Sport Science*, [online] 9(1). doi:10.29252/aassjournal.964.
6. Martins, D.J. de Q., Moraes, L.C.L. and Marchi Júnior, W. (2021). COVID-19 impacts on school sports events: an alternative through E-sports. *Managing Sport and Leisure*, 27(1-2), pp.1–5. doi:10.1080/23750472.2021.1928537.
7. Nielsen Sports (2018), Top 5 global sports industry trends, Nielsen, available at: https://www.nielsen.com/wp-content/uploads/sites/3/2019/04/top-5-commercial-trends-in-sports-2018.pdf
8. Nielsen Sports (2021), How the world's biggest sports properties engaged fans in 2020, Nielsen, available at: https://nielsensports.com/wp-content/uploads/2021/05/Nielsen-How-the-Worlds-Biggest-Sports-Properties-Engaged-Fans-in-2020.pdf
9. Nielsen Sports (2022), Fans are changing the game, Nielsen, available at: https://nielsensports.com/wp-content/uploads/2022/02/Nielsen-Sports-Fans-are-changing-the-game-1.pdf

10. Parnell, D., Widdop, P., Bond, A. and Wilson, R. (2020). COVID-19, networks and sport. *Managing Sport and Leisure*, 27(1-2), pp.1–7. doi:10 .1080/23750472.2020.1750100.

11. PwC (2020) Sports industry: system rebooting. PwC's Sports survey 2020, available at: https://www.pwc.ch/en/publications/2020/PwCs-Sports-Survey-2020.pdf

12. PwC (2021a) Sports industry: ready for recovery?. PwC's Sports survey 2021, available at: https://www.pwc.ch/en/publications/2021/pwc-sports-survey-2021.pdf

13. PwC (2021b) Sports transformed. Winning strategies against COVID-19 challenges to survive in the new world, PwC Singapore, available at: https://www.pwc.com/sg/en/publications/assets/page/sports-transformed.pdf

14. Research and Markets (2020), Sports Global Market Report 2020-30: COVID-19 Impact and Recovery, available at: https://www.researchandmarkets.com/reports/5022446/sports-global-market-report-2020-30-covid-19

15. Research and Markets (2021), Sports Global Market Report 2021: COVID-19 Impact and Recovery to 2030, available at: https://www.researchandmarkets.com/reports/5240315/sports-global-market-report-2021-covid-19-impact

16. Research and Markets (2022a), Sports Global Market Report 2022, By Type, Revenue Source, Ownership, available at: https://www.researchandmarkets.com/reports/5550013/sports-global-market-report-2022-by-type

17. Research and Markets (2022b), Spectator Sports Global Market Report 2022, By Type, Revenue Source, Type of Sport, available at: https://www.researchandmarkets.com/reports/5550024/spectator-sports-global-market-report-2022-by

18. Statista (2020a), *Effect of the coronavirus (COVID-19) pandemic on the number of sporting events worldwide in 2020*, by month, Statista, available at: https://www.statista.com/statistics/1129901/corona-number-sports-events-month/

19. Statista (2020b), *Effect of the coronavirus (COVID-19) pandemic on sports industry revenue worldwide in 2020*, Statista, available at: https://www.statista.com/statistics/269797/worldwide-revenue-from-sports-merchandising/

20. Statista (2020c), *Loss of revenue in the sports industry due to the coronavirus (COVID-19) pandemic as of May 2020*, by segment, Statista, available at: https://www.statista.com/statistics/1114808/coronavirus-sports-revenue-loss/

21. Statista (2020d), *Timeframe for the sports industry to recover from the COVID-19 crisis according to sports industry leaders worldwide as of August 2020*, Statista, available at: https://www.statista.com/statistics/1192693/sports-industry-timeframe-covid/

22. Statista (2020e), *Most common uses of digital technologies by the traditional professional sports industry as a result of the coronavirus (COVID-19) pandemic according to eSports industry professionals worldwide as of October 2020*, Statista, available at: https://www.statista.com/statistics/1247907/new-technology-pro-sport/

23. Statista (2020f), *Expected growth of sports media business models according to sports industry leaders worldwide as of August 2020, by type*, Statista, available at: https://www.statista.com/statistics/1192758/sports-industry-business-models/

24. Statista (2020g), *Impact of playing background music on watching sports TV during the coronavirus 2020*, Statista, available at: https://www.statista.com/statistics/1123200/background-music-sport-tv/

25. Statista (2020h), *Importance of recorded crowd noise to watching sport on TV in the U.S. 2020*, Statista, available at: https://www.statista.com/statistics/1192758/sports-industry-business-models/

26. Statista (2020i), *Impact of realistic-looking fans on watching sport on TV during coronavirus 2020*, Statista, available at: https://www.statista.com/statistics/1123193/realistic-looking-fans-sport-tv/

27. Statista (2020j), *Impact of hearing natural sounds on sports TV during coronavirus crisis in 2020*, Statista, available at: https://www.statista.com/statistics/1123205/natural-sounds-sports-tv/

28. Statista (2022a), *eSports market revenue worldwide from 2019 to 2024*, Statista, available at: https://www.statista.com/statistics/490522/global-esports-market-revenue/

29. Statista (2022b), *eSports market revenue worldwide in 2021, by region*, Statista, available at: https://www.statista.com/statistics/443147/estimate-of-global-market-revenue-of-esports-by-region/

30. Statista (2022c), *eSports audience size worldwide from 2019 to 2024, by type of viewers*, Statista, available at: https://www.statista.com/statistics/490480/global-esports-audience-size-viewer-type/

31. Statista (2022d), *eSports market revenue worldwide in 2021, by segment, Statista*, available at: https://www.statista.com/statistics/490358/esports-revenue-worldwide-by-segment/

32. Thibaut, E., Constandt, B., De Bosscher, V., Willem, A., Ricour, M. and Scheerder, J. (2021). Sports participation during a lockdown. How COVID-19 changed the sports frequency and motivation of participants in club, event, and online sports. *Leisure Studies*, pp.1–14. doi:10.1080/02614367.2021.2014941.

33. United Nations Department of Economic and Social Affairs (2020a), COVID-19, available at: https://www.un.org/en/desa/covid-19

34. United Nations Department of Economic and Social Affairs (2020b), UN/DESA Policy Brief #73: The impact of COVID-19 on sport, physical activity and well-being and its effects on social development, available at: https://www.un.org/development/desa/dpad/publication/un-desa-policy-brief-73-the-impact-of-covid-19-on-sport-physical-activity-and-well-being-and-its-effects-on-social-development/

35. Westmattelmann, D., Grotenhermen, J.-G., Sprenger, M. and Schewe, G. (2020). The show must go on - virtualisation of sport events during the COVID-19 pandemic. *European Journal of Information Systems*, 30(2), pp.1–18.

CHAPTER 20

Graduate students' migration behavior

Aleksandar Erceg[1,2]

ABSTRACT

One of the Higher education institutions (HEI) main goals is to educate and prepare a skilled labor force that should become a significant part of the national economy. Based on different studies (i.e., Faggian and McCann, 2009; Đuras, 2018; Dedukić, 2021, etc.), although most graduates tend to stay and work in the area they studied, some consider going abroad to start their careers. HEI graduate migration has a considerable research interest in the academic community. That only stresses the importance of the HEIs considering the potential migration of their students in two directions when enrolling and when graduating.

The main paper aims to present a literature review related to HEIs graduate migrations and empirically research Faculty of Economics in Osijek (EFOS) alumni experience regarding their behavior to external migration and starting their careers in Croatia or abroad. Research among EFOS alumnus was conducted in April 2021, and the data were analyzed with SPSS v23. The research data shows that most EFOS graduates stay in Croatia after graduation. The paper analyzes those who decided to leave Croatia after graduation and start their careers abroad. Research results can be a good foundation for HEI to improve and/or change its curricula to help prevent future migrations.

Keywords: *higher education institutions, migration, behavior*

JEL classification: *I23, O15*

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1. Introduction

Due to their significance, migrations are of academic interest to many researchers, and this is due to their connection to the sustainability, existence, and function of many countries worldwide. Migration is a movement component that influences the population and spatial distribution, socioeconomics, and demographic composition, which can have delayed or instantaneous effects. These population characteristics are influenced by migration in two areas – emigration from origin and immigration to the destination. It is migration, especially economic and voluntary, that shows that people are not only reconciled with survival and basic needs but they are driven by the desire and hope that leaving and employment in a more prosperous country will achieve the ideal of better and higher, at any level (Peračković and Rihtar, 2017). Friganović (1989) states that population migrations are constantly influenced by humanity's economic, political, cultural, and ethnic evolution. Every significant period in the development of society was marked by the migration of a particular type with specific causes and consequences. Therefore, the study of migration is significant. Many researchers (e.g., Castles and Miller, 2009) and theorists of migration from various scientific disciplines are increasingly focusing on complex issues of international migration (Balija, 2019). Migration issues are not new phenomena but continuous topics whose importance is well-known and recognized. However, Troskot, Prskalo, and Šimić Banović (2019) state that public policy mechanisms and relevant institutions do not offer enough solutions and activities to solve these issues.

Unemployment of young people is the most important and current problem of today, which affects the individual and the whole community. It leaves behind major adverse economic, political, and social problems related to the entire community. Young and highly educated people are in a bad social position because new jobs are not created or opened for a small number of people. Then, young, highly educated staff who finish their studies and enter the labor market face a big problem - lack of work experience. The labor market is mainly looking for candidates with work experience.

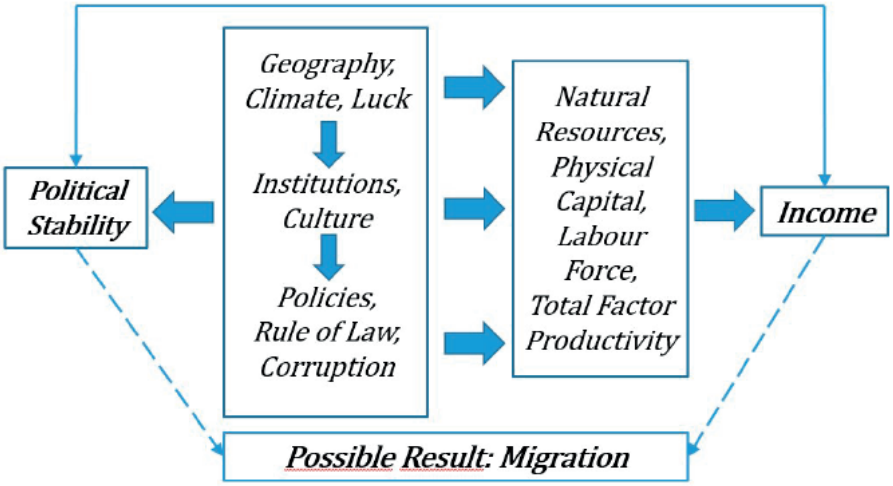
The paper aims to investigate students' behavior at the Faculty of Economics in Osijek related to external migrations after graduation. Section 1 of the paper presents a literature review on graduated students' migrations, and section 2 presents a literature review on brain drain. Section 3 of the paper presents the research of the Faculty of Economics in Osijek on students' intentions to migrate abroad, with particular emphasis on the student that started their careers abroad. The conclusion and proposals for further research are given in the last section of this paper.

2. Literature review

Human capital at a high level is considered a prerequisite for a country's economic performance and competitiveness. To reach a high quality of human capital, it is necessary to invest in and develop HEIs to have highly educated graduates. Thus, education has one of the most significant roles when talking about migration governing factors, and according to Handler (2018), this is more in the long run than in the short term. The author further states that causation direction is debated in theory regarding the long-run effect and that education is positively correlated with rising income. Kotavaara et al. (2018: 96) concluded that university regions do not always manage to take advantage of the full potential of local higher education, as they are not always able to retain university students after graduation. Additionally, they stated that previous research showed significant regional variations regarding graduated students who remained in the same region as the university.

Hsieh and Klenow (2010) presented the fundamental causal relations ruling the reasons for migration (Figure 1).

Figure 1: Migration reasons



Source: adapted from Hsieh and Klenow (2010)

Hsieh and Klenow (2010) stated that there are several different sources of migration, including political stability and income, which can be influenced by natural resources, geography, climate, institutions, culture, and the rule of law in the origin country. Given the utter opportunity to change residence (e.g., costs, information), existing and potential political (in)stability and international income differences give the necessary means for a person's decision to go abroad (Handler, 2018). Fargues (2017) presented a complex dual relation between migration and education that affects origin and destination countries and migrants and non-migrants in those countries. (Figure 2)

Figure 2: Mutual causation between education and migration

Concerned population		Education → Migration	Migration → Education
Origin country	**Migrants**	Education, a driver of migration	Education gained abroad, then brought back home by return migrants ("circular migration")
	Non-Migrants	Development consequences of highly-educated migration: "brain drain" vs. international remittances	Migrant remittances' impact on education in the homeland; parent's absence impact on education; prospect of emigration, an incentive to acquire more education ("brain gain")
Destination country	**Migrants**	Over-qualification of migrants ("brain waste")	School performances of migrants' kids; student (and teachers') migration
	Non-Migrants	Competition and emulation between natives and migrants	Diversity of origins in the classroom and the quality of education; enroll-ment of locals in foreign schools and the building of human capital

Source: adapted from Fargues, 2017

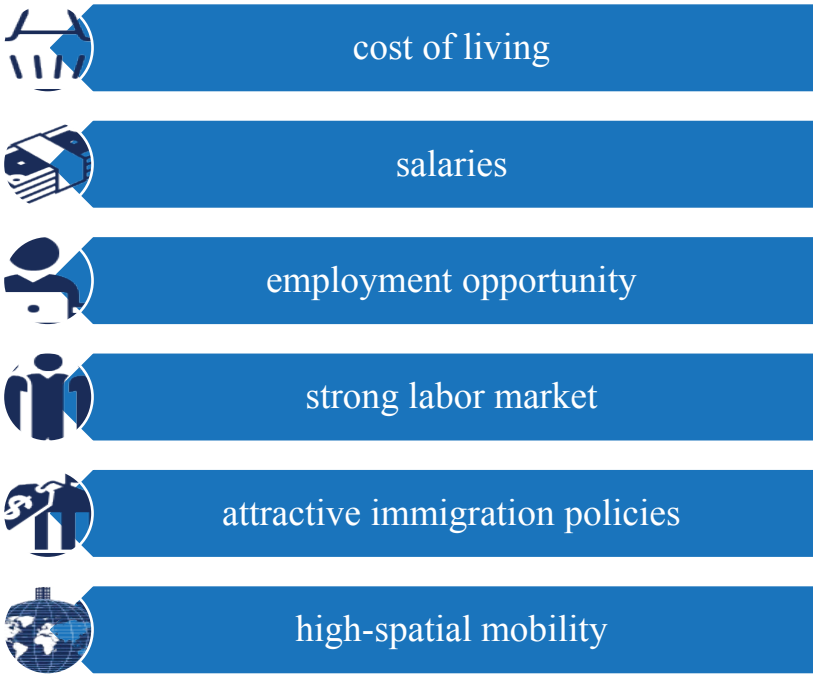
The author explains that there is mutual causation between education and migration. The migration can result in circular migration or brain gain for the origin country. In contrast, it can result in increased competition and diversity of origins in educational institutions in the destination country. Handler (2018) stated that education enhances migration by improving managing unfavorable situations and encouraging future-oriented ones. On the other side, education can delay migration by increasing better jobs and salary possibilities at home. Barrientos (2007) concluded that developing countries, when the migration rate is low and there is a requirement for human capital, can benefit from emigration while they lose when emigration grows high. Finally, Handler (2018) concluded that education has a substantial impact on migration, both positively (e.g., in early income development stages) and negatively (e.g., in later stages with improved living conditions).

More than several migration studies (e.g., Finney 2011) found that students are highly mobile with a predominant effect on distant migration flows (Dennett and Stillwell, 2010), uneven distribution of human capital (Faggian and McCann, 2009), and increased level of residential mobility (Sage, Smith and Hubbard, 2012). The connection between graduate migration and students is a fundamental part of intellectual elite cross-border mobility (Lowell et al., 2004). Data from UNESCO Institute for Statistics (2021) showed that almost 2% of students were part of migration since they studied at universities outside their countries. Caree and Kronenberg (2014) state that recently graduated university students constantly have high-level spatial mobility. Most developed economies are moving toward knowledge-based and progressively significant human capital (Dotti et al., 2013). Haapanen and Tervo (2012) state that regions with a lower level of human capital

have constrained growth. Since there is an acknowledgment of overseas graduates' importance, numerous industrialized countries have developed new immigration policies explicitly targeting this foreign population segment (Rowe, Corcoran, Faggian, 2013: 79) and focused on attracting educated immigrants. Researchers (Franklin, 2003; Winters, 2012) found that graduate students base their migration decision on several factors (e.g., cost of living in the desired area, employment opportunities, wage, etc.). It is essential to state that young graduate students are attracted to migrate to large cities with a strong labor market and higher wages (Oosterbeek and Webbink, 2011). Figure 3 summarizes the factors attributing graduate students' migrations.

In general, the migration process is divided into three stages: preparatory (which is the formation of territorial mobility of the population), primary (own resettlement), and final (which is the adaptation of migrants to the new place (Sobkin, Smyslov and Kolomiets Yu, 2020). Kazakis and Faggian (2016) found that migrants are self-selected and cannot be general population representatives. Faggian, McCann, and Sheppard (2007) found that graduate students with better grades are more mobile than other students and have better employment possibilities after finishing their education.

Figure 3: Factors attributing graduate students' migration



Source: adapted from Franklin, 2003; Oosterbeek and Webbink, 2011; Winters, 2013; Karee and Krobenerg, 2014

Because of graduated students' migration, there can be a significant intellectual elite loss for the country that can negatively affect the area's economic, technological, and trade resources (Corcoran and Faggian, 2017). Szelenyi (2006) concluded that educated population loss, described in the literature, is brain drain and lessens the area's human capital. Mass emigration of highly educated (even already employed) professionals, i.e., "brain drain", is harmful because the damage it causes is dual: first, it reduces the development capacity and life quality in local communities and, second, investment in the education of those who have gone are turning into a futile investment (Peračković and Rihtar, 2016). Venhorst, Van Dijk, and Van Wissen (2010) state that universities will benefit only from the human capital gain if the graduate students stay in the region. Thus, many areas have measures to keep graduates to human capital and inspire them to pursue employment in the region to pay back their education costs primarily covered by the country (Krabel and Flöther, 2014). If the countries want to avoid brain drain, attracting and retaining graduate students is significant. Many studies examined brain drain and intellectual migration (Noorden, 2012; Novotny, Fertrova, and Jungwiertova, 2020; Subbotin and Samin, 2020). Szelenyi (2006) as an opposite state brain gain which describes economic and educational gains of different countries that host skilled immigrants for a more extended period and usually permanently.

In addition to brain drain and brain gain, the circulation of highly educated young people and scientists is also essential. Circulation signifies a positive phenomenon because it is a short-term departure for personal and professional development. After that, they return to work in their home country with newly acquired skills (Đuras, 2018). However, regardless of the arrival of qualified employees, it is more worthwhile to invest in education in the long run because the local population will also learn the same required knowledge and skills and will go to another country due to lack of work in their own country (Jakovljević, Marin and Čičin-Šain, 2012).

3. Brain drain

The European Committee of the Regions (2018) published a report on "Addressing the brain drain: the local and regional dimension", which deals with migration flows at regional levels within Europe, the mobility of young, highly educated people within the European Union and various factors affecting mobility as well as the socio-economic impact of "brain drain" at regional levels. According to their results in 2017, there were migrants within 28 countries of the European Union, of which a total of 32% of the population includes young people aged 15-34. Most migrants choose Germany or the United Kingdom as their destination, and most of them come from countries such as Romania, Poland, Italy, and Portugal. The percentage of highly educated migrants with tertiary education is 25%. They choose urban areas and the northern parts of the European Union as ideal career advancement and development places. Ireland, Sweden, Denmark, Estonia, and parts of the United Kingdom share a reasonably high employment rate.

Rehak and Eriksson (2019) stated two conceptual methodologies for presenting the interrelation between jobs and higher education in a migration framework. The human capital theory of internal migration is the first approach for describing the higher education mechanism and migration (Harris and Todaro, 1970). The second approach is the education concept, differentiating between skills mismatch and overeducation (Sattinger, 1993). Haapanen and Tervo (2012) concluded a lower brain drain in universities in the growth centers (i.e., capital cities) than in the country's universities in peripheral regions. Their research was confirmed by Ahlin, Andersson, and Thulin (2014), who found that graduate students in Sweden move to countries largest regions. Similar graduate students' migration was found in Italy (Fratesi and Percoco, 2014), the United Kingdom (Faggian and McCann, 2009), and the Netherlands (Venhorst, van Dijk, and van Wissen, 2010).

Different researchers (e.g., Venhorst, van Dijk and van Wissen, 2011; Krabel and Flother, 2014; Ahlin, Andersson and Thulin, 2014) found that regional growth of the economy, level of wages, employment rate, and potential jobs availability influence graduate students migration decisions. However, it is essential to state that the objectives behind university graduates' migration decisions are more complicated than just securing better job possibilities and/or higher wages (Nifo and Vecchione, 2014). Finally, Kotavaara et al. (2018) concluded that university graduates look for increased life quality which contains a mix of different characteristics such as economics, cultural social that are connected to social mobility, job opportunities, and economic welfare.

3.1. Croatia and migration

According to the World Economic Forum (Schwab, 2019), Croatia is among the highest-ranked countries with the world's most significant "brain drain". On a 1 to 7 scale (1 = all talented people leave the country, 7 = all talented people stay in the country), Croatia has an index of 1.88, followed by neighboring Bosnia and Herzegovina (1.76), Northern Macedonia (2.13), and Serbia (2.31). The country with the highest brain drain index is Haiti, with 1.70. These results show that Croatia is immensely affected by this phenomenon and needs effective measures such as improving the quality of life and providing quality jobs to stop the further emigration of highly educated skilled labor.

According to Potočnik and Adamović (2018), two-thirds of young people consider moving abroad for a long time or forever if they fail to achieve their personal and professional goals in Croatia. Authors further state that it should be borne in mind that emigration from Croatia is not the primary wish of young people; young people who manage to find stable employment and quality of life conditions in their home country choose to stay in the country. In this context, it is crucial to understand that the causes of dissatisfaction with life in Croatia are not the only determinants of the decision to emigrate. In addition to the pressure mentioned above factors in the country of origin, the decision of an individual to leave the homeland is also influenced by attractive factors in the country of destination.

Today, the departure of young people is most often a result of the employment impossibility as a socio-economic factor and the characteristics of the society in which they grow up (Kraljević, 2020). Research by Spajić-Vrkaš and Ilišin (2015) showed that 30% of young people believe that nepotism prevails in society (the importance of "connections" and not abilities and expertise), lack of life perspective, and low standard of living and that this is causing migration of young graduates. Aspirations related to the professional development of young people and the achievement of satisfactory status should not be neglected. It is important to state that there is no difference in graduates' desire to leave depending on their settlement type (Šimac, Rukavina, and Trako Poljak, 2021). Hence, students from urban settlements think more often about going to live and work abroad than their colleagues from rural settlements. It has been shown that for graduates from rural areas, predictors for leaving include the level of social support. In contrast, graduates from urban areas include national pride and trust in Croatian institutions.

Research conducted in Croatia indicates that young people considering the decision to leave the country are not primarily or exclusively guided by the opportunity for better material status (Potočnik and Adamović, 2018; Peračković and Rihtar, 2016). On the other hand, young people see leaving the country as an escape from a dysfunctional social system, and they do not trust the origin country's system. They believe that the destination country will give them a fairer chance for a better and happier life.

The previous research results (Spajić-Vrkaš and Ilišin, 2015; Peračković and Rihtar, 2016; Potočnik and Adamović, 2018; Šimac, Rukavina and Trako Poljak, 2021) showed that many graduate students want to live outside Croatia. Most of them believe that they will live in one of the countries of the European Union, stating, among other better living prospects, better living standards, and more accessible employment. For a country threatened by depopulation, it is worrying that graduated students are relatively severe about emigrating, although this does not mean they will realize their intentions (Šimac, Rukavina & Trako Poljak, 2021).

Research conducted by Stanić, Perić and Stanić (forthcoming) concluded that developing programs encouraging university cooperation with the business community could stimulate joint projects. Those projects will enable young people to experience the business environment before entering the labor market, improve the community's life quality, and enable young people not to seek opportunities outside their homeland. The result of joint programs lies in the development of intellectual migration, especially in widening conceptual frameworks of academic mobility and scientific relations (Dolzhikova et al., 2017).

4. Results and discussion

The Faculty of Economics in Osijek graduate students' research was conducted from January 2021 to March 2021. The sample of respondents for this research included 486 alumni of the Faculty of Economics in Osijek. An online questionnaire was created on the Alchemer tool and sent to 3500 e-mail addresses to collect data, making the response rate 13.9%. The sample characteristics are shown in Table 1.

Table 1: Sample characteristics (n=486)

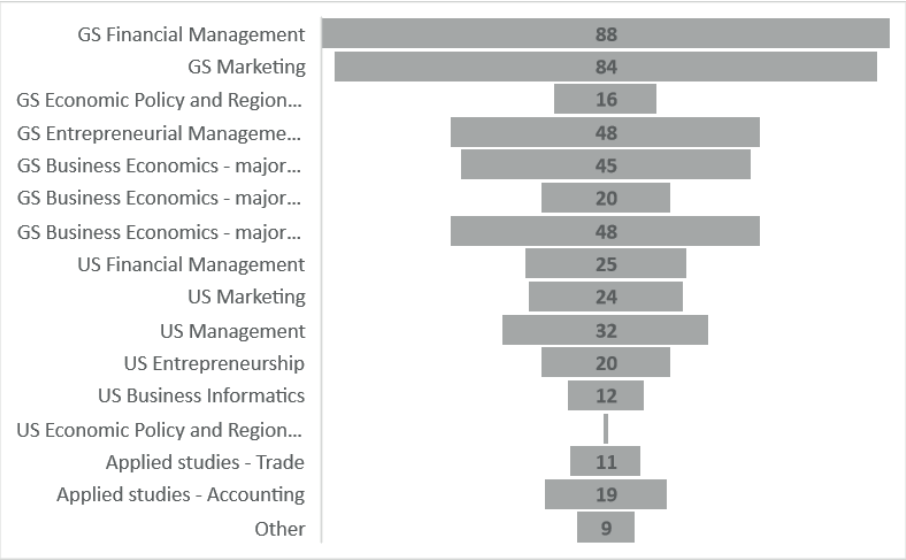
Variable	N	%
Gender		
Male	145	29.8
Female	341	70.2
Age		
20 - 23	61	12.6
24 - 29	309	63.6
30 - 39	83	17.1
40 - 55	30	6.2
Older than 55	3	0.6
Highest level of education		
University applied study	27	5.6
University undergraduate study	116	23.9
University graduate study	343	70.6

Source: author

The research is based on a suitable sample of respondents. However, minor deviations from the characteristics of the Faculty of Economics in Osijek student population when writing this paper are relatively small. According to the internal data of the Faculty of Economics, in the academic year 2020/2021, in all study programs of the Faculty of Economics in Osijek, the share of women in the student population was 60.7%, while the share of women in the sample of respondents was 70.2%. Furthermore, the most significant number of respondents (70.6%) completed university graduate studies, corresponding to the entire population's data on completed study programs. Ultimately, the most significant number of respondents who completed the questionnaire (63.6%) are in the age group of 24 to 29 years, which is relevant data given that the central part of the questionnaire refers to job search and the role of formal higher education in that process.

At the research time, the Faculty of Economics in Osijek offered five graduate university programs, six undergraduate university studies, and two professional studies in accounting and trade. Figure 4 shows the number of respondents according to completed study programs.

Figure 4: Completed study programs at the Faculty of Economics in Osijek (number of respondents) (n=486)

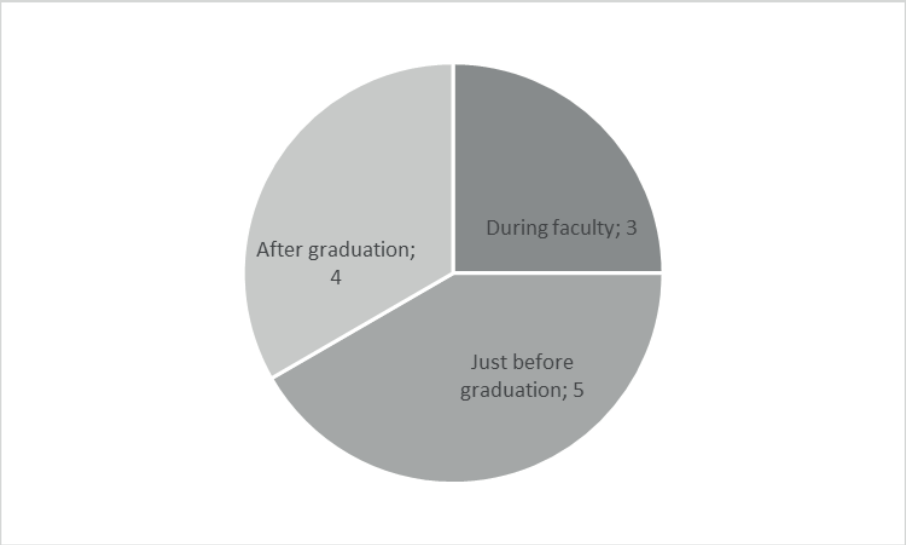


*GS – graduate studies; US – undergraduate studies

Source: author

This paper evaluates the external migration of the Faculty of Economics students – i.e., whose first job was outside Croatia. Out of the total number of respondents, there were only twelve graduate students whose first job was abroad – making it only 2.5% of the total number of respondents and only 3.4% of those who have found a job. Three more graduate students (0.62%) were unemployed during research and looking for a job outside Croatia. It is essential to state that this represents the limitation of this research since only 2.5% had their first job within their qualification abroad or looking for employment abroad. These results contrast study results by Dedukić (2021), who found that uncertainty in employment in the Croatian labor market has resulted in a wave of emigrants. The largest group consists mainly of young and middle-aged people.

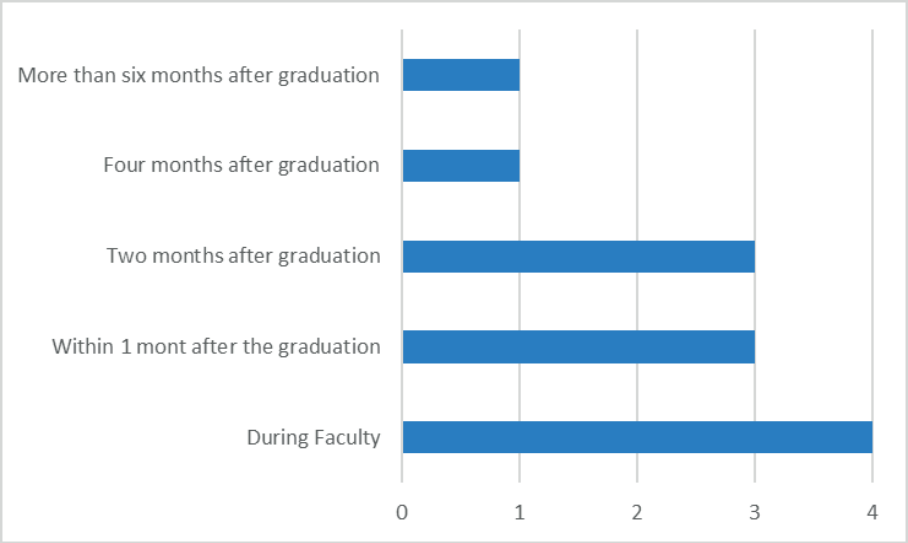
Figure 5: Starting with a job search (n=12)



Source: author

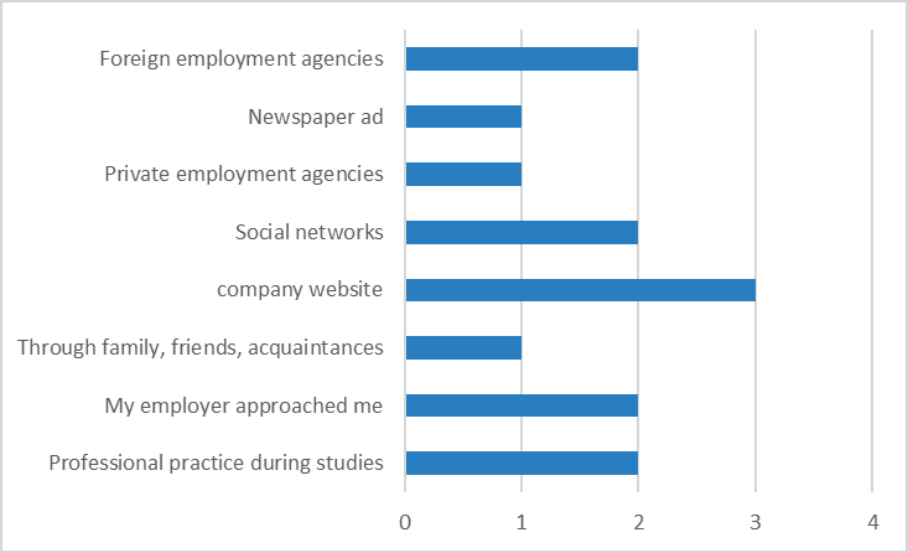
Based on the research results, one can see that two-thirds of the students started looking for a job abroad by the time they graduated, showing their intention to find a job outside Croatia. This shows their intention to leave Croatia no matter the possibility of finding a job in their home country. More than half students found a job abroad within one month after graduation (Figure 6), which can be connected to their intention to leave Croatia and the timing of their job search. This data confirms their intention to work outside Croatia no matter what could happen in Croatia regarding their potential career.

Figure 6: When did you find your job? (n=12)



Source: author

Figure 7: Where did you get information about your job? (n=12)



Source: author

Students have used several channels to find information about their potential job abroad. Most used sources of information are company websites, social networks, and foreign employment agencies, while newspaper ads and contact through friends and family were not used so often.

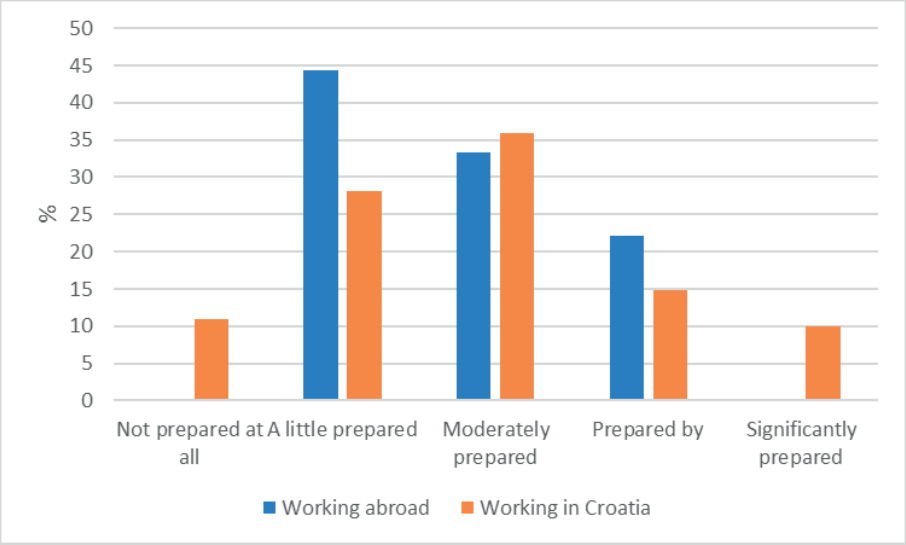
Figure 8: Type of contract for the first employment (n=12)

Source: author

It is important to state that more than half of the students that started their careers outside of Croatia got indefinite employment contracts which shows the intention of foreign companies to keep them for a more extended period. On the other side, only 2 graduate students started their career abroad through the trainee employment contract. This can be the only first step to the indefinite contract, but at the same time, this can allow the graduate student to have some experience and then leave for another company. Inadequate wages are one of the push factors that can affect leaving the country. The average net salary for the third quarter of 2021, according to the Central Bureau of Statistics in Osijek-Baranja County, amounted to 6,532 HRK. More than 62% of respondents working in Croatia have a lower than or average net salary, while 33% have a higher than the average net salary. Answers from respondents who left Croatia show that more than 55% have an average salary higher than 7,000 HRK. Higher salaries can be an attractive influence for starting a career abroad and potential immigration reasons. On the other side, one should consider differences in the purchasing power in the destination country since the higher nominal salaries are not higher in the actual terms. These findings offer another research possibility in comparing purchasing power concerning salaries of the students who started their careers abroad.

When asked about readiness for work (i.e., knowledge, skills, etc.) situation is almost the same. More than 75% of respondents working in Croatia feel moderately or less prepared for work, and more than 77% of respondents working outside Croatia feel the same. (Figure 9) This can lead to the conclusion that the quality of education does not play an essential role in decisions on working in or outside Croatia.

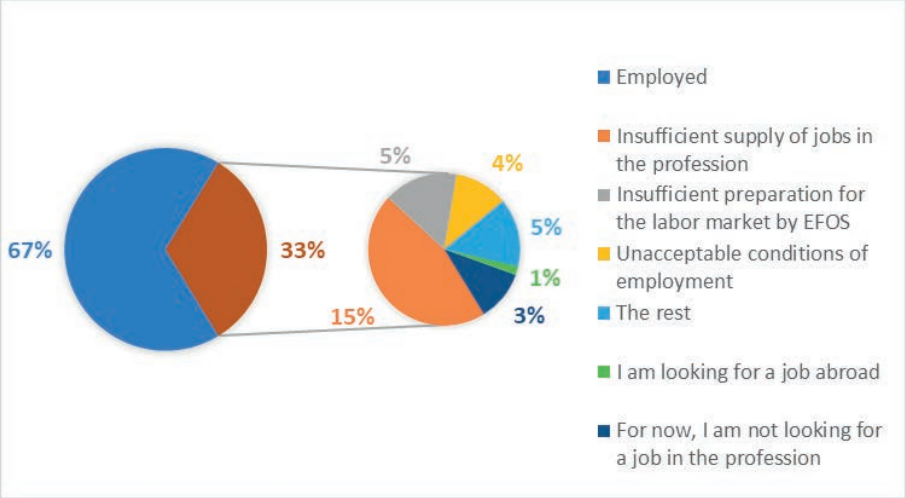
Figure 9: Preparation for the job (n=486)



Source: author

Based on answers, only 33% of the total respondents are unemployed, as seen in Figure 10. However, the reason for unemployment differs.

Figure 10: Reason for unemployment (n=486)



Source: author

Out of all unemployed respondents, only 1% are unemployed since they are looking for a job outside Croatia. This shows that most currently unemployed respondents believe that they will be able to start a career in Croatia and are not considering moving abroad.

5. Conclusions

Migrations have always been an exciting topic, and they are theoretically and methodologically one of the most comprehensive and complex variables in social research. The migration process is influenced by various factors, including other economic and political reasons. Earlier findings indicate that the development of higher-quality universities can increase the retention of graduates in the region. Job matching education is a vital migration characteristic of non-local graduates concerning potential career opportunities and higher salaries. Universities have a significant role in the regional economy since they can be the push and pull factors influencing migration flows.

Although we witness daily news about people leaving the country, the research shows that the situation is not bad among the Faculty of Economics alumni. Based on the research results, young people do not want to leave their families and tend to give life in Croatia a chance. The results showed that only 3.4% of respondents worked outside Croatia during the research, confirming previous studies that the intention to seek employment abroad is low. Our research shows that young people do not consider moving abroad and starting a job their priority. Although the results lead to this conclusion, one should consider that there are probably more students who want or will be willing to work abroad if they do not find a job in Croatia or get a job offer abroad. However, as stated previously, the research was limited only to Faculty of Economics alumni, and for a short period, so the research results could be misleading.

Therefore, repeating the survey among the same respondents could produce different results. Additionally, future research should be extended to other faculties within the University of Osijek. It should also look at the influence of regional characteristics on retaining graduates and differentiating between different graduate types.

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References

1. Ahlin, L., Andersson, M., Thulin, P. (2014) "Market Thickness and the Early Labour Market Career of University Graduates: An Urban Advantage?" Spatial Economic Analysis, Vol. 9, No. 4, pp. 396-419.
2. Balija, M. (2019) "Iseljavanje iz Hrvatske – razvojno ili sigurnosno pitanje", Podravina, Vol. 18, No. 35, pp. 105-121.
3. Barrientos, P. (2007) "Analysis of International Migration and its Impacts on Developing Countries", Institute for Advanced Development Studies, Development Research Working Paper 12/2007. Available at: http://www.inesad.edu.bo/pdf/wp12_2007.pdf [Accessed: March 11, 2022]
4. Carree, M.A. Kronenberg, K. (2014) "Locational choices and the costs of distance: empirical evidence for Dutch graduates", Spatial Economic Analysis, Vol. 9, No. 4, pp. 420–435.
5. Castles, S., Miller, P. M. J. (2009) "The Age of Migration: International Population Movements in the Modern World", USA: Palgrave Macmillan.
6. Corcoran, J., Faggian, A. (2017) "Graduate migration and regional development: an international perspective". In Corcoran, J. and Faggian, A. eds., Graduate Migration and Regional Development, London: Edward Elgar Publishing.
7. Dedukić, D. (2021) "Kompetencije 21. stoljeća i migracije visokoobrazovanih mladih u Republici Hrvatskoj", Forum za sigurnosne studije, Vol. 4/5, No. 4/5, pp. 125-147.
8. Dennet A, Stillwell, J. (2010) "Internal migration in Britain, examined through an area classification framework", Population, Space and Place, Vol. 16, pp. 517–538.
9. Dolzhikova, A., Arslanov, R., Moseikina, M., Linkova, E., Bukalerova. L. (2017) "The double degree program History and dialogue of cultures of the Peoples Friendship University of Russia and the University Grenoble Alpes as an aspect of intellectual migration and French Russian international cooperation in the field of education" In EDULEARN17 Proceedings, pp. 7899-7903.
10. Dotti, N.F. et al. (2013) "Local labour markets and the interregional mobility of Italian university students", Spatial Economic Analysis, Vol. 8, No. 4, pp. 443–468.
11. Đuras, M. (2018) «Proces odljeva mozgova i kako ga zaustaviti», graduate thesis, University of Zagreb, Faculty of organization and informatics, Varaždin.
12. European Committee of Regions (2018) Addressing brain drain: The local and regional dimension. Available at: https://cor.europa.eu/en/engage/studies/Documents/addressing-brain-drain/addressing-brain-drain.pdfv [Accessed: March 6, 2022]

13. Faggian A, McCann P. (2009) “Human capital, graduate migration and innovation in British cities”, Cambridge Journal of Economics, Vol. 33, pp. 317–333.

14. Fargues, P. (2017) “International Migration and Education - A Web of Mutual Causation”, UNESCO, Paper commissioned for the Global Education Monitoring Report 2019 Consultation on Migration, ED/GEMR/MRT/2019/T1/1. Available at: https://es.unesco.org/gemreport/sites/gem-report/files/Fargues_International%20Migration%20and%20Education.pdf [Accessed: March 8, 2022]

15. Franklin, R.S. (2003) “Migration of the young, single, and college educated, 1995–2000”, Special Report, US Department of Commerce, Economics and Statistics Administration, US Census Bureau. Available at: https://usa.ipums.org/usa/resources/voliii/pubdocs/2000/censr-12.pdf. [Accessed: March 8, 2022]

16. Faggian, A., McCann, P. (2009) “Universities, Agglomerations and Graduate Human Capital Mobility”, Tijdschrift voor economische en sociale geografie Vol. 100, No. 2, pp. 210-223.

17. Faggian, A., McCann, P., Sheppard, S. (2007) “Some evidence that women are more mobile than men: gender differences in UK graduate migration behavior”, Journal of Regional Science, Vol. 47, No. 3, pp. 517–539.

18. Finney N. (2011) “Understanding ethnic differences in the migration of young adults within Britain from a lifecourse perspective”, Transactions of the Institute of British Geographers Vol. 36, pp. 455–470.

19. Fratesi, U., Percoco, M. (2014) “Selective Migration, Regional Growth and Convergence: Evidence from Italy”, Regional Studies, Vol. 48, No. 10, pp. 1650-1668.

20. Friganović, M. (1989) “Migracije kao konstanta geoprostora”, Acta Geographica Croatica Vol. 24, No. 1, pp. 19-29.

21. Haapanen, M., Tervo, H. (2012) “Migration of the highly educated: evidence from residence spells of university graduates”, Journal of Regional Science, Vol. 52, No. 4, pp. 587–605.

22. Handler, H. (2018) “Economic links between education and migration: An overview”, Policy Crossover Center Vienna - Europe, Flash Paper, Vol. 2018, No. 4, pp. 1-17.

23. Harris, J., Todaro, M. (1970) “Migration, unemployment and development: A two-sector analysis”, The American Economic Review, 60(1), pp. 126–142.

24. Hsieh, Chang-Tai, Peter J. Klenow (2010) “Development accounting”, American Economic Journal: Macroeconomics 2(1), pp. 207-223.

25. Jakovljević, M., Marin, R., Čičin – Šain, D. (2012) “Izazovi globalizacije i njihov utjecaj na privlačenje i zadržavanje talenata”, Oeconomica Jadertina, Vol. 2, No. 2, pp. 66-81.

26. Kazakis, P., Faggian, A. (2016) “Mobility, education and labor market outcomes for US graduates: is selectivity important?” Annals in Regional Science, Vol. 53, No. (3), pp. 731-758. https: //doi.org/10.1007/s00168-016-0773-6.

27. Kotavaara, N. et al. (2018) “University graduate migration in Finland”, Geoforum, Vol. 96, pp. 97-107. https://doi.org/10.1016/j.geoforum.2018.07.010

28. Krabel, S., Flöther, C. (2014) “Here today, gone tomorrow? Regional labour mobility of German university graduates”, Regional Studies, Vol. 48, No. 10, pp. 1609–1627.

29. Kraljević, R. (2020) “Studenti i njihova okolina o percepciji budućnosti” In Perić Kaselj, M. ed. Migracije i identitet: kultura, ekonomija, država, Zagreb: Institut za migracije i narodnosti (IMIN), pp. 1063-1070

30. Lowell, B.L., Findlay, A., Stewart, E. (2004) “Brain strain: optimising highly skilled migration from developing countries”, Institute for Public Policy Research Working Paper, 3.

31. Nifo, A., Vecchione, G. (2014) “Do Institutions Play a Role in Skilled Migration? The Case of Italy”, Regional Studies, Vol. 48, No. 10, pp. 1628-1649.

32. Noorden R. (2012) “Global mobility: Science on the move”, Nature. 2012. Vol. 490, No. 7420. pp. 326–329.

33. Novotný J., Feřtrová M., Jungwiertová L. (2020) “Postgraduate migration behaviour of international university students supported from the Czech Development Cooperation scholarships”, Popul Space Place, Vol. 26, No. 7, e2361. https://doi.org/10.1002/psp.2361.

34. Oosterbeek, H. Webbink, D. (2011) “Does studying abroad induce a brain drain?” Economica, Vol. 78, No. 310, pp. 347–366.

35. Peračković, K., Rihtar, S. (2016) “Materijalizam kao društvena vrijednost i poticaj namjerama iseljavanja iz Hrvatske”, Migracijske i etničke teme, Vol. 32, No. 3, pp. 295-317. https://doi.org/10.11567/met.32.3.1.

36. Potočnik, D., & Adamović, M. (2018) Iskustvo migracije i planirani odlasci mladih iz Hrvatske. Friedrich-Ebert-Stiftung. Available at: http://www.fes-croatia.org/fileadmin/user_upload/Migracije_mladih_WEB_verzija.pdf [Accessed: March 1, 2022]

37. Rehak, Š., Eriksson, R. (2019) “Migration of university graduates and structural aspects of regional higher education”, European Planning Studies, pp. 1-19. https://doi.org/10.1080/09654313.2019.1700483

38. Rowe, F., Corcoran, J., Faggian, A. (2013) “Mobility patterns of overseas human capital in Australia: the role of a ‘new’ graduate visa scheme and rural development policy”, Australian Geographer, Vol. 44, No. 2, pp. 177–195.

39. Sage, J., Smith, D. P., Hubbard, P. (2012) “The rapidity of studentification and population change: there goes the (student)hood”, Population, Space and Place, Vol. 18, pp. 597–613.

40. Sattinger, M. (1993) “Assignment model of the distribution of earnings”, Journal of Economic Literature, 31(2), pp. 831–880.

41. Schwab, K. (2019) The Global Competitiveness Report, World Economic Forum. Available at http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf [Accessed: March 12, 2022]

42. Sobkin, V. S., Smyslova, M. M., Kolomiets, Yu. O. (2020) “Migration attitudes of postgraduate students: on the issue of brain drain”, Psychological-Educational Studies, Vol. 12, No. 3, pp. 61–79.

43. Spajić-Vrkaš, V., Ilišin, V. (2015) “Potrebe, problemi i potencijali mladih u Hrvatskoj-istraživački izvještaj”. Zagreb: Ministarstvo socijalne politike i mladih.

44. Stanić M., Perić, J., Stanić, R. (forthcoming) “Povećanje zapošljivosti studenata kao odgovor na migracijske izazove”. In Mijoč, J. (ed). Proceeding of 4. Hrvatski iseljenički kongres - „Povratak: stvarnost ili utopija?, u postupku objavljivanja.

45. Subbotin A., Samin A. (2020) “Brain drain and brain gain in Russia: analyzing international mobility of researchers by discipline using Scopus bibliometric data 1996-2020”, MPIDR Working Papers WP-2020-025, Max Planck Institute for Demographic Research, Rostock, Germany. https://doi.org/ 10.4054/MPIDR-WP-2020-025.

46. Szelényi, K. (2006) “Students without borders? Migratory decision-making among international graduate students in the US”, Knowledge, Technology and Policy, Vol.19, No. 3, pp. 64–86.

47. Šimac, B., Rukavina, I., Trako Poljak, T. (2021) Zašto studenti žele otići živjeti i raditi izvan Hrvatske? Istraživanje razlika u želji odlaska prema tipu naselja. In Primorac, J., Kuti, S., Marcelić, M. eds. Hrvatsko društvo i COVID-19 pandemija: Kriza kao prilika? VIII. nacionalni kongres Hrvatskog sociološkog društva, Zagreb: Hrvatsko sociološko društvo, p. 47-47.

48. Troskot, Z., Prskalo, M. E., Šimić Banović, R. (2019) “Ključne odrednice iseljavanja visokokvalificiranog stanovništva: slučaj Hrvatske s komparativnim osvrtom na nove članice EU-a”, Zbornik radova Pravnog fakulteta u Splitu, Vol. 56, No. 4, pp. 877-904.

49. UNESCO Institute for Statistics (2021) Global flow of tertiary educated students. Available at: http://www.uis.unesco.org/Education/Pages/international-studentflow-viz.aspx [Accessed: March 5, 2022]

50. Venhorst, V., Van Dijk, J., Van Wissen, L. (2010) “Do the best graduates leave the peripheral areas of the Netherlands?” Tijdschrift voor economische en sociale geografie, Vol. 101, No. 5, pp. 521–537.

51. Venhorst, V., Van Dijk, J., Van Wissen, L. (2011) “An Analysis of Trends in Spatial Mobility of Dutch Graduates”, Spatial Economic Analysis, Vol. 6, No. 1, pp. 57-82.

52. Winters, J.V. (2012) “Differences in employment outcomes for college town stayers and leavers”, IZA Journal of Migration, Vol. 1, No. 1, pp. 1–17.

CHAPTER 21

Push and pull factors of youth migration: The analysis of socio-economic context

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ABSTRACT

This paper addresses the burning issue of young people with a college degree leaving Croatia to start a professional career and build their lives in another country. Previous studies have shown an increasing number of young people considering moving out of their home country for a longer period of time or even forever. The purpose of this study is to identify the main social and economic factors that influence young people's intention to leave Croatia. Building upon previous research, the empirical analysis explores demographic variables and attitudes that may influence the decision to migrate. The hierarchical regression analysis revealed that fear of long-term unemployment and general dissatisfaction with the political and social situation in Croatia are the most important push factors, while the possibility of achieving personal goals and values by living abroad is the most important pull factor for young people's decision to emigrate.

Key words: *migration, attitudes, university students, hierarchical regression*

JEL classification: *JEL_F22, JEL_O15*

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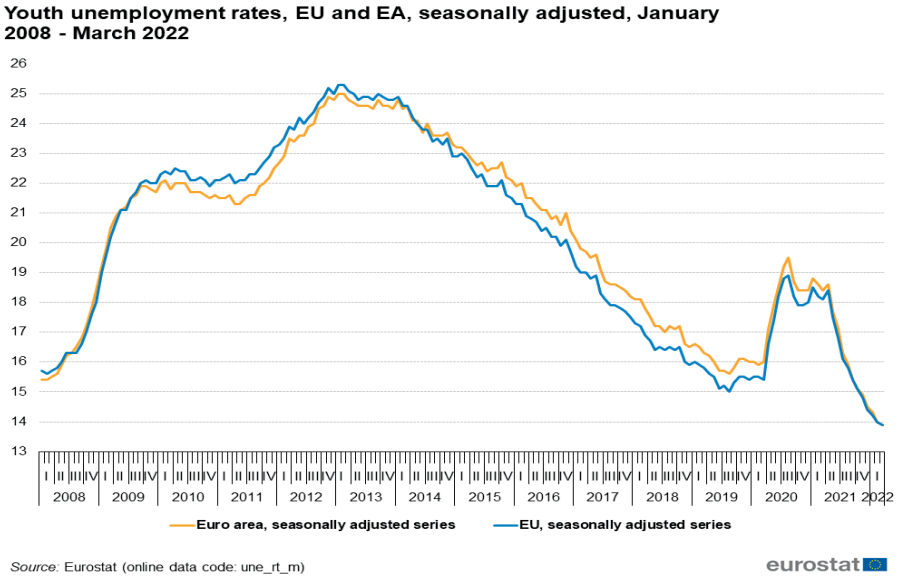
1. Introduction

According to Potočnik & Adamović (2018), two thirds of Croatian youth is considering moving abroad for a long time or forever. However, moving to a foreign country is not their primary intention. If they achieve their private and professional goals in Croatia, they are likely to stay. These facts are not idiosyncratic for Croatia. Economic crisis that hit the European Union in 2010s left many young people with poor employment prospects. Steady recovery trends that started in 2013 were overturned again in late 2019. The covid-19 pandemic has brought a new level of uncertainty that has caused a resurgence in economic activity and rising unemployment rates (Table 1).

Table 1: Youth unemployment rates, EU and EA, seasonally adjusted



Source: Eurostat (online data code:une_rt_m)

Factors that influence young person's decision to build their life outside the home country are complex and interrelated. Often, such decisions are triggered by a specific life event, for instance college graduation. This study is exploratory in nature and its aim is to increase our understanding of specific social and economic factors that shape a migration decision among youth who are in their final years of college education. The first part of the paper presents the theoretical framework and the results of previous studies in the field. This is followed by a description of the empirical study - characteristics of the sample, measures, data collection procedures, and statistical methods used in the analysis. The following section shows the results of the study and finally the paper ends with the discussion and conclusion.

2. Previous studies on migration

Migration is a complex phenomenon that requires a multidisciplinary approach to be understood and managed. Cross-border movement of people is a demographic, economic, political, legal and cultural issue. The reasons people decide to change their residence are diverse, and it is almost impossible to examine one set of migration factors without considering others. The overarching incentive for a decision to migrate is dissatisfaction with one's current life. Ostrachenko and Popova (2014) found that life satisfaction plays an important role in the formation of all types of migration intentions (permanent, temporary, and internal). Furthermore, their study showed that life satisfaction mediates the relationship between individual socioeconomic factors and migration intention as well as between macroeconomic variables and migration intention. The notion of dissatisfaction with the current climate or quality of life seems to be the common theme of many migration studies (Abdulloev, 2018; Van Mol, 2016; Van Dalen and Henkens, 2013; Berry and Okulicz-Kozaryn, 2009) and significantly increases the likelihood that a person will move away from their current residence.

The conceptual framework commonly applied in assessing the determinants of individuals' migration decision divides the influencing factors into push factors and pull factors. Both groups of factors operate in unison and one can hardly exist without the other. In other words, regardless of the strength of pull factors in a receiving country, migration will not occur on a large scale if there is no push from a donor country and vice versa. In this context, push factors are often used with a negative connotation, representing various threats or constraints to a particular lifestyle or quality of life to which an individual aspires. Common push factors include low job prospects in the home country, political corruption, inadequate health care, poor quality of the education system, or environmental degradation. Pull factors, on the other hand, are associated with the destination country and represent positive factors, such as better opportunities to find a job or develop professionally, and a better quality of life in general.

One of the subfields of migration research is youth migration. This line of research is receiving increasing attention from scholars around the world. According to the International Labour Office report (2020), young people between the ages of 15 and 29 account for 21 percent of the total number of international migrants. In general, young people migrate for reasons related to one of the following: work, education, and marriage. Although many young people see international migration as an opportunity for career advancement, better education, or personal development, the impact on the labor market and home country prosperity is significant. Unemployment rates among youth are at least twice the general unemployment rate in almost all countries, and an estimated 73 million young people are unemployed (International Labour Office, 2020). The trend of increasing international migration among young people is expected to continue.

Unemployment is only one of the macro-level indicators that affect individual's decision to leave the home country. Mainly, the higher the gap between the gross domestic product on a reginal and national level, the more willing people the less developed area are to move and the same applies to developed countries as well (Williams at al., 2018). Other macro-level indicators that are found to affect migration intentions are the quality of health system, level of crime and security issues, personal freedom, and the levels of corruption in the public sector (Baláž et al., 2016; van Halen and Henkens, 2008). At the meso level, the factors that support the decision to migrate refer to the social support one receives from one's family and friend networks, community organizations, or other groups of people who provide support and assistance to people with migration aspirations (Van Mol et al., 2018). Finally, micro level factors capture individual sociodemographic characteristics that may affect migration decision. Gender has been shown to play a role in migration decisions in that males and females do not have the same push and pull factors that influence their migration aspirations (Timmerman et al., 2015; Timmerman and Hemmerechts, 2015), nor do they have the same opportunities to leave their home country (Van Mol, 2017). In addition, youth migrants appear to be the most mobile social group, and they tend not to have marital ties, making them less attached to their home country. Besides, the prospects of a quality education are an important pull factor, and since a quality education is often expensive, both education and social status can influence migration intentions and consequently migration behavior.

The Potential Net Migration Index (PNMI) is one of the most widely used measures for tracking and predicting global migration movements. The index itself is the estimated number of adults who indicate that they would like to permanently migrate from a country if the opportunity arose, minus the estimated number who indicate that they would like to migrate to the country, as a share of the total adult population. According to the latest Gallup report (2018), the most popular destination countries globally are the U.S. and Australia, while within the European Union, most attractive countries are Sweden, Denmark, Malta, Ireland, Germany, Austria and France. Croatia is among countries with the negative PMNI values meaning that more people would like to leave Croatia than move to Croatia (PNMI in 2018 was -6%). In terms of youth migration, the situation is even worse: the Education PNMI in 2018 was -14% and the Youth PNMI was -15% indicating the net youth population loss. The unfavorable migration trend of Croats is also confirmed by Eurostat analysis. In 2010, Croatian citizens of working age (20-64) living abroad in some EU countries made up 9.9% of the population living in Croatia. In 2020, the value of the same indicator increased to 17.6%, which puts Croatians in second place on the list of the most mobile EU citizens, right after Romanians. Within the European area, Croatia is recognized as a country of emigration with one of largest diaspora communities among countries of similar size and population.

In the last two decades, Croatia has experienced a strong outflow of young people. Young people, most of whom had high school diplomas, left Croatia in search of better job and educational opportunities. Neither public policy makers nor leaders of educational institutions knew the answer to the

question of what measures should be taken to balance the influence of the strong push factors related to the economic crisis on the one hand and the pull factors of EU free movement of workers on the other. Hornstein and Taylor (2018) argue that public pressure groups should play a critical role in both fostering changes in migration policy areas and the education system to better fit the needs of the labor market. Consistent with his study, Čavrak (2013) argues that building an efficient and high-quality education system is a condition sine qua non for addressing demographic and migration challenges. Young people, especially highly educated ones, hold the promise for future economic and social progress and should therefore be at the center of the future migration agenda. Recent attempts to provide financial incentives for emigrants to return to Croatia have proven quite ineffective.

3. Sample, measures and methods

The sample of respondents included both undergraduate business students who were in their final year of study and graduate business students. There are several reasons for this sample selection. First, all of the selected students are one or two years away from graduation and therefore will soon be looking for a job. The first job is considered a milestone in a young person's life and can be seen as a triggering event for the decision to move to another place to start the new stage of life. Second, business schools provide a wide range of knowledge and transversal skills that can be used in a variety of situations and work settings, both in home country and internationally. Third, business students get an exposure to the international companies during their studies (through various classroom activities, case studies, mobility programs, professional internships), and for most of them, finding a job in their field in another country is a realistic option.

The sample included 252 respondents with the average age of 23.06 years. Demographic characteristics of the sample are provided in the table 1.

Table 1: Demographic characteristics of the sample

Variable	Category	Frequency	Percentage
Gender	Male	77	30.6
	Female	175	69.4
Year of study	3rd year of undergraduate study	79	31.3
	1st year of graduate study	94	37.3
	2nd year of graduate study	79	31.7
Academic major	Financial management	62	24.6
	Marketing	32	12.7
	Management	57	22.6
	Entrepreneurship	49	19.4
	Business Informatics	40	15.9
	Logistic Management	12	4.8
Work Status	Employed	56	22.2
	Student job	160	63.5
	Unemployed	36	14.3
Standard of living	Below average	26	10.3
	Average	173	68.7
	Above average	53	21.0
Migration intention	I plan to live in Croatia two years after the graduation from college	224	88.9
	I plan to live in Croatia five years after the graduation from college	190	75.4

Source: Author's work

Individual's intention to leave the home country after graduation is set at the main dependent variable in the research design. According to previous studies, migration intentions are considered to be a good predictor of migration behavior (De Jong 2000; van Dalen and Henkens, 2013). It is represented by a three-item construct (Cronbach's Alpha = .956) expressing the intention on the three levels: as a want (*I want to live abroad after graduation from the college*), as an expectation (*I expect to live abroad after graduation from the college*) and as an intention (*I intent to live abroad after graduation from the college).*

The main predictor variables – push and pull factors – are adapted from Kasap & Ćubela, (2019) and measured on a seven-point Likert scale. They represent personal, economic, social and political reasons that may serve as an incentive for an individual to leave a home country or to move to a foreign country for a longer time period.

The hierarchical regression modeling was used to assess individual role of each set of prospective predictor variables by including more predictors and building successive linear regression models.

4. Results

Respondents' migration intentions seem to be consistent with the results of previous studies in that the longer the period they focus on, the easier it is for them to imagine living abroad. Moving from a two-year period to a five-year period, the percentage of respondents confirming their intention to stay in Croatia drops from 88.9% to 75.4%. To better understand the factors influencing this decision, all likely predictors were divided into two groups - one group includes factors related to the home country (push factors), and the other group includes factors related to the destination country (pull factors). Correlation analysis confirmed a statistically significant but very weak relationship between intention to leave and push factors (correlation coefficients ranging from .260 to .344) as well as between intention to leave and pull factors (correlation coefficients ranging from .196 to .415).

Table 2: Correlation matrix for intention to leave Croatia and push factors

	1	2	3	4	5	6	7	8
Intention to leave (1)	1	.341**	.260**	.307**	.344**	.283**	.291**	.333**
Unemployment (2)		1	.624**	.581**	.679**	.510**	.476**	.297**
Inadequate salaries (3)			1	.723**	.735**	.602**	.634**	.394**
Uninspiring work environment (4)				1	.743**	.625**	.659**	.356**
Job insecurity (5)					1	.704**	.670**	.387**
Corrupt society (6)						1	.756**	.399**
Life in an unregulated country (7)							1	.420**
The intolerance of the political and social situation in Croatia (8)								1
M	3.05	4.70	5.18	5.08	5.00	5.53	5.24	4.83
SD	1.90	1.68	1.60	1.43	1.54	1.44	1.53	1.64
** Correlation is significant at the 0.01 level								

Source: Author's work

Table 3: Correlation matrix for intention to leave Croatia and pull factors

	1	2	3	4	5	6	7	8	9
Intention to leave (1)	1	.409**	.231**	.228**	.196**	.243**	.415**	.365**	.316**
Achieving personal goals and values (2)		1	.537**	.505**	.319**	.415**	.389**	.460**	.469**
Job search (3)			1	.610**	.244**	.529**	.362**	.492**	.408**
Inspiring work environment (4)				1	.357**	.472**	.416**	.477**	.465**
Uncorrupted society (5)					1	.430**	.350**	.369**	.543**
New experiences (6)						1	.570**	.546**	.519**
Rich cultural and entertainment life (7)							1	.626**	.566**
Professional development (8)								1	.584**
Life in an environment with a high level of human rights protection (9)									1
M	3.05	5.22	5.69	5.10	4.90	5.68	4.81	5.65	5.10
SD	1.90	1.42	1.22	1.33	1.56	1.29	1.63	1.19	1.33
** Correlation is significant at the 0.01 level									

Source: Author's work

The next step was to build the regression models. Hierarchical multiple regression is the method of choice for studies that are based on a solid foundation of selected theoretical frameworks and whose goal is to test the explanatory power of preselected groups of variables. The process of hierarchical regression analysis consists of building three successive linear regression models. The first model included sociodemographic variables that were treated as control variables in the study. None of the variables in Model 1 had statistically significant predictive power for intention to leave. The second model comprised of control variables and push factors. Possibility to stay unemployed longer after graduation and general dissatisfaction with the political and social situation in Croatia are the most important predictors of the intention to leave the country. Due to the interrelationships among the variables, gender is a significant predictor of intention to leave the country, in the sense that male respondents have a more pronounced intention to leave.

The Model 3 included variables from Model 2 and the pull factors. Gender and fear of long-term unemployment lost their predictive power, while the perception of an opportunity for achieving personal goals and values by living in a foreign country became the main predictor of the intention to leave. The final model explains 35.6% of the variance.

Table 4: Hierarchical regression analysis

	Model 1	Model 2	Model 3
Control variables			
Age	-.001	-.034	-.049
Gender	.102	.203**	.210**
Year of study	.027	.087	.099
Academic major	.036	.016	.020
GPA (undergraduate study)	.130	.043	.015
GPA (graduate study)	-.056	-.013	.003
Work status	.027	.033	.032
Push factors			
Unemployment		.204*	.127
Inadequate salaries		-.156	-.143
Uninspiring work environment		.077	.063
Job insecurity		.192	.122
Corrupt society		-.029	.014
Life in an unregulated country		.026	-.024
The intolerance of the political and social situation in Croatia		.287**	.227**
Pull factors			
Achieving personal goals and values			.292**
Job search			-.055
Inspiring work environment			-.042
Uncorrupted society			-.081
New experiences			-.071
Rich cultural and entertainment life			.184
Professional development			.114
Life in an environment with a high level of human rights protection			.021
r^2	.023	.242	.356
Adjusted r^2	-.019	.175	.262
Δr^2	.023	.219	.114
F-test	.545	3.599***	3.772***
Δ F-test	.545	6.525***	3.332***

*** p < .001, ** p < .01, * p < .05

Source: Author's work

5. Discussion and conclusion

Croatia has historically been a country of emigration, and the demographic trend is worrying. In the last two decades, the prolonged economic crisis and increasing pessimism among Croatian residents have led more and more young people and families to leave Croatia for a longer period of time or forever. The loss of part of the young population is not only a demographic concern, but also an economic and social one. Without a young and qualified workforce with innovative ideas and proactive behavior, economic progress is hard to achieve. The aim of this study is to improve our understanding of the economic and social factors that increase the likelihood of young people leaving Croatia after completing their formal education. The reasons for leaving Croatia are diverse and interrelated. To account for this, the author applied a hierarchical regression analysis on a sample of business students who are in their final year of study. By creating three successive linear models, it is possible to control the order in which the variables are entered and to separately test the relationship between the intention to leave and the push factors before and after the addition of pull factors.

The results of hierarchical regression showed that demographic factors as independent prospective predictors did not influence intention to leave. However, when push factors were included in the model, gender became a significant predictor of migration intention. In Model 2, intolerance of the political and social situation in Croatia is the main predictor of intention to leave. It seems that there are no specific reasons (or they are difficult to articulate) for young people not wanting to stay in Croatia. It is the overall situation in a country and the systematic problems of the society that make young people consider a decision to leave their home country. After the pull factors were included in the analysis, one of them became the most important predictor of migration intention. The perception of foreign countries as a better place to achieve personal goals and values seems to be the main driver of the migration decision.

This research has confirmed the findings of previous studies that young people in Croatia on average tend to consider moving abroad, but not immediately after graduating from college. They are discouraged by the general situation in their home country, but the positive aspects of living in a foreign country seem to have a slightly stronger influence on their migration decision than the disadvantages of staying in Croatia. Previous research has suggested various activities and policies that could keep young people in their home country or motivate those who have already migrated to return. However, global and national migration reports suggest that the international mobility of young people will only increase in the future and that trying to stop it is a futile endeavor. Therefore, this study calls for further investigation of ways in which young people who have moved abroad can be used as a certain remote human capital that can have a positive impact on the economic growth and social progress of the home country. Qualitative studies should be applied to provide the basis for the theoretical development of cooperation and partnership models between Croats living in their home country and abroad.

The present study has certain limitations, primarily related to the sampling method and the potential for generalization of the results. In addition, the variables used in the study reflect migration aspirations rather than actual migration behavior.

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References

1. Abdulloev, I. (2018) “Job dissatisfaction and migration: evidence from Tajikistan”, IZA Journal of Development and Migration, Vol. 8, No. 1, pp. 1-27.
2. Azmat, F., Osborne, A., Le Rossignol, K., Jogulu, U., Rentschler, R., Robottom, I., Malathy, V. (2013) “Understanding aspirations and expectations of international students in Australian higher education”, Asia Pacific Journal of Education, DOI:10.1080/02188791.2012.751897
3. Baláž, V., Williams, A. M., Fifeková, E. (2016) “Migration decision making as complex choice: Eliciting decision weights under conditions of imperfect and complex information through experimental methods”, Population, Space and Place, Vol. 22, No. 1, pp. 36-53.
4. Berry, B. J., Okulicz-Kozaryn, A. (2009) “Dissatisfaction with city life: A new look at some old questions”, Cities, Vol. 26, No. 3, pp. 117-124.
5. Čavrak, V. (2013) “Obrazovanje za dobro društvo”, Ekonomsko obrazovanje u Republici Hrvatskoj - jučer, danas, sutra: zbornik radova znanstvene konferencije, Ekonomski fakultet Sveučilišta u Zagrebu, Zagreb.
6. De Jong, G. F. (2000) “Expectations, gender, and norms in migration decision-making”, Population studies, Vol. 54, No. 3, pp. 307-319.
7. Gallup Analytics (2018). Potential Net Migration Index. Available at: https://news.gallup.com/poll/245270/newest-potential-net-migration-index-shows-gains-losses.aspx Accessed February 11, 2022.
8. Hornstein Tomić, C., Taylor, K. (2018) “Youth unemployment, the brain drain and education policy in Croatia: A call for joining forces and for new visions”, Policy Futures in Education, Vol. 16, No. 4, pp. 501-514.
9. International Labour Office (2020) ” Global employment trends for youth 2020: Technology and the future of jobs”

10. Kasap, P., Ćubela Adorić, V. (2019) “Stavovi prema odlasku i ostanku u Hrvatskoj, percipirana kontrola i subjektivne norme kao prediktori namjere odlaska i ostanka”, 27. Godišnja konferencija hrvatskih psihologa (knjiga sažetaka) / Šincek, Daniela; Rudolfi, Nelija; Penezić, Zvjezdan (ur.). Jastrebarsko: Hrvatsko psihološko društvo, pp. 171.

11. Knezović, S., Grošinić, M. (2017) “Migration trends in Croatia”, Hanns-Seidel-Stviftung, Institut za razvoj i međunarodne odnose, Kolor Klinika, Zagreb, pp. 1-39.

12. Otrachshenko, V., Popova, O. (2014) “Life (dis) satisfaction and the intention to migrate: Evidence from Central and Eastern Europe”, The Journal of Socio-Economics, Vol. 48, pp. 40-49.

13. Potočnik, D., Adamović, M. (2018) “Iskustvo migracije i planirani odlasci mladih iz Hrvatske”. Friedrich-Ebert-Stiftung, Available at: http://www.fes-croatia.org/fileadmin/user_upload/Migracije_mladih_WEB_verzija (March 3rd, 2020)

14. Timmerman, C., Hemmerechts, K. (2015) “The relevance of a culture of migration and gender dynamics in understanding migration aspirations in contemporary Turkey”, In Emancipation in exile: perspectives on the empowerment of migrant women/Abadan-Unat, Nermin, pp. 219-236.

15. Timmerman, C., Martiniello, M., Rea, A., Wets, J. (Eds.) (2015) “New dynamics in female migration and integration”, New York & London: Routledge

16. van Dalen, H. P., Henkens, K. (2008) “Emigration Intentions: Mere Words or True Plans? Explaining International Migration Intentions and Behavior” (CentER Discussion Paper; Vol. 2008-60). Macroeconomics.

17. van Dalen, H. P., Henkens, K. (2013) “Explaining emigration intentions and behaviour in the Netherlands, 2005–10”, Population studies, Vol. 67, No. 2, pp. 225-241.

18. Van Mol, C. (2016) “Migration aspirations of European youth in times of crisis”, Journal of youth studies, Vol. 19, No. 10, pp. 1303-1320.

19. Van Mol, C. (2017) “Moroccan women in Madrid: between change and continuity”, Identities, Vol. 24, No. 1, pp. 100-118.

20. Van Mol, C., Snel, E., Hemmerechts, K., Timmerman, C. (2018) “Migration aspirations and migration cultures: A case study of Ukrainian migration towards the European Union”, Population, space and place, Vol. 24, No. 5

21. Williams, A. M., Jephcote, C., Janta, H., Li, G. (2018) “The migration intentions of young adults in Europe: A comparative, multilevel analysis”, Population, Space and Place, Vol. 24, No. 1

CHAPTER 22

The role of universities in migration of young people

Julia Perić[1]

ABSTRACT

In recent pre-corona years, many transition countries such as Croatia have experienced a significant increase in the migration of young people. Although migration is not unknown in Croatia, the recent wave of migration has shown that Croatia could not prevent this trend and retain young, well-educated people. Major social problems on a global level, such as unemployment and poverty, are some of the reasons for migration. Still, research related to the Republic of Croatia claims that one of the most important reasons for young people to leave Croatia is to be found in a poor climate in science and education. This paper aims to examine the relatedness between universities and youth migration. Considering the third mission of universities, which is to collaborate with the local community and improve the quality of life in it, the study will investigate whether the university's level of community engagement and student satisfaction with affiliated faculties impact students' intention to migrate. The empirical part of the study focuses on the perceptions of 252 students at the Faculty of Economics in Osijek, one of the largest faculties in Eastern Croatia, a part of Croatia most affected by youth migration

Key words: *youth migration, brain drain, social responsibility of universities, students*

JEL classification: *JEL_I23, JEL_I25, JEL_F22, JEL_O15*

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1. Introduction: Youth Migration

The number of international migrants has steadily increased from 173 million in 2000 to 281 million in 2020, representing 2.8 percent and 3.6 percent of the world's population, respectively (UNDESA, 2022). According to Castles and Miller (1993), the age of migration began in the early 1990s, and one of the primary triggers was globalization as more countries opened up to migration. In 2006, UNFPA found that young people were moving more than ever due to economic, political, social, and demographic changes. Opening borders through the EU-sponsored Erasmus program for college student exchanges has created a new generation of young mobile Europeans. After EU enlargement in the early 2000s, opportunities for young people to travel, study, work, and live in wealthier countries have increased (King, 2018), making young people from low- and middle-income countries one of the most mobile social groups (Hall, 2020). Fourteen years later, according to Hall (2020), the number of young migrants is higher in absolute numbers than ever before. In 1990, there were 52 million migrants between the ages of 15 and 34, and by 2020, there were nearly 90 million migrants in the same age group. Lulle et al. (2019) reported that in 2013, half of all migrants moving within the European Union were from the newer member states, although these countries accounted for only 21% of the total EU population. In 2019, Eurostat data, as cited by Lulle et al. (2019), revealed that Romanians made the most use of the free movement right (21.3%), followed by Lithuanians (14.5%), Croats (14%), Portuguese (13.6%), Bulgarians (13.6%), and Latvians (11.8%).

Youth migration is usually associated with leaving home to study or enter the labor market in another area. However, Benson (2011) argues that youth migration is not only shaped by work, income, or career prospects but also by the notion of a lifestyle as a constant search for a better way of life. According to Cain and de Azevedo (2021), young people, especially students, are responsible for their own mobility and are tasked with finding meaning and value in it while ensuring a smooth transition from one mobile learning phase to the next. The authors note that mobility in tertiary education is guided by students' needs and aspirations, but does not come without emotional and economic costs. Heckert (2015) notes that the opportunities available to young migrants depend on the social and economic characteristics of the country of origin and the potential destination country. Todisco et al. (2003) argue that the pull factors play a more critical role than push factors in the mobility of highly skilled workers, i.e., the social and economic structural conditions of host regions are among the essential pull factors determining the mobility of highly qualified and educated workers.

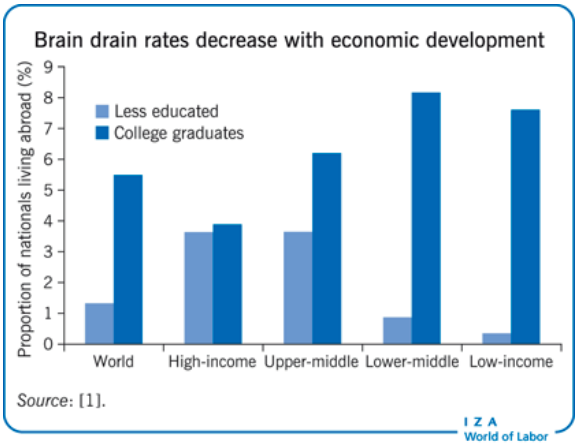
Accession to the European Union, political changes, and the poor climate in science and education (Troskot et al., 2019) have led to a significant increase in the migration of Croatian young people with university degrees, most of whom are looking for work abroad. According to Hornstein Tomić and Taylor (2018), the Croatian education system, which urgently needs reform due to poor communication between the education and business sectors, has played a causal role in the rise of youth unemployment and youth migration.

To reduce migration, significantly reduce the brain drain, and thus improve the climate in science and education, the education system must meet the requirements of the domestic labor market in terms of expertise and enhance the employability of young people. The purpose of this paper is to explore the relationship between universities and youth migration. Although universities cannot solve the problem of youth unemployment and migration alone, nor are they the leading cause of it, it will be investigated whether students think that universities should play an active role in addressing these two social problems at the local level. Considering the third mission of universities, which is to collaborate with the local community and improve the quality of life in it, the study will investigate whether the university's level of community engagement and students' satisfaction with affiliated faculties impact students' intention to migrate.

2. From Brain Drain to Brain Circulation

Highly educated people and experts contribute to the country's development and raise the standard of living. Modern knowledge societies know that the migration of highly skilled, university-educated professionals, a phenomenon known as "brain drain," inevitably leads to a decline in progress in their home country. The term "brain drain" was first introduced by the British Royal Society to refer to the migration of British scientists and technicians to the United States and Canada in the 1950s and 1960s (Cervantes and Quellec, 2002). Research by Docquier and Marfouk (2007) showed that the brain drain rate for tertiary-educated individuals is 7.3 times higher than for those with only primary education and 3.5 times higher than for those with only secondary education. Developed countries have many more opportunities and resources for "brain gain," i.e., attracting educated, professional, and talented young people. A higher standard of living, a better quality of life, better health care systems, more accessible and faster employment, decent and higher salaries, access to resources, and political stability are important factors that attract young people from less developed countries and thus have significant negative economic and social impacts on developing countries. As shown in Figure 1, brain drain increases as the country become less economically developed.

Figure 1: The relationship between brain drain rates and economic development



Source: Docquier (2014)

According to Docquier (2014), migration can change the skill structure of the labor force, cause labor shortages, and affect fiscal policy. However, it can also generate money and knowledge from migrants and returnees, so whether migration, as stated by the author, is seen as a blessing or a curse depends on the country's characteristics and policy objectives. The brain drain represents a significant challenge for local communities, as it makes the transition to a sustainable and competitive economic model based on knowledge, innovation, technological know-how, and high-value-added products and services very slow and harder to achieve.

Mattoo, Neagu, and Özden (2008) note that there is often concern that brain drain may turn into another phenomenon called "brain waste," which insinuates that some migrants do not end up working in skilled occupations after migration, so their skills are underutilized or not utilized at all. Although many immigrants start their careers below their level of expertise if they do not return to use their potential, the actual "brain waste" represents a loss for both the expert and the country to which the immigrant has migrated (Dragan and Milosavljević, 2018).

According to Docquier and Rapoport (2006), there are two main causes of brain drain. First, globalization has opened the possibility of migration, leading to an increase in human capital where it already exists. Second, developed countries have recognized the opportunity to attract global talent and have begun to compete through quality-selective immigration policies. However, the brain drain should not be viewed as entirely detrimental to developing countries' growth potential as it has been considered for years. Docquier and Rapoport (2006) argue that recent economic research has emphasized several positive feedback effects and shown that migration may foster human capital formation at the origin. Countries of origin can also benefit from the brain drain, particularly through remittances, circular migration, human capital

formation, participation of skilled migrants in business networks, innovation, and technology transfer (Docquier, 2014). Vega-Muñoz et al. (2021) believe that brain drain or brain circulation, depending on the scientific experience gained abroad, can have positive effects on shaping local academic systems. Authors recognise that highly skilled migration has the potential to promote the development of a national academic system, as the knowledge acquired by migrants can return to their country of origin through diaspora networks. In addition, according to Vega-Muñoz et al. (2021) the application of intellectual property rights can increase the likelihood that brain drain will turn into brain gain.

Shin and Moon (2018) define four main interrelated and overlapping strategies nations should obtain to enhance their development through investing in human potential:

1. *Brain train and retention* used by countries to educate and train their citizens and try to keep them within national boundaries so they can contribute to the development of their country of origin.
2. *Brain gain* implemented by those countries that are not able to produce a sufficient supply of labor for all their economic sectors, so they need to import foreign labor using a range of pathways (import foreign labor directly into the workforce or educate international students at their higher education institutions before employing them)
3. *Brain circulation* as a way to send young people abroad for education to gain educational or work experience and bring them back to contribute to the development of their home country.
4. *Brain linkage* focused on young people who choose to remain in the host country after education but consider them as a temporarily lost skill promoting business visits or short-term stays in their country of origin as a type of home-host interaction.

As mentioned above, the authors argue that these four strategies are interrelated and overlapping in a sense that, for example, brain retention can reduce brain drain but at the same time might discourage brain circulation, and brain circulation reduces brain drain but could also reduce the potential for brain linkage. So the brain drain can be tackled through brain gain and brain circulation. As Kone and Özden (2017) state, emigrants who return to their home countries bring back the knowledge and experience they acquired abroad. According to the authors, such temporary migration, aka “brain circulation”, benefits the sending country, as migrants can remit money during their absence and invest the accumulated savings in growth-enhancing economic activities in their home country upon their return.

However, due to lower economic and social development, developing countries can hardly attract highly qualified and talented young people. So the focus of developing countries should be, on the one hand, on brain circulation i.e., allowing young people to go abroad, giving them a chance to get acquainted with new cultures, gain knowledge, experience and financial capital, and on the other on creating an environment to which these young

people will want to return and utilize gained knowledge and experience. Docquier (2014) argues that returnees' additional expertise and financial capital acquired abroad generate important benefits, especially for their home countries' technology adoption, entrepreneurship, and productivity. However, to create such an environment, encourage brain circulation and decrease the brain drain, the countries must, according to Ben-Hur, Bris and Caballero (2017), consider the following:

- *Legislation* **-** more open and forward-looking societies with the legislation that effectively promotes scientific research, non-restrictive immigration laws, and a lower risk of political instability decrease brain drain and prevent domestic talent from leaving the country.
- *Agility* - the agility and adaptability of companies to market changes exhibited through innovation and inclusive corporate values, not only encourage locals to remain in their home country but also attract talent from other countries.
- *Education* – the quality of education, particularly at the university level, may entice local talent to remain in their country by reducing the need to search for a better education elsewhere.
- *Pay* – interestingly, the quality of the education system in a country is of greater significance in determining talent flows since remuneration levels appear to have only a marginal impact on the attractiveness of countries to foreign talent.

The rest of the paper will focus on education and the role of universities in the migration of young people. The next chapter will try to answer whether universities can respond to the problems of youth unemployment and brain drain in their local communities.

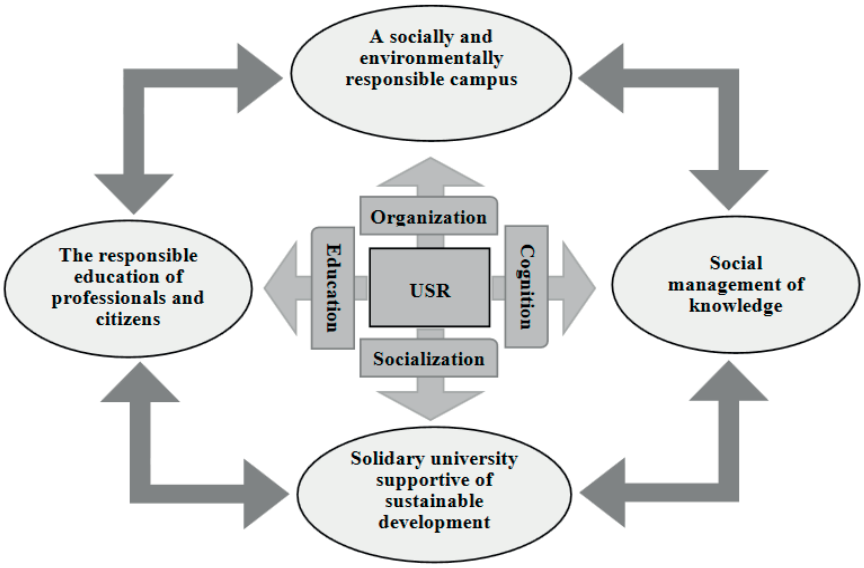
3. The Role of Universities in Migration of Youth

Universities represent an increasingly important component in the creation of sustainable development of their local communities. As already mentioned, universities cannot solve the problem of youth unemployment and migration alone, nor are they the leading cause of it. Still, they should be co-responsible for creating an entrepreneurial environment that will encourage cross-sector cooperation and joint problem-solving. Universities feel more and more pressure from their communities to shift their focus from teaching and researching towards their third mission – contribution to the community. This pressure is rising due to the rise of social problems young people are facing in their local communities, and according to Etzkowitz (2002), if the primary mission of the university is seen as a reproductive process that takes place through learning, connecting the learning process with economic activities can influence the creation of self-sustaining dynamics of economic and social development of the community. The third mission of the university represents its social responsibility.

Jimenez de la Jara (2007) defines the social responsibility of universities (USR) as the ability to disseminate and practice a set of principles and values through four key activities: management, education, research and additional activities. The author believes that universities should base their academic and organizational responsibilities on ethical concepts that meet the needs of the community in which they operate. Bokhari (2017) argues that universities play a broader social role and fulfil a moral obligation to give due attention to social, ethical, economic, political, and environmental issues.

Vallaeys (2014) distinguishes four types of universities' impact on society, and the author outlined four areas of university's socially responsible management (Figure 2). These four impacts are the organizational impact, which affects the university's environment and community, including students, staff, and academics; the educational impact, which relates to educating people and shaping ethics and values; the cognitive impact, which involves the production of knowledge and consolidates the relationship between the technological and social contexts of science and society; and the social impact, which relates to society by supporting progress, building social capital, and preparing students for the real world.

Figure 2: Universities' Areas of Social Responsibility



Source: Vallaeys (2014)

Those four areas of USR play an important role in producing knowledge, creating sustainable societies, promoting employment, preventing protracted brain drain, supporting brain circulation and answering to emergent problems their local communities face. Sharma (2019) states that universities have an important role in protecting and educating students, changing cultural perceptions and informing policy with evidence-based research in an era of heightened migration. Young people in developing countries often feel that their local universities provide a rather poor education that does not give them promising careers (Browne, 2017). Therefore, according to Browne (2017), young people are more likely to migrate due to a combination of higher financial resources, greater aspirations, and lack of appropriate employment and education in their home environment.

Lack of appropriate employment and the desire to migrate arise from a mismatch between education programs and the knowledge and skills requirements of labor markets, for which the responsibility lies more on the education systems than the private sector and political climate in the country. Handler (2018) argues that education can hinder the brain drain in two ways. First, education that handles adverse situations favors future-oriented people and makes them better informed of regional income differences, fostering circular migration. By supporting circular migration education system is aware of its benefits i.e., how skills and knowledge obtained in the destination country can improve living conditions in the country of origin. Second, suppose the education system is created so that it understands the needs and requirements of the labor market, cooperates with its community and can respond to changes in its environment. In that case, it improves the chances for better jobs and incomes at home and prevents a long-term brain drain. Thus, if the quality of universities influences the migration decisions of students and graduates, investment in education can improve the brain circulation and partially transform brain drain into brain gain. (Ciriaci, 2013).

4. Giving Croatia a chance

Croatia has always been known as a traditional emigration country, but this trend has grown significantly with Croatia's accession to the European Union. World Bank Report (2016) states that Croatia is ranked fourth among high-income countries that are not members of OECD (Organization for Economic Cooperation and development) with a high emigration rate.

According to the 2020 Human Development Index (HDI), a measure for assessing long-term progress in three basic dimensions of human development: a long and healthy life, access to knowledge, and a decent standard of living, Croatia's HDI value for 2019 is 0.851, placing the country in the very high human development category and ranking 43rd out of 189 countries and territories. However, Croatia's 2019 HDI score of 0.851 is below the average of 0.898 for countries in the very high human development group and below the average of 0.911 for countries in the European Union (Table 1). As Sanderson (2009) points out, a higher level of international migration is associated with a lower score on the human development index

and insufficient investment in human development leads to a greater desire for young people, especially highly educated and skilled, to migrate.

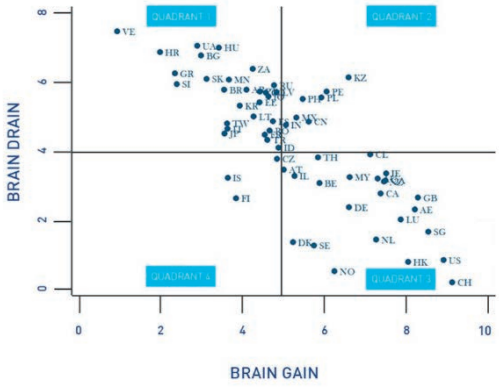
Table 1: Croatia's HDI and Component Indicators for 2019 Compared to Selected Countries and Groups

	HDI value	HDI rank	Life expectancy at birth	Expected years of schooling	Mean years of schooling	GNI per capita (2017 PPP US$)
Croatia	0.851	43	78.5	15.2	11.4	28,070
Bulgaria	0.816	56	75.1	14.4	11.4	23,325
Serbia	0.806	64	76.0	14.7	11.2	17,192
European Union	0.911	—	81.4	16.8	12.1	44,635
Very high HDI	0.898	—	79.6	16.3	12.2	44,566

Source: https://hdr.undp.org/sites/default/files/Country-Profiles/HRV.pdf

According to Cavalini et al. (2018), the share of highly skilled EU28 migrants has increased steadily over the 2014-2017 period, with the largest country-level increases in Hungary (+51%), Croatia (+46%), and Slovakia (+41%). Knezović and Grošinić (2016) note that Croatia is among the thirty countries in the world that have the biggest problem with brain drain, which leads to serious problems that result in a long-term loss of social capital and a decline in the functionality of the economy. IMD World Competitiveness Yearbook Croatia (HR) also uncovers Croatia as one of the most negatively impacted countries (Figure 3).

Figure 3: Global distribution of talent (2016)



Source: Ben-Hur, Bris and Caballero (2017)

Croatia's accession to the European Union gave Croatian youth a wide range of possibilities for education and employment. However, regardless of a search for better educational opportunities and better chances for employment majority of Croatian young people want to leave because of the poor political climate, corruption and poor climate in science and education i.e., low quality of educational programs and communication between the academic sector and its community (Troskot et al., 2019; Hornstein Tomić and Taylor, 2018).

According to Hornstein Tomić and Taylor (2018), experts and policymakers agree that there is a mismatch between higher education and the needs of a rapidly changing and increasingly internationalized labor market, which is why the Croatian education system needs thorough reform to better prepare young people for the labor market and impact the country's competitiveness.

The empirical part of the study conducted for this paper showed that students think similarly. The research focused on students' perceptions at the Faculty of Economics in Osijek (EFOS), one of the largest faculties in Eastern Croatia, a part of Croatia most affected by youth migration. This paper aimed to examine the relatedness between universities and youth migration. The questionnaire was created to investigate students' intention to leave Croatia, with a particular focus on their faculty's role in that decision. The research was conducted from February to April 2022, and the answers were collected from 252 students. The sample characteristics can be seen in Table 2.

Table 2: Sample characteristics

Variable	**N**	**%**
Gender		
Male	78	29.9
Female	173	70.1
Level of education		
University undergraduate study – last year	84	32.2
University graduate study – 1st year	94	36
University graduate study – 2nd year	83	31.8
Residential status		
From urban area	173	66.3
From rural area	88	33.7

In addition to graduate students, final-year undergraduates were also included as they are more intensively considering what they want to do after graduation.

The research showed that while 66.3% of students live in an urban area, only 28% of students study in their place of residence. This information is interesting because when it comes to youth migration in Croatia, the vast majority of young people do not migrate across borders; a much larger number migrate within the country, mostly from rural to urban areas. This is a well known fact, but an interesting starting point for further research on the relationship between education and brain circulation between rural and urban areas.

The seven-point Likert scale was used for questions designed to elicit students' perceptions of the university's role in addressing social problems and their satisfaction with the faculty's offerings (ranging from knowledge to extra-curricular activities and opportunities to gain additional experience).

The scale ranges from 1 - strongly disagree to 7 - strongly agree.

This research confirmed previous studies that young people, especially those who are still studying, do not want to leave without first trying to pursue a professional career in Croatia (Potočnik and Adamović, 2018, Gvozdanović et al., 2019). Most students want to give Croatia a chance and therefore try to make a living and start a family in Croatia. The research for this paper showed that 88.9% of students can imagine living in Croatia two years after graduation, and 75.9% can imagine doing so even five years after graduation. Even though the decrease in the percentage is small, it could mean that some students do not trust that the situation in the country can change for the better and therefore believe that they will have to leave the country at some point.

The students' opinion of their chosen faculty is shown in Table 3. Students feel that although the faculty provides many opportunities for networking and extra-curricular activities and is a socially responsible institution, the faculty is much less likely to provide students with the knowledge and skills needed for employment in Croatia, the knowledge provided is not sufficiently recognized in the international labor market, and the faculty does not adequately familiarize students with the characteristics of the global labor market.

Table 3: Students' satisfaction with the faculty they choose

	Mean
The faculty provides students with numerous opportunities to network and acquire skills through extra-curricular activities	4.95
The faculty I chose is a good example of a socially responsible organization in my community	4.79
The faculty I chose is a good example of a socially responsible organization in my community	4.71
Faculty is responsible for the social inclusion and civic engagement of students	4.53
The knowledge acquired at the chosen faculty is valued on the international labor market	4.34
The faculty shares responsibility for solving social problems at the national level	4.23
The faculty shares responsibility for solving various social problems that affect young people in their local community	4.23
The faculty exposes students to international business practice	4.16
The faculty provides students with enough knowledge and practical work for a successful start of a professional career in Croatia	4.01

Correlation analysis (Table 4) confirmed a statistically significant but weak relationship between intention to stay and students' perceptions of faculty (correlation coefficients ranging from .187 to .281). Therefore, satisfaction with the university, perception of the knowledge provided by faculty and perceptions of USR, for example, do not strongly influence young people's decision to stay or leave. What is interesting, however, is the connection

between students' perceptions that faculty share responsibility for solving social problems and the knowledge and extra-curricular activities that faculty provide to young people, as well as the faculty's role in students' social integration and civic engagement. This means that students not only recognize that it is the social responsibility of faculty to participate in solving social problems (e.g., migration and unemployment), but that faculty can do so indirectly by investing in knowledge and experience and preparing young people not only for professional life but also for active civic engagement and participation in activities that bring a better future to their community.

Table 4: Correlation matrix for intention to leave and students' perception of their faculty

	1	2	3	4	5	6	7	8	9	10
Intention to stay (1)	1	.187**	.225**	.281**	.220**	.148*	.112	.194**	.221**	.216**
The faculty I chose has met my expectation (2)		1	.733**	.604**	.552**	.476**	.432**	.355**	.303**	.351**
The faculty I chose is a good example of a socially responsible organization in my community (3)			1	.621**	.587**	.501**	.394**	.455**	.361**	.392**
The faculty provides students with enough knowledge and practical work for a successful start of a professional career in Croatia (4)				1	.712**	.596**	.616**	.521**	.472**	.444**
The knowledge acquired at the chosen faculty is valued on the international labor market (5)					1	.554**	.468**	.488**	.441**	.418**

The faculty provides students with numerous opportunities to network and acquire skills through various extracurricular activities (6)						1	.536**	.459**	.442**	.502**
The faculty exposes students to international business practice (7)							1	.583**	.536**	.514**
The faculty shares responsibility for solving social problems at the national level (8)								1	.790**	.727**
The faculty shares responsibility for solving various social problems that affect young people in their local community (9)									1	.780**
Faculty is responsible for the social inclusion and civic engagement of students (10)										1

As mentioned in the first part of the paper, building and producing knowledge, affecting society through building social capital and preparing students for the real world are important areas of every university's social responsibility. Not nurturing these areas and not investing in the knowledge and skills necessary in the labor market affects the increase in youth unemployment, and thus, the increase in brain drain and migration of young people. Both of these social problems young people in Croatia face.

5. Concluding remarks

Unemployment of young people is the most important and current problem of today, and most young people leave the country because they hope to find well-paid jobs much faster than in Croatia. However, previous research has shown that two-thirds of young people consider going abroad for a long time or forever if they do not achieve their personal and professional goals in Croatia. The question arises as to who is responsible for helping students achieve their personal and professional goals by staying in Croatia. One could argue that the government is the one that should prevent the migration trend and retain young, well-educated people, but it is preoccupied with unimportant political issues and so far, it has failed to do so. Respectively, those social issues are not solely the government's responsibility but rather the shared responsibility of all social actors, with a particular emphasis on education. The quality of university activities i.e., teaching, research and contribution to the community, affects young people's decision to leave (Ciriaci, 2013). Unfortunately, the Croatian education system cannot follow the labor market changes, trends and needs, so youth migration is inevitable.

The education system has the responsibility to be concerned about socio-economic transformations happening faster than ever before and be responsive to them. Young people in Croatia are willing to give Croatia a chance and not leave the country before they try to make something out of their life in Croatia. That is why universities must take responsibility and:

- be more responsive to the social problems (especially of the young people) – young people need to see that universities are aware that they share responsibility for what happens in their communities but also share responsibility for helping to find solutions,
- develop programs that meet the needs of the environment and improve student employability,
- promote brain circulation, which will give students opportunities to gain knowledge abroad, return home and invest that knowledge into the sustainable social and economic development of their own country,
- encourage young people to become active and responsible citizens (through various co-curriculum and extra-curriculum activities, cooperation with associations, volunteering, internships) as this will strengthen their sense of belonging to the country
- promote cross-sectoral cooperation and joint work to reduce the migration of young people by increasing interaction between universities and companies, promoting entrepreneurship, supporting the brain circulation and developing an appropriate and attractive technological, scientific and entrepreneurial environment that provides satisfactory opportunities for young people who stay in Croatia and for those who return to their home regions.

This paper provides a reasonable basis for further and more detailed research on the role of universities in youth migration. The limitation of this work is that only one faculty from a single Croatian region was considered. It would be interesting to see if students' responses differ depending on the level of development of the region they come from, but also if different profiles of students (in-demand vs. less in-demand professions) have different intentions to leave the country. Future research should also consider other stakeholders, such as faculty leadership (and find out what they think about the university's role in youth migration), the business sector (and their perceptions of how universities respond to this and similar social issues), civil society (and how they see the link between USR and youth migration).

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References

1. Ben-Hur, S. et al. (2017) What drives the brain drain and brain gain, IMD World Competitiveness Center, Available at: https://www.imd.org/research-knowledge/articles/what-drives-brain-drain-and-brain-gain/ [Accessed: June 9, 2022].
2. Benson, M. (2011) The movement beyond (lifestyle) migration: Mobile practices and the constitution of a better way of life, Mobilities, 6(2), 221-235.
3. Bokhari, A. A. (2017) Universities' social responsibility (USR) and sustainable development: A conceptual framework. SSRG International Journal of Economics and Management Studies (SSRG-IJEMS), 4(12), 8-16.
4. Browne, E. (2017) Evidence on education as a driver for migration, Available at: https://assets.publishing.service.gov.uk/media/598086a0ed915d022b00003c/K4D_HDR__Migration_and_Education.pdf [Accessed: June 15, 2022]
5. Cairns, D., & de Azevedo, L. F. (2021). Free Movement in Education. The Palgrave Handbook of Youth Mobility and Educational Migration, 77-81.
6. Castles, S., Miller, M.J. (1993) The Age of Migration, 4th ed., Palgrave MacMillan. ISBN-10: 0230517846
7. Cavallini, S. et al. (2018) Addressing Brain Drain: The Local and Regional Dimension, Commission for Social Policy, Education, Employment, Research and Culture (SEDEC), The European Committee of the Regions.
8. Cervantes, M., Guellec, D. (2002) The brain drain: Old myths, new realities, Organisation for Economic Cooperation and Development. The OECD Observer, (230), 40.

9. Ciriaci, D. (2014) Does university quality influence the interregional mobility of students and graduates? The case of Italy. Regional Studies, 48(10), 1592-1608.

10. Docquier, F. (2014) The brain drain from developing countries, IZA World of Labor. Available at: https://doi.org/10.15185/izawol.31 [Accessed: June 15, 2022]

11. Docquier, F. et al. (2007) Brain drain in developing countries, The World Bank Economic Review, 21(2), 193-218.

12. Docquier, F., Rapoport, H. (2006) The brain drain. New Palgrave Dictionary of Economics, 1-8.

13. Dragan, I. L. I. C., Milosavljevic, M. (2018) Brain drain: Propulsive factors and consequences, Journal of Economic Development, Environment and People, 6(4), 29-40.

14. Etzkowitz, H. (2002) Incubation of incubators: innovation as a triple helix of university-industry-government networks, Science and Public Policy, 29(2), 115-128.

15. Gvozdanović, A. et al. (2019) Istraživanje mladih u Hrvatskoj 2018./2019.

16. Hall, S. (2022) Youth, Migration and Development: A New Lens for Critical Times

17. Handler, H. (2018) Economic links between education and migration: An overview, Flash Paper Series, Policy Crossover Center Vienna-Europe, (4).

18. Heckert, J. (2015) New perspective on youth migration: Motives and family investment patterns. Demographic Research, 33, 765-800

19. Hornstein Tomić, C., Taylor, K. (2018) Youth unemployment, the brain drain and education policy in Croatia: A call for joining forces and for new visions, Policy Futures in Education, 16(4), 501-514

20. Jimenez de la Jara, M. (2007) The socially responsible university: A way of being, In Global University Network for Innovation. Available at: https://www.guninetwork.org/articles/socially-responsible-university-way-being. [Accessed: June 9, 2022]

21. King, R. (2018) Theorising new European youth mobilities, Population, Space and Place, 24(1), e2117.

22. Knezović, S., Grošinić, M. (2017) Migration trends in Croatia, Hanns-Seidel-Stviftung, Institut za razvoj i međunarodne odnose. Kolor Klinika, Zagreb, 1-39.

23. Kone, Z. L., Özden, Ç. (2017) Brain drain, gain and circulation, In Handbook of Globalisation and Development (pp. 349-370). Edward Elgar Publishing.

24. Lulle, A., Janta, H., & Emilsson, H. (2021) Introduction to the Special Issue: European youth migration: human capital outcomes, skills and competences. *Journal of Ethnic and Migration Studies*, *47*(8), 1725-1739.

25. Mattoo, Aaditya, et al. (2008) Brain waste? Educated immigrants in the US labor market, Journal of development economics 87, no. 2, pp. 255-269.

26. Potočnik, D., Adamović, M. (2018) Iskustvo migracije i planirani odlasci mladih iz Hrvatske, Friedrich-Ebert-Stiftung. Available at: http://www.fes-Croatia.org/fileadmin/user_upload/Migracije_mladih_WEB_verzija.pdf [Accessed: June 1, 2022]

27. Sharma, Y. (2019) The role of universities in an era of heightened migration, University World News. Available at: https://www.universityworldnews.com/post.php?story=20190704120608132 [Accessed: June 9, 2022]

28. Shin, G. W., Moon, R. J. (2018) From brain drain to brain circulation and linkage, Shorenstein Asia-Pacific Research Center Working Paper, Stanford, CA: Stanford University. Available at:

29. https://fsi-live. s3. us-west-1. amazonaws. com/s3fs-public/brain_drain_to_circulation_and_ linkage_0. pdf. [Accessed: June 9, 2022]

30. Todisco, E., et al. (2003) Skilled migration: a theoretical framework and the case of foreign researchers in Italy

31. Troskot, Z. et al. (2019) Ključne odrednice iseljavanja visokokvalificiranog stanovništva: slučaj Hrvatske s komparativnim osvrtom na nove članice EU-a., Zbornik radova Pravnog fakulteta u Splitu, 56(4), 877-904.

32. United Nations Department of Economic and Social Affairs (2022) Migration Trends and Families, Policy Brief No 133. Available at: https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/publication/PB_133.pdf [Accessed: June 1, 2022]

33. United Nations Population Fund (2006) Young People Move More Now then Ever, Press Release. Available at: https://www.unfpa.org/press/young-people-move-more-now-ever [Accessed: June 1, 2022]

34. Vallaeys, François (2014) University Social Responsibility: A mature and responsible definition, in Higher Education in the World 5: Knowledge, Engagement and Higher Education: Contributing to Social Change, Global University Network for Innovation (GUNI)

35. Vega-Muñoz, A., Gónzalez-Gómez-del-Miño, P., & Espinosa-Cristia, J. F. (2021). Recognizing new trends in brain drain studies in the framework of global sustainability. *Sustainability*, *13*(6), 3195.

CHAPTER 23

Role of extracurricular activities in the subsequent mobility of Croatian university students

Ljerka Sedlan Kőnig[1]

ABSTRACT

Extensive research has shown that taking part in extracurricular activities has numerous benefits for students, including the development of interpersonal and communication skills, self-confidence and self-esteem, the acquisition of employability skills, and the development of the ability to transfer these skills to work after graduation. This article addresses the less researched question of whether participation in extracurricular activities increases students' propensity to move abroad. The results of primary research among 252 students at a Croatian university suggest that extracurricular activities may induce students to move abroad. This is especially true for students who have studied abroad under the Erasmus programme and are more likely to intend to settle abroad. As a participant in the Bologna Process in higher education, the Croatian Ministry of Education promotes and facilitates the mobility of higher education students. The result of this study draws attention to the side effect of educational policies that encourage students to study abroad (such as the Erasmus programme), in particular to the fact that such policies can lead to brain drain from developing countries.

Key words: *extracurricular activity, education, mobility, human capital, brain drain*

JEL classification: *J61, J62*

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1. Introduction

One of the characteristics of the global era is unprecedented mobility, for leisure, work, business or education. Thanks to the internet, which stimulates the desire to be mobile, mobility has become a fact, a necessity and a cultural aspiration, and, today's world, to be foreign is a perfectly normal condition in (The Economist, 2009). Therefore, young people are more and more characterized by globalized and cosmopolitan experience, and mobility has become essential for their future plans, achievements and competitive advantage (Skrbis et al., 2014). It is not surprising then that the concept of mobility has gained a lot of interest lately, especially as an aspect of contemporary citizenship (Cass et al., 2005), and some authors even talk about the "human right to mobility" (Beck and Beck-Gernsheim, 2009, p.34).

In today's world, human capital has become increasingly relevant as it drives the economic development. Therefore, countries and regions are oriented to attracting highly educated citizens. Migration itself can be seen as a form of investing in human capital. By migrating, people acquire knowledge and experience, which increase their stock of human capital (Faggian, 2005). Understanding the migration patterns of university graduates is of particular importance for regional development because they constitute a large share of migrants, and are considered one of the most productive segments of the population (Kraljević, 2020). On top of that, they are less risk-averse towards relocating to meet economic and life-style demands (Franklin, 2003). Globally, more and more students and graduates are either enrolled or study temporarily at higher education institutions outside of their home country, i.e. 2 in 100 students as reported by UNESCO Institute for Statistics (2016), and the number of students looking for education abroad continues to increase. After the completion of their studies, many (of these well-educated individuals) remain in the host country, increasing its human capital, which results in economic and intellectual gains of the host country. Understanding migration propensity of graduates is important because it can shape local economic development and help countries bear the consequences of a loss of knowledge, technology transfer, investments, as well as regional returns on investment in higher education.

Our knowledge of the extent of graduate propensity for mobility when entering the labor market is insufficient. This study aims to contribute to previous knowledge by investigating the role that extracurricular activities and mobility during studies play in subsequent mobility. Therefore, the following main hypotheses are proposed:

H1: Students who take part in extracurricular activities have a higher propensity to migrate after finishing their studies.

H2: Previous mobility for educational purposes during studies affects mobility upon entering the labor market

This paper builds on the existing literature not only by focusing specifically on the Croatian context, but also by incorporating extracurricular activities into the study of graduate migration, and examining the role that migration

for educational purposes plays in future career paths after graduation. The possible contribution of this study lies in the preliminary recommendations for the creation of public policies to prevent the brain drain, encourage circular migration, and reintegration of the well-educated population.

The remainder of the paper is organized as follows: The next section includes a literature review on graduate migration and its consequences, the relationship between education and migration, an overview of graduate migration from Croatia, and the relationship between participation in the Erasmus program and future migration propensity. Then, the methodology of the analysis, the empirical approach and the data are described, followed by the results and discussion. The last section contains the concluding remarks of the study and possibilities for further research.

2. Literature review

Human capital is associated with increases in economic development and population growth, wages, income, and innovation (Florida et al., 2008) and is therefore considered one of the strongest predictors of sustained economic vitality (Abel and Deitz, 2012). Empirical evidence suggests that well-educated employees, who generate knowledge spillovers and increase productivity promote local development (Consoli et al., 2013) and therefore become strategically important as an irreplaceable resource for economic success (Corcoran and Faggian, 2017).

Higher education provides graduates with competences they can use anywhere, and available communication tools have enabled the dissemination of information that facilitates migration (Fargues, 2017). Graduate migrants possess newly acquired competences, and are highly geographically mobile two years before and during the graduation year. Migration rates increase significantly in the first few years after graduation and decrease thereafter. (Haapanen and Trevo, 2009). Other authors have shown that international migration peaks at age 25. Exactly 53% of immigrants in the European Union were less than 28 years old at arrival in 2010 (Fargues, 2017).

Because attachment to the region of study is likely to vary, studies of graduate migration generally distinguish between students with and without a migrant background (DaVanzo, 1983; Faggian et al., 2007b). In these studies, graduate migrants are defined as young educated adults who live in a country or region other than the country in which they were born or studied. Regarding sequential migration of university graduates, Jewell and Faggian (2014) distinguish between those who migrate for occupational reasons: Late Migrants (LM) who migrate for a job after completing their studies in their hometown, Repeat Migrants (RM) who migrate for a job after completing their studies outside their hometown, and Return Migrants (RE) who move away for studies and return to their hometown after graduation, and University Stayers (US) who stay for a job in the region where they studied outside their hometown.

Compared to the total number of university graduates, female students tend to be more mobile (Faggian et al., 2007b). Students who studied at a smaller, peripheral university or university of applied sciences and graduated with relatively poor grades are also more likely to leave the region (Krabel Flőther, 2014). In addition, self-employed graduates show a significantly higher likelihood of staying and working in the region where they studied (Figuereido et al., 2002; Dahl and Sorenson, 2007). Interestingly, students from prestigious universities with better grades tend to be more mobile (Faggian et al., 2007b). Corcoran and Faggian (2017) conclude that migration rates are lower for students who worked during their studies.

In terms of regions, potential migrants are most prevalent in regions where economic problems are greatest and unemployment is highest (Božić and Burić, 2005). Average income levels vary from region to region, leading to migration flows (Sjaastad, 1962). The decision to move after graduation can be influenced by a number of economic, educational, legal and political factors, such as.: personal preferences, individual human capital (Faggian and McCann, 2009; Groen, 2004), field of study and academic success (Krabel Flőther, 2014), research opportunities and promotion prospects (Potočnik and Adamović, 2018), legal uncertainty, inefficient jurisdiction, bureaucracy, opportunities to improve skills (DiCintio and Grassi, 2013), gender, social ties, ie, family, friends, own children (Dahl Sorenson, 2010; Hansen et al., 2003), previous mobility (Belfield and Morris, 1999; Krabel Flőther, 2014), and regional characteristics (Hansen et al., 2003), especially unemployment rates and employment opportunities (Kodrzycki, 2001), low standard of living and negative GDP growth (Potočnik and Adamović, 2018). Other authors (Franklin, 2003; Winters, 2012) add to the list the requirements for specific graduate competences, wage levels, local cost of living, cultural and recreational opportunities and quality of life, crime, corruption (Ariu and Squicciarini, 2013; Troskot et al., 2019), and levels of insecurity, as well as household and family situations. Some factors, such as poor employment prospects, limited economic opportunities, or high crime rates, push graduates to migrate to a region or country with more opportunities. On the other hand, higher wages, better facilities, or more attractive working conditions are considered pull factors. Push factors have been found to be more important for mass migration of the less educated population, while pull factors are more important for the well-educated population (Todisco et al., 2003).

When they leave their home countries, they bring intellectual and other resources with them to the areas they have chosen, but many also have to make a number of trade-offs, i.e., leave their comfort zone behind, abandon their previous lifestyle and leave family and friends. When young, well-educated people move, they increase the stock of human capital in the receiving region. In addition, it should be noted that the decision to move away depends not only on objective reasons (e.g., socioeconomic status), but also on the perception of the person making that decision. On the other hand, it may be difficult to move after graduation if one has become accustomed to local amenities and has built strong friendships and networks during university that may enhance employment prospects in the region where one studied (Winters, 2012).

On the one hand, the investment of the country of origin in human capital can be wasted by graduate migration, but on the other hand, it has been shown that migrants provide the country of origin with values, know-how, and experience, as well as remittances and direct investment that can have an impact on development (Fargues, 2017), as not all graduates settle in the host country for life. In the host country, graduate migrants compete in the local labour market and fill vacancies created by the lack of interested workers in the host country.

Recently, a wide range of experts have considered the potential short- and long-term, negative and positive consequences of graduate migration, both for graduates and for countries. The potential for human development through the accumulation of experience gained abroad, assuming circular migration, and the application of acquired knowledge in the country of origin, along with the amounts remitted and the experiential, financial, and social capital brought back by those who return, represent the positive economic impacts, as well as the fact that migrants become examples and role models. In addition, these individuals may also contribute to investments in the economy of the country of origin. Human capital has also experienced globalisation, and modern approaches to the migration of well-educated people, such as the " paradigm of mobility" (Sheller and Urry, 2006), include an optimistic and cosmopolitan view of migration, describing this trend as polycentric, circular, temporary, and based on exchanges between sending and receiving countries (Ackers, 2005; Balaz et al., 2004). Ciumasu (2007) even adds a new term, "brain networking," which he argues is a successful strategy for sending countries to mitigate the negative consequences of a well-educated population, as such networks are believed to help provide resources and infrastructure that can provide effective channels for the transfer of knowledge, capital, and values to sending countries (Petroff, 2016). Empirical evidence shows that skilled migrants serve as "bridges" as they can provide access to markets, be sources of investment, and even initiate public debates on issues of national interest or co-sponsor reforms and new projects (Lowell and Findlay, 2001).

However, these positive sides of the phenomenon of graduate mobility only partially mitigate the negative sides, especially the reduced competitiveness due to the lack of innovation and ideas, which ultimately affects the gross domestic product and the development of society as a whole (Atoyan et al., 2016). On the negative side, in addition to the loss to the family and local community, graduate mobility also represents a loss to the country of origin, which needs competent citizens and positive spillover effects for its long-term development. This type of migration challenges the entire society and creates a negative and uncertain atmosphere for future generations and their contribution to society. For the state, this means the loss of significant financial resources invested in education, as well as future gains they could have made if they had chosen to stay. The brain drain causes the country to fall behind technologically, lose its competitive advantage, increase social spending and, in the long run, cause the country's demographic collapse. Therefore, in order to maximise local human capital, many regions and countries are making efforts to attract graduates and encourage them to seek employment in the country, thus repaying some of the costs paid by

the state for their education (Krabel and Flőther, 2014). In contrast, the term “brain gain” refers to the educational and economic gains of countries that are destination countries for well-educated people for a longer period of time.

Graduate migration is a controversial phenomenon, as well-educated graduates from developing countries are more likely to migrate to developed countries to continue their education and advance their careers, and this poses the risk of brain drain (Szelényi, 2006). Brain drain (sometimes referred to as brain flight when immigrant free choice is put forward) occurs when remittances, capital, knowledge, and technology transfers do not offset the immigration of experts, researchers, and intellectuals for employment purposes (Lowell and Findlay, 2001).

Brain drain should be distinguished from academic mobility and another growing trend, circular migration. Academic mobility refers primarily to students and academics and relates to temporal mobility for the purpose of continuing studies or acquiring expertise, while brain drain typically involves well-educated individuals who decide to move permanently after completing their education in their home country. On an individual level, academic mobility offers the opportunity to develop oneself in an international environment and to learn new languages and cultures. It also contributes to society as a whole through the positive aspects of international cooperation between universities and the exchange of experience and knowledge that directly contributes to the development of the education system. Circular migration is a positive, temporary emigration of individuals (students and highly qualified professionals), which includes their return to the country and the expected positive impact of their contribution to science and research.

From the perspective of the labor market, Croatia is characterized by low flexibility and mobility of the labor force, as well as by the emigration tendencies of highly qualified individuals. Remittances from abroad are rather low in Croatia, accounting for only about 3% of GDP (Potočnik and Adamović, 2018).

It is estimated that between 200,000 and 250,000 people have emigrated from Croatia since EU accession. As a result, Croatia has lost 13% of its potential GDP. Available data on migration flows show that the outflow of young, educated adults represents a significant demographic and economic loss for Croatia, due to the withdrawal of the tax and fiscal base and the long-term consequences of a collapse of the health, social, and pension systems. It has also been shown that the country has failed to retain its most important human capital. The phenomenon of brain drain is particularly worrisome given the negative factors at play in Croatia, i.e., the demographic situation, the high unemployment rate of the young population, and the low percentage of well-educated people in the total population. This problem exists not only in Croatia, but also in other Central European and Eastern European (post-) transition countries of the EU (Troskot et al., 2019).

According to a recent study (Kraljević, 2021), half of young adults in Croatia consider emigrating for a longer period of time or forever if they do not achieve their personal or professional goals, and they predominantly choose

geographically close countries, mostly EU countries. The main push factor is not unemployment, but the desire to gain new experience and further education at international institutions, which is in line with the situation in the European Union (32% of young adults want to continue their education or work abroad). Moreover, the current unfavorable social climate in Croatia has not awakened empathy for community problems among young people. As for the perceived consequences of future migrations, they largely refer to the consequences at the personal and family level, while the consequences for the broader community remain outside their thoughts. This is not surprising given that young adults in Croatia have a very low level of interest in community issues (Adamović and Maskalan, 2017).

In a recent study, Potočnik and Adamović (2018) concluded that young adults (aged 19-29) in Croatia do not yet have a rich experience of living abroad for longer than two months. Satisfaction with current life, attachment to family, (local) patriotism, and perceived difficulties in moving are most often cited as important factors in rejecting the idea of going abroad. They also emphasize a high quality of life that they would not be able to achieve abroad, as well as social responsibility, i.e., the need to promote positive change in their community through their own actions. On the other hand, young people who tend to leave give reasons ranging from the influence of friends who have already gone abroad, to education and employment, to general dissatisfaction with life in Croatia and political reasons, a better standard of living, and a higher probability of employment. As a primary consequence of living abroad, they emphasize living in a "better organized country" where their education and work are valued. But for most, the primary goal is to finish their education and see if they can achieve their own goals in their home country, and only then, if they fail, to choose one of the foreign destinations.

Education and migration are closely linked by mutual causes and consequences for both migrants and non-migrants in both sending and receiving countries. Education is increasingly a cause of migration, and students, teachers, and researchers make up a growing share of global migrants. More so, a large proportion of highly educated migrants have completed at least the final stage of their education after migration (Fargues, 2017).

In many ways, education and international migration interact synergistically. Education is often seen as a driver of migration, both by raising individuals' expectations and aspirations and by creating better opportunities for employment abroad. On the other hand, migration increases the resources that make education desirable and attainable (Fargues, 2017). Globally, migrants have been found to be better educated than the average population in the country of origin. In general, labor mobility is found to increase with skill (Lehmer and Ludsteck, 2008; Faggian et al., 2007a). While several studies have found relatively high labor mobility among college graduates (see, for example, Bound and Holzer, 2000; Groen, 2004 for the United States; Hoare and Corver, 2008 for the United Kingdom), other studies show that graduate mobility is relatively low (Belfield and Morris, 1999 in the case of U.K. graduates).

The availability and number of scholarships for young people under 35 is large and can certainly be considered an attractive push factor. Students are offered a number of scholarships and opportunities to stay in a foreign country for a short period of time in order to improve the knowledge from their studies or to facilitate the mastery of a foreign language.

We can observe that there is a special type of temporary migration in Croatia, which is mostly realized through various scholarship programs. Young adults want to continue their education through programs such as Erasmus because they believe that it will help them improve their education and skills, and thus achieve better employability in the hard labor market.

A large body of evidence suggests that it is not only what happens within a higher education institution that matters to students' futures, and extracurricular activities (membership in student organizations and clubs, doing sports professionally, volunteering, paid student employment) have been shown to confer a variety of benefits by building students' character and sense of unity among students (O'Hanlon, 1982). Extracurricular activities are thought to help develop important noncognitive skills, particularly teamwork, perseverance, and leadership, as well as hard-to-measure qualities such as ambition, willingness to learn, soft skills, and curiosity (Snellman et al., 2015), responsibility, communication skills, self-confidence, and self-esteem, which pay dividends later, particularly in finding one's first job (Clark et al., 2015). Participation in extracurricular activities has previously been found to increase social mobility and has been associated with positive outcomes such as higher educational attainment and future earnings (Snellman et al., 2015). Paid student employment has been found to increase business and trade awareness, while athletic activities best promote self-confidence and self-esteem. Social groups are beneficial for developing interpersonal skills (Clark et al., 2015). Therefore, many universities nowadays award and encourage extracurricular activities. Extracurricular activities are important to the hiring process because recruiters use extracurricular activities as a selection criterion.

The goals of globalization and internationalization make international careers increasingly desirable, and the international skills acquired during student mobility are an essential outcome. One particular form of academic mobility, the European Action Scheme for the mobility of University Students (Erasmus), is recognized as the most successful exchange program because it combines knowledge, attitudes, and skills, linking cultural enlightenment, interpersonal experience, linguistic challenges, academic enrichment, and professional opportunities. It contributes to global development and meets business expectations through individual development. It has an impact that goes beyond academic achievement as it promotes the academic, professional and individual development of participants. It is clear from the official Erasmus documents that the skills and qualifications acquired through this program are readily recognized across borders and in the labor market, and that the competencies acquired benefit not only the students participating in this program, but also the institutions and organizations involved, as well as society at large, by contributing to growth, equity, prosperity, and social inclusion in Europe and beyond.

One of the roles of the Erasmus program is to develop multiple perspectives in students' future career choices that are not limited to national or local perspectives. Employers increasingly confirm that the skills acquired through Erasmus programs are critical for hiring and career development of employees (Mizikaci and Arslan, 2019), and employability is generally positively influenced by mobility (Mitchell, 2012).

Reports indicate that especially in Southern and Eastern Europe, mobile students have a stronger connection to Europe (Erasmus+ report). They are better equipped with professional skills, more innovative, have better language skills, have a better understanding of other cultures and are therefore more confident and better able to compete in the business world (Mizikaci and Arslan, 2019) and expect to find better jobs at home and abroad. A recent study from Turkey found that upon returning from an Erasmus mobility, students compared employment opportunities at home to those abroad and believed that this attitude was influenced by the academic improvement the program provided (Mizikaci and Arslan, 2019),

In addition to the positive effects of participating in the Erasmus program, there are also some challenges. Some authors argue that mere exposure to a new environment is not enough to have an impact on future careers (Alfanseder et al., 2011). Gonzalez et al. (2011) note that European students are not only interested in complementing their major studies but are also motivated to participate in the Erasmus program by employment opportunities outside their home country, and Lesjak et al. (2015) concluded that students are more likely to choose developed countries as Erasmus destination countries because of the higher likelihood of encountering new educational systems and employment opportunities. Simões et al. (2020) found evidence that mobility experiences prepare graduates for an international career, i.e. repeat mobility. A study period abroad may subsequently trigger the decision to go abroad. If this effect is substantial, a country that encourages its students to study abroad may actually be exporting its highly skilled workforce. Oosterbeek and Webbik (2009) found that awarding a scholarship to a mobility program reduced the likelihood that an applicant would stay in the home country for the first few years of his or her career by 30%. Their results also suggest that study abroad increases the probability of settling abroad by almost 100% and that each month of study abroad decreases the probability of living in the home country by 4-5%. Similarly, Dreher and Poutvaara (2005) find that the stock of foreign students is an important predictor of subsequent migration to the host country. It appears that education policies that encourage students to study abroad may actually lead to brain drain. In the 1970s, Bhagwati and Hamada introduced the idea of a "brain tax" that could compensate sending countries for the loss caused by migration. On the other hand, it has been estimated that a limited but positive emigration rate of skilled workers (between 5 and 10%) can be beneficial for development (Beine et al., 2001).

3. Methodology/Method/Model/Conception of analysis

Based on the findings from the literature review and the proposed hypotheses, a quantitative, exploratory approach was adopted to investigate the migration propensity of students in relation to participation in extracurricular activities and, in particular, participation in the Erasmus program. The main objective of this exploratory research was to investigate the relevance of extracurricular activities for graduates' future careers and, in particular, their mobility. It also aimed to investigate whether study abroad increases the willingness to live abroad.

An online questionnaire was selected for primary data collection. The questionnaire was distributed in May 2022 via the Survey Gizmo platform to students in their final year of undergraduate studies and to students in their first and second year of graduate studies at the Faculty of Economics in Osijek. These years of study were selected because the period immediately before and after a prolonged investment in human capital is when the propensity to migrate is the highest (Kazakis & Faggian, 2017). Similar data are also available for Croatia (DZS, 2021).

A total of 252 students completed the questionnaire. The responses were analyzed using SPSS Statistics for Windows, Version 23.0. Table 1 shows the descriptive statistics of the convenience sample.

Table 1: Sample characteristics

	Frequency	Percent
Gender		
Male	77	30.6
Female	175	69.4
Year of study		
3rd year of undergraduate study	79	31.3
1st year of graduate study	94	37.3
2nd year of graduate study	79	31.7
Place of residence		
Village/small town	86	34.1
Town/City	166	65.9
Do you study in your hometown?		
No	69	27.4
Yes	183	72.6
Job Aspirations		
I plan to start my own business	104	41.3
I plan to start a business with a partner	39	15.5
I plan to work in a state-owned company	94	37.3

Migration intention		
I plan to live in Croatia five years after the graduation from college	224	88.9
I plan to live in Croatia two years after the graduation from college	190	75.4

Source: Author

The gender profile (69.4% women and 30.6% men in the sample) roughly reflects the overall population of students at Faculty of Economics in Osijek, and no significant differences were found between female and male students. In terms of their employment plans, most of the students surveyed plan to start their own business either alone or with a partner (56.8%), or they plan to work in a state-owned enterprise after graduation (37.3%).

There is no universal definition or a list of extracurricular activities, and in this study, extracurricular activities are understood as any activity, hobby, or work outside of academic study (Clark et al., 2015). Students were presented with a list of extracurricular activities observed in the faculty and community and asked to indicate the activities in which they participated (Table 2).

Table 2: List of extracurricular activities

Extracurricular activity	No. of students
Study or internship in a foreign country through Erasmus+ program	28
Participation in an international student exchange through student organizations (IAESTE, AIESEC)	11
Participation in Work&Travel or similar program	19
Voluntary work at the Faculty in organization of an event (Creative treasury, EU week, Week of the money, Global entrepreneurship week)	75
Voluntary work outside faculty in organizations and events (Dog shelter, SOS Children's Village, Pannonian challenge)	98
Participation in Legal and Economic Clinic	27
Active engagement in the student associations or clubs (ESN, Andizet, META, EWoB, ERUDIO, edIT, Financijski impuls)	47
Doing sports professionally	40

Source: Author

Table 2 shows that most students participate in some form of extracurricular activity and that some students actively participate in more than one such activity. It is evident that most students volunteer (173 out of 252) and take part in internships in Croatia (73 out of 252). For this research, 58 students who migrated temporarily during an extracurricular activity (either through Erasmus+, a student exchange, or a work&travel programme) are of particular interest.

4. Results and discussion

As shown in Table 1, the majority of students live in the city (65.9%), and 72.6% study in their hometown. Murphy-Lejune (2002), Krabel and Flőther (2014), and Faggian et al. (2007b) found that previous migration from parental residence to college location is one of the strongest predictors for subsequent migration. Mobility of Croatian students is rather low. In the sample, less than 30% of the student's study outside their hometown. Therefore, the finding that the vast majority plan to live in Croatia two or five years after graduation from college (Table 1) is not surprising. That emigration for employment purposes is generally not a priority for young adults in Croatia was also recently reported by Dedukić (2022).

It has been found (Clark et al., 2015) that different extracurricular activities develop different skills. Regarding Hypothesis 1: Students who participate in extracurricular activities have a higher propensity to migrate after graduation, the results of the correlation analysis show no relationship between participation in extracurricular activities and intention to migrate/stay or students' attitude to stay/migrate. In addition, the independent-samples t-test procedure shows that if we consider the variable of extracurricular activities as a summary of all extracurricular activities listed, there is no relationship or difference between students who participate in extracurricular activities and those who do not. This implies that H1 is rejected. For testing the hypothesis, correlation analysis and independent samples t-test were used.

It has been observed earlier (Clark et al., 2015) that not every extracurricular activity develops the same competences and shapes student's mindset the same way, therefore the analysis on the level of individual extracurricular activity was carried out. It indicatsd that students who are professional athletes show significantly lower intention to leave Croatia compared to the rest of the sample ($\boldsymbol{t}_{72,819}$ = -2.106, p <.05). This result is not surprising, as it has been previously reported (Sedlan Kőnig, 2012) that students who are active in professional sport are more likely to exhibit entrepreneurial behavior. Internal locus of control, beliefs, proactivity, optimism, flexibility and other characteristics of entrepreneurial behavior explain why students athletes are less likely to migrate after graduation.

On the other hand, Hypothesis 2: Previous mobility for educational purposes during studies affects mobility upon entering the labor market was proven. Students who participated in Erasmus programs showed significantly higher intention to leave Croatia compared to the rest of the sample (***t*250**= -3.684, p <.001), and at the same time significantly lower intention to stay in Croatia after graduation (***t*250** = 2.196, p <.05). Moreover, students who participated in exchange programs showed significantly higher intentions to leave Croatia compared to the rest of the sample (***t*250** = -2.298, p <.05). This is consistent with previous findings, as Krabel and Flőther (2014) also found that graduates who went abroad for a limited period of time during their studies were significantly more mobile.

In addition, students who participated in the Erasmus mobility programs demonstrated more pronounced attitude that leaving Croatia can help them achieve their personal goals and values (***t*250** = -1.974, p <.05) and enhance their professional development (***t*250** = -2.527, p <.05). This result is consistent with the previous one (Clark et al., 2015) when 64% of students said that extracurricular activities helped them get their first job and 57% said that their extracurricular activities helped them do better in their first job.

In summary, the results show that extracurricular activities generally have no effect on students' propensity to migrate, with the exception of professional sports, which reduces the intention to migrate after graduation. Perhaps they have built a network of contacts that will allow them to live better in the Republic of Croatia, perhaps they feel that they have already started building their professional career in the Republic of Croatia and therefore plan to stay in the country after graduation. On the other hand, participation in Erasmus and student exchange programs has also been shown to increase Croatian students' intention to leave the country after graduation. This suggests that hosting foreign students is an effective way to attract future migrants. This finding brings to light an overlooked side effect of the Bologna Agreement and the policy of awarding Erasmus and exchange student scholarships, namely the loss of young, well-educated people in the early stages of their careers. Students who stay abroad or emigrate later should be considered as a cost to be borne by the sending countries. Therefore, as suggested earlier by Poutvaara (2008), these countries should consider developing country-specific skills through higher education, rather than internationally applicable training.

However, international student flows may well lead to mutual benefits, as they involve both exchanges of skilled workers and brain drain. The negative effects of graduate mobility should be weighed against potential positive effects such as remittances, the creation of new businesses, and networks. Migrants are expected to acquire new knowledge, skills, acquaintances, and financial resources that can contribute to social and economic development when they return to their home countries. Graduate mobility and brain drain are directly related to the state's active preventive measures aimed at retaining the well-educated population. In general, Croatian graduate migrants do not intend to stay in a host country for a long time (Potočnik and Adamović, 2018; Božić and Burić, 2005).

5. Conclusions

It is known from previous research that well-educated people are particularly mobile. Despite its exploratory nature, this study provides empirical evidence that participation in Erasmus and student exchange programs increases Croatian students' intention to leave the country after graduation.

Freedom is as important as development, and this must also apply to migration decisions. When examining ways to prevent brain drain, it is important to consider the balance between individual freedom and the individual's debt to the country. It should be in the interest of every country to retain as many

well-educated citizens as possible, and if they emigrate, to create conditions that will bring them back. It should be also noted that most migrants with college degrees do not intend to leave the country permanently, but try to find reasons to stay or return to Croatia after some time abroad. Managing migration by limiting graduate emigration in the name of national interests of developing countries and limiting immigration by developed countries does not seem to be an adequate answer. Existing measures to address brain drain in the Republic of Croatia, such as housing loan subsidies and financial support for youth employment, show limited results. Previous experience from Croatia also shows that without an improvement in the social, economic, and political situation and without an improvement in the quality of life and work, no significant impact on brain drain can be expected. The current brain drain trends can only be stopped by a combination of thoughtful and proactive population policies, changes in the education system that meet the real needs of an orderly labor market, and social policies aimed at the unemployed. It seems that the possibility of career advancement and a creative and inspiring environment for further professional development could help. The Republic of Croatia should work to promote labor mobility in the country and circular migration, while creating conditions for emigrants to return. This seems to be the only way forward.

This study may have important implications for Croatian higher education policy, as it shows that graduate mobility is influenced by prior mobility during studies, and raises important questions, such as how to motivate students who have taken part in mobility for educational purposes during their studies and who are admissible for the Croatian labor market to stay in the country after graduation or at least contribute to the economy through projects, partnerships and other forms of cooperation during their migration period.

A serious limitation of this research is that only graduates from a single Croatian faculty were included in the sample, and therefore the results cannot be generalized to other universities in Croatia. Further studies involving other universities in Croatia (and other countries) should follow. More detailed interviews and deeper analyses could provide further insights. Possible areas for future research could include the alumni. Finally, a longitudinal study is suggested to determine whether attitudes or intentions change as a function of specific factors or life stages.

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References

1. Abel, J. R., Deitz, R. (2012) “Do colleges and universities increase their region’s human capital?”, *Journal of Economic Geography*, Vol. 12, No. 3, pp. 667-691.
2. Ackers, L. (2005) “Moving People and Knowledge: Scientific Mobility in the European Union”, *International Migration*, Vol. 43, No. 5, pp. 99–131. https://doi.org/10.1111/j.1468-2435.2005.00343.x
3. Adamović, M., Maskalan, A. (2017) *Pogled iz rodne perspektive na neke vrijednosti i interese mladih*, Zagreb: Institut za istraživanja u Zagrebu.
4. Alfranseder, E., et al. (2012) “Exchange, employment and added value”, Brussels: Erasmus Student Network AISBL. Available at: https://esn.org/sites/default/files/esnsurvey2011_web.pdf [Accessed: May 12, 2022]
5. Atoyan, R., et al. (2016) “Emigration and Its Economic Impact on Eastern Europe*”, IMF Staff Discussion* Note Available at: https://www.imf.org/external/pubs/ft/sdn/2016/sdn1607.pdf [Accessed 12 May 2022]
6. Ariu, A., Squicciarini, P. (2013) “The Balance of Brains: Corruption and High Skilled Migration”, *Institut de Recherches Economiques et Sociales de l’ Universite catholique de Louvain*, 15 May, Louvain-la-Neuve, IRES. Available at: https://sites.uclouvain.be/econ/DP/IRES/2013010.pdf [Accessed 12 May 2022]
7. Balaz, V., Williams A., Kollar D. (2004) “Temporary versus Permanent Youth Brain Drain: Economic Implications”, *International Migration*, Vol. 42, No. 4, pp. 3–34. https://doi.org/10.1111/j.0020-7985.2004.00293.x
8. Beck, U., Beck-Gernsheim, E. (2009) “Global generations and the trap of methodological nationalism for a cosmopolitan turn in the sociology of youth and generation”, *European sociological review*, Vol. 25, No. 1, pp. 25-36. https://doi.org/10.1093/esr/jcn032
9. Beine, M., Docquier, F., Rapoport, H. (2001) “Brain drain and economic growth: theory and evidence”, *Journal of Development Economics*, Vol. 64, No. 1, pp. 275–89. https://doi.org/10.1016/j.jdeveco.2004.03.008
10. Belfield, C., Morris Z. (1999) “Regional Migration to and From Higher Education Institutions: Scale, Determinants and Outcome”, *Higher Education Quarterly*, Vol. 53, No.3, pp. 240-263.
11. Bhagwati, J. N., Hamada, K. (1974) “The brain drain, international integration of markets for professionals and unemployment”, *Journal of Development Economics*, Vol. 1, No. 1, pp. 19–42. https://doi.org/10.1016/0304-3878(74)90020-0
12. Bound, J., Holzer H.J. (2000) “Demand Shifts, Population Adjustments, and Labor Market Outcomes during the 1980s”, *Journal of Labor Economics*, Vol. 18, No. 1, pp. 20-54. https://doi.org/10.3386/w5685
13. Božić, S., Burić, I. (2005) “Migracijski potencijal Hrvatske–mikroanalitički aspekti”, *Migracijske i etničke teme*, Vol. 21, No. 1-2, pp. 9-33.

14. Cass, N., Shove, E., Urry, J. (2005) “Social exclusion, mobility and access”, *The sociological review*, Vol. 53, No. 3, pp. 539-555.

15. Ciumasu, I. M. (2007) “International circulation of talent–a solution for the development of Romania”, Strasbourg, Lifelong Learning and Qualifications in Higher Education. *UNISO 2007,* pp.207-217.

16. Clark, G., et al. (2015) “‘It’s everything else you do…’: Alumni views on extracurricular activities and employability”, *Active Learning in Higher Education*, Vol. 16, No.2, pp. 133-147. https://doi.org/10.1177/1469787415574050

17. Consoli, D., Vona, F., Saarivirta, T. (2013) “Analysis of the graduate labour market in Finland: spatial agglomeration and skill–job match”, *Regional Studies*, Vol. 47, No. 10, pp. 1634-1652. https://doi.org/10.1080/00343404.2011.603721

18. Corcoran, J., Faggian, A. (2017) Graduate migration and regional development: an international perspective*,* UK, University of Sheffield, Edward Elgar Publishing.

19. Dahl, M. S., Sorenson O. (2007) “Home sweet home: Social capital and location choice”, *Social Science, pp.* 1-22. https://doi.org/10.4337/9781784712167.00005

20. Available at: http://dimetic.dime-eu.org/dimetic_files/Lect-to-Sorenson_Dahl-Sorenson.pdf [Accessed 12 May 2022]

21. DaVanzo, J. (1983) “Repeat migration in the United States: who moves back and who moves on?”, *The Review of Economics and Statistics*, pp. 552-559. https://doi.org/10.2307/1935923

22. Dedukić, D. (2021) “Kompetencije 21. stoljeća i migracije visokoobrazovanih mladih u Republici Hrvatskoj”, *Forum za sigurnosne studije*, Vol. 4, No. 4/5, pp. 124-147.

23. Di Cintio, M., Grassi, E. (2013) “Internal migration and wages of Italian university graduates”. *Papers in Regional Science*, Vol. 92, No. 1, pp. 119-140. https://doi.org/10.1111/j.1435-5957.2011.00397.x

24. Dreher, A., Poutvaara, P. (2005) Student flows and migration: An empirical analysis. CESifo Working Paper, No. 1490, Center for Economic Studies and Ifo Institute (CESifo), Munich https://doi.org/10.2139/ssrn.731765 Available at: econstor.eu/bitstream/10419/18954/1/cesifo1_wp1490.pdf [Accessed May 12, 2022]

25. DZS, Državni zavod za statistiku. (2021) Migracija stanovništva Republike Hrvatske u 2020. Available at: https://www.dzs.hr/Hrv_Eng/publication/2021/07-01-02_01_2021.htm [Accessed May 5, 2022)

26. Erasmus+ Programme. (n.d.) Available at: http://www.ua.gov.tr/en/programmes/erasmus-programme [Accessed May 12, 2022]

27. Faggian, A. (2005). Human capital, migration and local labour markets: the role of the higher education system in Great Britain, PhD thesis, University of Reading.

28. Faggian A, McCann P., Sheppard S. (2007a) “Human capital, higher education and graduate migration: an analysis of Scottish and Welsh students”, *Urban Studies*, Vol.44, No. 13, pp. 2511–2528. https://doi.org/10.1080/00420980701667177

29. Faggian A, McCann P., Sheppard S. (2007b) “Some evidence that women are more mobile than men: gender differences in U.K. graduate migration behavior”, *Journal of Regional Science,* Vol. 47, No. 3, pp. 517–539.

30. Faggian, A., McCann P. (2009) “Human capital, graduate migration and innovation in British regions”, *Cambridge Journal of Economics*, Vol. 33, No.2, pp. 317-333. https://doi.org/10.1093/cje/ben042

31. Fargues, P. (2017). “International migration and education - A web of mutual causation”, Paper commissioned for the Global Education Monitoring Report Consultation 2019 Consultation on Migration Available at: https://efaidnbmnnnibpcajpcglclefindmkaj/https://cadmus.eui.eu/bitstream/handle/1814/47106/Fargues_International%20Migration%20and%20Education.pdf?sequence=2 [Accessed May 10, 2022]

32. Figueiredo O., Guimaraes, P., Woodward D. (2002) “Home-field advantage: location decisions of Portuguese entrepreneurs”, *Journal of Urban Economics*, Vol. 52, No. 2, pp. 341-361. https://doi.org/10.1016/s0094-1190(02)00006-2

33. Florida, R., Mellander, C., Stolarick, K. (2008) “Inside the black box of regional development—human capital, the creative class and tolerance”, *Journal of economic geography*, Vol 8, No. 5, pp. 615-649. https://doi.org/10.4324/9780203094945-11

34. Franklin, R.S. (2003) “Migration of the young, single, and college educated, 1995–2000”, Special Report, US Department of Commerce, Economics and Statistics Administration, US Census Bureau. Available at: https://usa.ipums.org/usa/resources/voliii/pubdocs/2000/censr-12.pdf. [Accessed March 8, 2022]

35. González, C. R., Mesanza, R. B., Mariel, P. (2011) “The determinants of international student mobility flows: An empirical study on the Erasmus programme”, *Higher Education*, Vol.62, No. 4, pp. 413–430. https://doi.org/10.1007/s10734-010-9396-5

36. Groen, J.A. (2004) “The effect of college location on migration of college-educated labor”, *Journal of Econometrics*, Vol. 121, No.1-2, pp. 125-142. https://doi.org/10.1016/j.jeconom.2003.10.002

37. Haapanen, M., Tervo, H. (2012) “Migration of the highly educated: Evidence from residence spells of university graduates”, *Journal of Regional Science,* Vol. 52, No. 4, pp. 587-605.

38. Hansen, S.B., Ban, C., Huggins L. (2003) “Explaining the Brain Drain From Older Industrial Cities: The Pittsburgh Region”, *Economic Development Quarterly*, Vol. 17, No. 2, pp. 132-147. https://doi.org/10.1177/0891242403017002002

39. Hoare, A., Corver M. (2008) “The Regional Geography of New Young Graduate Labour in the UK”, *Regional Studies*, Vol. 44, No. 4, pp. 477-494. https://doi.org/10.1080/00343400902736543

40. Jewell, S., Faggian, A. (2014) “Interregional migration ‘Wage Premia’: the case of creative and science and technology graduates in the UK”, *Applied Regional Growth and Innovation Models*, pp. 197-214.

41. Kazakis, P., Faggian, A. (2017) “Mobility, education and labor market outcomes for US graduates: Is selectivity important?”, *The Annals of Regional Science*, Vol. 59, No. 3, pp. 731-758.

42. Kodrzycki, Y.K. (2001) “Migration of Recent College Graduates: Evidence from the National Longitudinal Survey of Youth”, *New England Economic Review*, No.1-2, pp. 13-34.

43. Krabel, S., Flöther, C. (2014) “Migration of Recent College Graduates: Evidence from the National Longitudinal Survey of Youth”, *Regional studies*, Vol. 48, No. 10, pp. 1609-1627.

44. Kraljević, R., (2020) “Studenti i njihova okolina o percepciji budućnosti”, *Proceedings of the International Scientific-professional Conference Migracije i identitet: kultura, ekonomija, država,* pp.1063-1069.

45. Lehmer, F., Ludsteck J. (2008): “The Returns to Job Mobility and Inter-Regional Migration”, *IAB-Discussion Paper,* No. 6.

46. Lesjak, M., et al. (2015) “Erasmus student motivation: Why and where to go?” *Higher Education*, Vol. 70, No.5, pp. 845–865. https://doi.org/10.1007/s10734-015-9871-0

47. Lowell, L., Findlay A. (2001) “Migration of highly skilled persons from developing countries: impact and policy responses”, *International migration papers*, Vol. 44, No. 25, pp. 1-45.

48. Mitchell, K. (2012) “Student Mobility and European Identity: ERASMUS Study as a Civic Experience?”, *Journal of Contemporary European Research,* Vol. 8, No. 4, pp. 490-518. https://doi.org/10.30950/jcer.v8i4.473

49. Mizikaci, F., Arslan, Z. U. (2019) “A European perspective in academic mobility: A case of Erasmus program” *Journal of International Students*, Vol. 9, No. 2, pp. 705-726. https://doi.org/10.32674/jis.v9i2.1138

50. Murphy-Lejeune E. (2002) Student Mobility and Narrative in Europe: The New Strangers, London and New York: Routledge.

51. O’Hanlon, T. P. (1982) “School sports as social training: The case of athletics and the crisis of World War I”. Journal of sport history, 9(1), pp.5-29.

52. Oosterbeek, H., Webbink, D. (2011) “Does studying abroad induce a brain drain”, *Economica*, Vol. 78, No. 310, pp. 347-366. https://doi.org/10.1111/j.1468-0335.2009.00818.x

53. Petroff, A. (2016). “Reversing the brain drain: evidence from a Romanian brain networking organization”, *International Migration*, Vol. 54, No. 5, pp. 122-135. https://doi.org/10.1111/imig.12268

54. Potočnik, D., Adamović, M. (2018) “Iskustvo migracije i planirani odlasci mladih iz Hrvatske.” *Friedrich-Ebert-Stiftung* Available at: http://www.Fes-croatia.org/fileadmin/user_upload/Migracije_mladih_WEB_verzija.pdf [Accessed: May 12, 2022]

55. Poutvaara, P. (2008). “Public and private education in an integrated Europe: studying to migrate and teaching to stay?”, *Scandinavian Journal of Economics*, Vol. 110, No. 3, pp. 591–608. https://doi.org/10.1111/j.1467-9442.2008.00552.x

56. Sedlan-Kőnig (2012) Metodologija visokoškolskog obrazovanja u funkciji razvijanja poduzetničkog ponašanja, PhD Thesis, Josip Juraj Strossmayer University of Osijek, Faculty of Economics in Osijek

57. Sheller, M., Urry J. (2006) “The new mobilities paradigm”, *Environment and Planning A*: *Economy and Space,* Vol. 38, No.2, pp. 207–226. https://doi.org/10.1068/a37268

58. Simões, F., Rocha, R., & Mateus, C. (2020) “Beyond the prophecy success: How place attachment and future time perspective shape rural university students intentions of returning to small islands”, *Journal of Youth Studies*, 23(7), pp.909-925. https://doi.org/10.1080/13676261.2019.1645312

59. Sjaastad, L. A. (1962). “The costs and returns of human migration”, *Journal of political Economy*, Vol. 70, No. 5, pp. 80-93.

60. Skrbis, Z., Woodward, I., Bean, C. (2014) “Seeds of cosmopolitan future? Young people and their aspirations for future mobility”, *Journal of Youth Studies*, Vol. 17, No. 5, pp. 614-625. https://doi.org/10.1080/13676261.2013.834314

61. Snellman, K., et al. (2015). “The engagement gap: Social mobility and extracurricular participation among American youth”, *The ANNALS of the American Academy of Political and Social Science*, Vol. 657, No.1, pp. 194-207.

62. Szelényi, K. (2006) “Students without borders? Migratory decision-making among international graduate students in the US”, *Knowledge, Technology & Policy*, Vol. 19, No. 3, pp. 64-86.

63. The Economist 2009. The Others. 19.December, p. 85-87.

64. Todisco, E. Brandi M. C., Tattolo G. (2003) “Skilled Migration: a Theoretical Framework and the Case of Foreign Researchers in Italy”, *Fulgor*, Vol. 1, No. 3, pp. 1-16. Available at: https://dspace.flinders.edu.au/xmlui/handle/2328/175 [Accessed 12 May 2022]

65. Troskot, Z., Prskalo, M. E., Šimić Banović, R. (2019) “Ključne odrednice iseljavanja visokokvalificiranog stanovništva: slučaj Hrvatske s komparativnim osvrtom na nove članice EU-a”, *Zbornik radova Pravnog fakulteta u Splitu*, Vol. 56, No. 4, pp. 877-904.

66. UNESCO Institute for Statistics (2016) Global flow of tertiary educated students. Available at: http://uis.unesco.org/en/uis-student-flow [Accessed: May 12, 2022]

67. US Department of Commerce, Economics and Statistics Administration, US Census Bureau (2003) Migration of the young, single, and college educated: 1995 to 2000*,* Iowa: Census 2000 Special reports. Available at: https://usa.ipums.org/usa/resources/voliii/pubdocs/2000/censr-12.pdf [Accessed: May 12, 2022]

68. Winters, J.V. (2012). “Differences in employment outcomes for college town stayers and leavers”, *IZA Journal of Migration*, Vol. 1, No. 1, pp. 1–17. https://doi.org/10.2139/ssrn.2114903

CHAPTER 24

Anchoring Factors to International Youth Labor Migration

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ABSTRACT

Economic crises increase unemployment in general, but not uniformly across the labor market. Young people are considered a particularly vulnerable group in the labor market and are more prone to international migration, especially if they have a high level of education. After Croatia's EU accession in 2013 and the subsequent removal of labor market-related obstacles, it became easier for highly skilled young people to migrate to Western European countries, resulting in a significant brain drain and impacting Croatian demographics. In order to better assess the determinants of migration, we introduced the concept of anchoring factors, i.e. factors that influence the decision to stay in the home country and not to migrate abroad, which is also our main contribution. We distributed a questionnaire to 714 students at a Croatian public college. Our results show that despite income and economic differences between the home and destination countries, there is a significant influence of perceptions of quality of life in Croatia, suggesting that students do not determine their future primarily according to career-related determinants. These findings may have implications for the development of regional and national strategies aimed at preventing brain drain and improving demographic, and thus economic, indicators in Croatia.

Key words: *Migration, Youth, Anchoring factors, Push & pull factors, Migration barriers*

JEL classification: *F2, J1*

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1. Introduction

International migration is a global issue. So far, global migration has been proportional to the growth of the world's population, but there is a high probability that general development, especially the availability of information, will facilitate and thus accelerate human mobility. However, the migration literature does not provide a comprehensive understanding of why people migrate. Researchers apply different analytical approaches across disciplines to assess the drivers of international migration decisions. The phenomenon is complex and thus requires analysis at multiple levels. Therefore, migration research focuses simultaneously on the micro and macro levels to identify the determinants that contribute to migration behavior. Micro-level factors refer to a person's personal motivations for migrating. They examine the reasons behind a person's decision to leave their home country and settle in another country. Macro-level factors examine the conditions in both the home and destination countries that serve as incentives for international migration: They include socioeconomic, political, and cultural similarities and differences between countries, usually in a comparative dyadic manner. Because both similarities and differences between countries can serve as a starting point for considering migration, the migration literature often uses the terms *push and pull factors* to categorize incentives to move abroad. Push factors are incentives to move abroad that originate in adverse circumstances in the home country, e.g., the unemployment rate, poverty, the level of corruption in the home country, etc. They need not be only at the macroeconomic level. They can also be personal in nature and relate to perceptions of insecurity, climatic preferences, turning points in life, or perceived opportunities to achieve prosperity in personal or professional life in the future. Pull factors refer to the appealing conditions in a destination country and often lead to a better standard of living due to broader employment opportunities, higher incomes, better work-life balance, etc.

In general, we argue that incentives to remain in the home country should be studied in migration discourse. In addition, we suggest that research on the determinants that lead to non-migration behavior is as important as understanding the determinants that lead to migration. We suggest that research should be conducted through a multilevel analysis of micro and macro factors on a sample of individuals with a strong desire to migrate in order to fully understand the drivers of migration. Thus, the aim of our paper is to extend a push and pull model of migration factors to include two additional factors: anchoring and barrier factors. Both groups of factors are predictors of non-migrating behavior. We assume that push and pull factors are strongly influenced by agency and therefore it is not sufficient to assess which factors drive someone out of their home country (push factors), but also what kind of threat prevents their migration behavior in an unfavorable situation (barrier factors). We therefore argue that the other end of the push side is not a pull side, but barriers that are evaluated to be a stronger threat to out-migration than maintaining the status quo. On the other hand, in a situation where a person seeks and successfully perceives opportunities in a destination country (assuming he/she has a strong intention to migrate),

there is a set of factors that may provide even greater perceived opportunities if he/she stays (anchoring factors). Thus, we also argue that the opposite end of the pull factors side is not related to push incentives, but to a perceived domestic opportunity having even greater value. This group of factors may explain why the majority of people with migration intentions do not engage in migration behavior after all - they prioritize staying (they score it higher in decision making) because it means staying in the comfort zone and, at the same time, this is perceived as more valuable than moving abroad. This idea could lead to a shift in policy focus from how to stop brain drain to finding tools to better support those who stay.

The paper is organized as follows: In the first section, we explain the push and pull factors described in the migration literature. We then develop and explain our four-factor model, which includes push, pull, anchoring, and barrier factors as vectors of a two-dimensional scale (context analysis and personal perception). In the Data and Methods section, we provide an overview of our sample and present the methods used in data analysis. In the Results and Discussion section we test our model, while in the Conclusions section we give a brief overview of our conceptual model, including a comparison of its results with previous studies in the field and highlighting its limitations.

2. Push and pull factors

Migration is a complex process in which regularities can be identified in when and where people migrate. Migrants move from low-income to high-income areas, from capital-poor to rich places and countries, and so on. Thus, migration represents a mechanism that establishes a regional spatial-economic equilibrium (Ravenstein, 1885). Because of its economic, social, political, and cultural importance, research on migration determinants goes back to classical economic development theory. Nevertheless, migration patterns often contradict the predictions of standard economic theory models (e.g., the absence of migration flows even in the presence of constant income inequality, or the presence of substantial migration flows despite the absence of an economic mismatch between home and destination countries) (Radu and Straubhaar, 2012). Given the large differences in migration behavior across regions or communities without corresponding differences in economic indicators, the question of why people migrate continues to be a focus of migration studies. Research on the determinants of migration has evolved considerably in recent decades (Williams et al., 2018; Belmonte and McMahon, 2019; Milasi, 2020). Researchers often examine migration decisions using push and pull factors in the home and destination countries (Lee, 1966; Passaris, 1989; McDowell and de Haan, 1997; de Haas, 2010; Van Hear et al., 2017; Urbanski, 2022). Push factors are usually related to fear or realistic threat (e.g., physical danger) or the perception of lower chances of succeeding in the home country. They may originate in personal life (work-life balance) or professional aspirations (e.g., not enough opportunities to advance professionally and pursue one's career). Pull factors represent the attraction of the destination country and refer to factors such as the prospect of more interesting jobs in destination countries, better salaries, gaining new

experiences, meeting new people, and discovering new cultures. In other words, models using push and pull factors explain how different conditions in the home and destination countries influence migration. Lee (1966) pointed out that high unemployment rates and low incomes in some countries drive residents out of their home country, while another country encourages them to move in by offering better prospects.

Push and pull factors have a multidimensional structure. They represent drivers that shape the broader context in which migration intentions arise and in which people make their migration decisions (Van Hear et al., 2017). They are multidimensional and include determinants at the micro, meso, and macro levels. Micro-level determinants include individual characteristics, traits, and preferences. Meso-level determinants include social relationships and membership in a particular social group (household, organizations, social networks, etc.). Macro-level determinants relate to economic, political, cultural, and other institutional conditions. The interplay of these dimensions makes it difficult to isolate determinants as universal drivers of migration. For example, poverty was considered one of the most important drivers of migration until migration costs were introduced into research on international migration and it was found that the most disadvantaged citizens (the poorest) could not afford to migrate (Tapinos, 1990; UNDP, 2003). Thus, poverty per se may not be a driver of migration, even though there is a strong link between migration and poverty (Van Hear and Sorensen, 2003). Migration researchers are therefore constantly striving to find reliable answers to the questions of how, where, and when the drivers of migration operate.

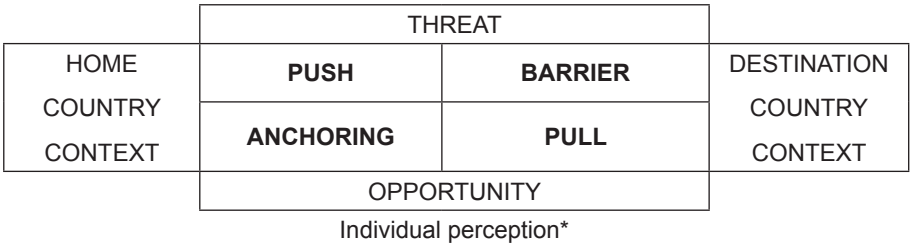
Critics of the push and pull approach point out that push and pull factors do not form a consistent explanatory framework, but rather serve as groups of determinants that are listed together (Skeldon, 1990). Moreover, push and pull factors are static variables in economic models, i.e., they describe migration as an action rather than a process with several distinct phases (from preparation to actual move) and thus do not consider the dynamic nature of the migration process, i.e., the integration of changing motivations, decisions, and the environment (de Haas, 2011).

2.1. Migration intentions and non-migrating behavior: designing a four-factor model

Migration intentions are a widely used proxy for actual migration, as studies show that they are an immediate antecedent (Mobley et al., 1979) and a reasonable predictor of migration behavior (Griffeth et al., 2000; Van Breukelen et al., 2004; Van Mol, 2016; Carling and Collins, 2017; Bakina et al., 2019; Zdrilić and Sokolić, 2022). Nevertheless, it is noted that while many people express a desire to emigrate, only a proportion of them actually engage more intensively in preparations for moving abroad, and even fewer put their intentions into action and emigrate (European Commission, 2018). Moreover, studies that examine migration incentives often focus on contextual factors at both the macro and micro levels. In other words, they consider both structural characteristics of countries of origin and/or destination and individual characteristics of people with migration aspirations (Van Mol,

2016). For example, Ådnanes (2004) examined the structural characteristics of post-communist Bulgaria and their impact on youth migration in his study of the student population. Agadjanian et al. (2008) did the same with the young population in Kyrgyzstan, as did Bastianon (2019) in Georgia and Moldova, while Apsite et al. (2012) in their study of Latvian immigrants in Sweden compared structural differences between Sweden and Latvia as countries of origin and destination. Bahna (2008) looked at the impact of the 2004 eastward enlargement of the European Union on the migration intentions of citizens of the new member states, again focusing mainly on macro-level contextual factors. Boneva & Frieze (2001), Gosling et al. (2003), Frieze et al. (2006), Tabor et al. (2015), and Shuttleworth et al. (2020), on the other hand, focused mainly on the micro level and examined in their studies how different personalities or basically different individual characteristics influence the migration decision. Thus, in all of these studies, researchers often focus on the incentives to migrate (both at the country and individual level). However, by focusing only on the reasons for migration, the studies fail to analyze the reasons that lead people to stay in their home country as a result of their migration-related decision-making process. Thus, the incentives of a much larger group of people - those who have reasons not to act - remain fairly unknown. This group of factors is composed of micro and macro factors and thus requires a multilevel approach to analysis. Because the factors that ultimately lead to the decision to stay in the home country are multiple, even if people had a strong prior desire to move abroad, and the decision context is complex, we consider the decision process followed by non-migration behavior to be as complex as that leading to actual migration behavior. Based on this line of thought, we propose the following model to explain the conceptual decision-making framework of individuals who express migration intentions (Figure 1).

Figure 1: Factors affecting global migration



Note: *Factors related to personal context encompass personal characteristics, competencies, values and attitudes, and self-perception.

Source: authors

Based on the proposed model, we assume that: A) Push and pull factors are multidimensional in nature and therefore require multilevel analysis; and B) Push and pull factors are not two sides of the same coin.

We argue that push and pull factors do not account for the same dimensions of analysis. We introduce the following dimensions of analysis when people consider to migrate internationally:

1) Structural elements - a dyadic comparison between home and destination country contexts, 2) Agency - a subjective perception of factors related to personal context (opportunities vs. threats).

Agency refers to individual freedom of choice and is related to people's abilities to translate their desires into actions (Van Hear et al., 2017). Freedom of choice is enabled and constrained by external structural elements that affect migration decisions (contextual factors). Structural conditions can defer relative to individuals' attributes (gender, age, education level, ethnicity, etc.).

In addition to the push and pull factors found in the migration literature, the combination of these two dimensions allows for the discussion of two new aggregate groups of factors relevant to decisions about international migration: Anchoring factors (incentives to stay) and Barriers (perceived obstacles to migration). While these two groups of factors can lead to a similar effect of not taking migration action, they do not have the same underlying incentives. Anchoring factors refer to the circumstances in the home country that a person subjectively finds attractive, and he/she perceives these factors as opportunities. The person decides to stay regardless of strong personal migration intentions. Therefore, a person evaluates the possibility of moving abroad as less attractive compared to the possibility of staying. On the other hand, factors that act as obstacles affect the subjective perception of one's capabilities and therefore force the person to stay despite a strong desire to migrate. Thus, moving abroad is perceived as a higher risk (a detriment to one's well-being) than not taking action. All four groups of factors should be analyzed at the micro and macro levels.

Both push and anchoring factors assess the context of the home country with respect to international migration. While push factors express the urge to migrate, anchoring factors represent an assessment of the benefits of staying despite the desire to migrate. For example, a high unemployment rate in an occupation is a classic determinant that represents a push factor. The (un) employment rate is also a contextual, macroeconomic, objective indicator of the labor market, which should provide an equidirectional incentive for the entire population in a similar occupation. However, due to subjectivity and bounded rationality, this determinant could act simultaneously as a push factor and an anchoring factor. For example, if a person assumes that he or she would not find a job in his or her home country, this could provide a strong incentive for a person with migration intentions to move to a more promising country (with a less saturated labor market in a particular occupation). On the other hand, if a person assumes that he or she has the possibility of finding a good job in his or her home country, ceteris paribus, despite high unemployment, this could lead him or her to choose to stay in the home country. In other words, push factors refer to assigning a higher value to the unfavorable context in the home country, while anchoring factors refer to assessing the same or similar determinants as more favorable to remaining in the home country.

Both pull and barrier factors refer to estimations of a destination country. If pull factors appear attractive enough to the person with migration intentions, migration behavior is highly likely to be exercised. In contrast, a person who

perceives himself or herself as not having sufficient professional and life skills to succeed in the international market will not migrate regardless of his or her migration aspirations. We can apply a similar example with two individuals who have similar levels of expertise and education, in a situation with a high employment rate. An individual who is highly employable in both the country of origin and the country of destination may still perceive the opportunities abroad as more interesting and choose to move abroad, while a similar individual who is highly employable in both countries may, ceteris paribus, perceive their skills to be less competitive in the global marketplace and therefore be forced to stay.

It should be noted that these factors do not operate in isolation from each other. There is a very complex interplay between them that makes it very difficult to assess and isolate specific and precise determinants of decisions to continue or mitigate international migration in the case of strong migration intentions. These factors are also very difficult to study because they are largely subjective and based on individual perceptions and preferences. For example, suppose that two individuals have similar levels of propensity to migrate internationally (which is very difficult to measure to begin with), the same level of education and experience in the same occupation, and similar levels of comfort in life, etc. They live in the same country (the macro factors are the same for both) and have similar knowledge about the destination country. In this case, the extent of corruption in the home country, as a theoretically relevant determinant of migration behavior, should affect both individuals equally. In contrast, the results of our study show that while the level of corruption is the same for the entire population, it only affects a subset of people in their migration decision. Thus, while one group of individuals bases their migration decision on a high level of corruption, the other group of individuals at the same time and in the same sample completely disregards this determinant in their migration-related decision-making process.

3. Data and Methods

To deepen our knowledge of the anchoring factors that influence the decision to stay in the home country and not move abroad, we used both an online and a written version of the questionnaire distributed to undergraduate and graduate students of a Croatian public Faculty of Economics and Business in February of 2022.

After excluding the missing ones, we obtained 714 valid responses. The first part of the questionnaire was related to students' demographics (age, gender, and place of residence), the study program they attend and their current year of study, their work experience, income, and parental education. The second and most important part of the questionnaire dealt with the students' plans to stay in their home country and the supposed anchoring factors influencing such a plan. Thus, the main question describing our dependent variable referred to the students' desire to stay in Croatia after completing their studies, while the remaining questions focused on various factors that might influence such a decision. Students were asked about their family

relationships and social ties in Croatia, as existing studies have shown that this is one of the most important personal factors determining individual migration decisions. They were also asked about various job-related factors, such as availability and quality of job opportunities in Croatia, working conditions (e.g., working hours, complexity of work, etc.), salary-to-work ratio, possibility of undeclared work and career development opportunities. Regarding the institutional environment, questions were asked about the education, social and health care systems and the general political situation. Questions on social quality of life, general economic situation, and cost of living covered the main socioeconomic factors considered significant in the existing migration literature.

All responses were given on a five-point Likert scale, with 1 indicating strong disagreement and 5 indicating strong agreement with each statement. We used the categorical variable describing students' desire to stay in Croatia after completing their studies as our main dependent variable. We used the IBM SPSS software to apply different methods of data analysis. Pearson's chi-square test was used to examine the relationship between the dependent variable (i.e., students' desire to stay in Croatia) and other categorical variables. Then, we checked the correlation between our dependent variable and other anchoring factors, as well as those factors that are classified as important push and pull factors in the existing literature. We also examined the main barriers to actual migration abroad, as we found that these barriers are as important as the anchoring, push, and pull factors. In other words, despite a person's strong desire to migrate abroad, unfamiliarity with the language spoken in the preferred destination country or the lack of starting capital to build a new life there may prevent someone from actually emigrating. Thus, these barriers tend to work in a different direction than the push and pull factors, but unlike the anchoring factors, they focus only on the characteristics of the destination country. After finding correlations between different factors and our dependent variable, those factors that showed significant relationships were included in the model to predict students' desire to stay in their home country. Finally, the model was tested by linear regression analysis.

4. Results and Discussion

The majority of respondents were female students (76.5%) enrolled full-time in one of the undergraduate study programs (66.4%). Only 8.3% of all students surveyed attended an English-language study program, while the rest studied in their native language. In addition, only 11.5% of the respondents had no work experience, while the rest worked mainly in some student jobs, especially during the summer season. Regarding the place of residence, more than half of the surveyed students (56.7%) answered that they moved during the academic year to live closer to the faculty, which could be an indication of the internal migration in Croatia. Moreover, 70.9% of the respondents estimated their monthly income to be less than half of the average Croatian salary. Only 14.2% of them earn their own money through various jobs and scholarships, while the rest rely entirely (40.3%) or partially

(45.5%) on the financial support of their parents and family. Almost 70% of the surveyed students said that they have enough money to cover all their regular monthly expenses. However, less than half of them (41.2%) answered that they are able to cover some unexpected expenses (e.g., computer or mobile phone repair), while about one third (37.8%) manage to save some money every month. Regarding the parents' education, both parents of about half of the surveyed students have secondary education (i.e., high school diploma).

We have checked for the differences in students' desires to stay in Croatia using the Pearson's chi-square test. We controlled for differences in several other categorical variables: gender, study language (i.e., whether they are enrolled in the English-language program or studying in their native language), students' living experience abroad (minimum six months), students' studying experience abroad (minimum one month), and having partner, family/ relatives, or friends abroad. Generally, the Pearson's chi-square test is based on the simple idea of comparing the frequencies that are observed in certain categories to the frequencies that might be expected in those categories by chance (Field, 2009, 688). Thus, we have tested whether there is a difference in desire to stay in Croatia between female and male students; between those who study in English and Croatian language programs; between those who have already experienced living or studying abroad and those who haven't; and between those who have relatives or friends abroad and those who do not have such relationships.

The results showed there is a statistically significant difference only in students' desire to stay in Croatia based on their gender and language of the study program they are enrolled in. The other categorical variables proved to be insignificant for the differences between potential stayers and movers. In accordance with many previous studies that found men to be more likely to migrate, female students in our sample showed stronger desire to stay in Croatia after obtaining their university degree (χ^2 = 16,71; df = 4; $p<0.05$). The result showing adjusted residual > |1,96| is presented in Table 1.

Table 1: Crosstabulation – gender and student's desire to stay in Croatia

			Desire to stay in Croatia after completing studies					
			Strongly disagree	Disagree	Neither agree, nor disagree	Agree	Strongly agree	Total
Gender	Male	Count	16	15	42	45	48	166
		Expected Count	24,3	21,0	43,0	29,5	48,2	166,0
		Adjusted Residual	-2,1	-1,6	-,2	3,6	,0	
	Female	Count	88	75	142	81	158	544
		Expected Count	79,7	69, 0	141,0	96,5	157,8	544,0
		Adjusted Residual	2,1	1,6	,2	-3,6	,0	
Total		Count	104	90	184	126	206	710
		Expected Count	104,0	90,0	184,0	126,0	206,0	710,0

Source: authors' calculations

Furthermore, those students who are enrolled in the English-language study program have weaker desire to stay in Croatia, while those who study in their native language show stronger desire to stay in the home country after obtaining the university degree ($\chi 2 = 17,96$; $df = 4$; $p<0.05$). The result showing adjusted residual > |1,96| is presented in Table 2.

Table 2: Crosstabulation - study language and student's desire to stay in Croatia

			Desire to stay in Croatia after completing studies					
			Strongly disagree	Disagree	Neither agree, nor disagree	Agree	Strongly agree	Total
Study language	Croatian	Count	88	84	162	120	199	653
		Expected Count	95,4	83,5	168,8	116,5	188,9	653,0
		Adjusted Residual	-2,8	,2	-2,1	1,3	3,0	
	English	Count	16	7	22	7	7	59
		Expected Count	8,6	7,5	15,2	10,5	17,1	59,0
		Adjusted Residual	2,8	-,2	2,1	-1,3	-3,0	
Total		Count	104	91	184	127	206	712
		Expected Count	104,0	91,0	184,0	127,0	206,0	712,0

Source: authors' calculations

These results are as expected and could be reconciled with some previous findings showing that individuals who overcome language barriers and study in a multicultural environment tend to pursue their personal and professional goals more internationally and therefore have less desire to remain in their home country (as in the case of the English-language program presented).

After examining differences in the desire to remain in the home country (dependent variable) based on differences between genders and languages of the chosen study program, we examined students' perceptions of the main factors determining their migration decision (independent variables). Corruption and unethical behavior in Croatia turned out to be the most important variables representing push factors. Both pull and anchoring factors were covered by various occupational, socioeconomic, and personal factors, with only pull factors characterizing the preferred destination country abroad, while anchoring factors referred to the home country. Inadequate foreign language skills were investigated as the main barrier to foreign migration for the students surveyed. Descriptive statistics of all these factors are shown in Table 3.

First, we checked the correlations between our main dependent variable (students' desire to stay in Croatia after completing their studies) and different independent variables to decide which of them to include in our final model (the correlation matrix is shown in Table 4).

Table 3: Descriptive statistics of the observed variables

		N	Min.	Max.	Mean	Std. Deviation
Dependent variable	**Student's desire to stay in Croatia:** *"After graduation I would like to live in Croatia."*	712	1	5	3,34	1,392
Independent variables – push factors	**Corruption in Croatia**: *"I would migrate abroad because of the corruption rate in Croatia."*	673	1	5	4,23	,890
	Unethical behavior in Croatia: *"I would migrate abroad because of unethical use of acquaintances in Croatia."*	708	1	5	3,45	1,219
Independent variables – pull factors	**More job opportunities abroad**: *"I would migrate abroad because there are more job opportunities there."*	707	1	5	3,91	1,080
	More interesting job abroad: *"I would migrate abroad because jobs there are more interesting."*	708	1	5	3,70	1,120
	Better salary abroad: *"I would migrate abroad because of a better salary there."*	707	1	5	4,21	,997
Independent variables – anchoring factors	**Chances of finding an adequate job in Croatia**: *"I would stay in Croatia because I have a chance to find an adequate job after completing my studies."*	711	1	5	3,57	1,115
	Better life quality in Croatia: "*I would stay in Croatia because the quality of life here is better than abroad."*	711	1	5	3,07	1,295
	Family and friends in Croatia: "*I would stay in Croatia because of my family and friends here."*	712	1	5	3,97	1,118
Independent variables - migration barriers	**Language barrier:** "*I would not migrate abroad because I do not know the foreign language of another country."*	712	1	5	1,92	1,161

Table 4: Correlation matrix

		Desire to stay in Croatia after completing studies	Chances of finding adequate job in Croatia	I don't feel like migrating because of language barrier	Better salary abroad	Family and friends in Croatia	Better life quality in Croatia than abroad	Corruption in Croatia	Unethical behavior in Croatia	More interesting job abroad	More job opportunities abroad
Students' desire to stay in Croatia	Pearson Correlation	1	,233**	,207**	-,232**	,423**	,241**	-,052	-,151**	-,283**	-,154**
	Sig. (2-tailed)		<,001	<,001	<,001	<,001	<,001	,181	<,001	<,001	<,001
	N	712	711	712	706	711	710	672	707	707	706
Corruption in Croatia	Pearson Correlation	-,052	-,061	-,133**	,207**	-,010	-,124**	1	,331**	,149**	,233**
	Sig. (2-tailed)	,181	,115	<,001	<,001	,800	,001		<,001	<,001	<,001
	N	672	671	672	668	673	672	673	670	669	668
Unethical behavior in Croatia	Pearson Correlation	-,151**	-,181**	-,117**	,421**	-,144**	-,235**	,331**	1	,373**	,463**
	Sig. (2-tailed)	<,001	<,001	,002	<,001	<,001	<,001	<,001		<,001	<,001
	N	707	706	707	706	708	707	670	708	707	706
More job opportunities abroad	Pearson Correlation	-,154**	-,231**	-,105**	,657**	-,117**	-,247**	,233**	,463**	,530**	1
	Sig. (2-tailed)	<,001	<,001	,005	<,001	,002	<,001	<,001	<,001	<,001	
	N	706	705	706	705	706	705	668	706	706	707
More interesting job abroad	Pearson Correlation	-,283**	-,158**	-,197**	,587**	-,156**	-,211**	,149**	,373**	1	,530**
	Sig. (2-tailed)	<,001	<,001	<,001	<,001	<,001	<,001	<,001	<,001		<,001
	N	707	706	707	706	707	706	669	707	708	706
Better salary abroad	Pearson Correlation	-,232**	-,205**	-,140**	1	-,114**	-,260**	,207**	,421**	,587**	,657**
	Sig. (2-tailed)	<,001	<,001	<,001		,002	<,001	<,001	<,001	<,001	<,001
	N	706	705	706	707	706	705	668	706	706	705
Chances of finding an adequate job in Croatia	Pearson Correlation	,233**	1	,039	-,205**	,194**	,254**	-,061	-,181**	-,158**	-,231**
	Sig. (2-tailed)	<,001		,304	<,001	<,001	<,001	,115	<,001	<,001	<,001
	N	711	711	711	705	710	709	671	706	706	705
Better life quality in Croatia	Pearson Correlation	,241**	,254**	,196**	-,260**	,179**	1	-,124**	-,235**	-,211**	-,247**
	Sig. (2-tailed)	<,001	<,001	<,001	<,001	<,001		,001	<,001	<,001	<,001
	N	710	709	710	705	711	711	672	707	706	705
Family and friends in Croatia	Pearson Correlation	,423**	,194**	,175**	-,114**	1	,179**	-,010	-,144**	-,156**	-,117**
	Sig. (2-tailed)	<,001	<,001	<,001	,002		<,001	,800	<,001	<,001	,002
	N	711	710	711	706	712	711	673	708	707	706
Language barrier	Pearson Correlation	,207**	,039	1	-,140**	,175**	,196**	-,133**	-,117**	-,197**	-,105**
	Sig. (2-tailed)	<,001	,304		<,001	<,001	<,001	<,001	,002	<,001	,005
	N	712	711	712	706	711	710	672	707	707	706

** Correlation is significant at the 0.01 level (2-tailed).

Source: authors' calculations

All variables showed a significant coefficient with our dependent variable, except for the corruption in Croatia, which is why this variable was not included in our final model. Accordingly, the linear regression analysis has been applied. Its results show that the model significantly explains almost 28% of the variance in the dependent variable: R=52.9; R^2=27.9; $F_{9,688}$=29.64; p< 0.05 (Tables 5-7).

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,529[a]	,279	,270	1,190

Source: authors' calculations

Table 6: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	377,511	9	41,946	29,638	<,001[b]
	Residual	973,711	688	1,415		
	Total	1351,222	697			

a. Dependent Variable: Students' desire to stay in Croatia after completing studies

b. Predictors: Unethical behavior in Croatia, More job opportunities abroad, More interesting job abroad, Better salary abroad, Chances of finding adequate job in Croatia, Better life quality in Croatia, Family and friends in Croatia, Language barrier, Gender.

Source: authors' calculations

Table 7: Linear regression coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
B		Std. Error	Beta		t	Sig.
1	(Constant)	1,512	,364		4,150	<,001
	Unethical behavior in Croatia	,024	,043	,021	,555	,579
	More job opportunities abroad	,124	,060	,096	2,074	,038
	More interesting job abroad	-,216	,052	-,173	-4,148	<,001
	Better salary abroad	-,131	,066	-,094	-1,997	,046
	Chances of finding adequate job in Croatia	,143	,043	,115	3,319	<,001
	Better life quality in Croatia	,106	,038	,099	2,789	,005
	Family and friends in Croatia	,440	,042	,354	10,429	<,001
	Language barrier	,101	,041	,084	2,475	,014
	Gender	-,220	,109	-,067	-2,022	,044

Dependent Variable: Students' desire to stay in Croatia after completing studies

Source: authors' calculations

All pull factors related to job characteristics abroad (i.e., job opportunities: $\beta=0.12$; $p<0.05$; job quality and interest: $\beta=-0.22$; $p<0.05$; and salary: $\beta=-0.13$; $p<0.05$) were found to be significant in the respondent students' desire to stay in their home country. However, job opportunities abroad did not have the expected negative relationship with our dependent variable, so this factor needs to be further investigated and tested on a larger young population. Among the anchoring factors, expectations of finding a suitable job in Croatia ($\beta=0.14$; $p<0.05$), quality of life ($\beta=0.11$; $p<0.05$), and family relationships and social ties ($\beta=0.44$; $p<0.05$) played a significant role in predicting future migration considerations of our student respondents. They all had the expected positive relationship with our dependent variable, which in other words means that the possibility of finding a job in the field and the expected good quality of life in the home country, as well as strong ties with family and friends there, contribute to the preference to stay there rather than move abroad. Unfamiliarity with the language spoken in the preferred destination country proved to be a significant barrier to moving abroad ($\beta=0.1$; $p<0.05$), even when there is a desire and intention to migrate. Finally, unethical behavior in Croatia did not prove to be a significant push factor in the decision to stay in or leave Croatia.

The vast majority (over 70%) of students in our sample have a strong desire to leave their home country after graduation. Thus, they consider international migration as an option for building their future. These findings are in line with some other previous studies such as that of van Mol (2016), who used the Flash Eurobarometer survey to sample young people (aged 16-30) from all 28 EU Member States, and that of Milasi (2020), who examined the migration aspirations of the same population in 139 different countries during 2010-2016. The determinants of migration are the focus of such studies that analyze migration decision-making processes and secular trends and fluctuations in migration flows. These determinants are usually divided into push and pull factors. The results of our study show that occupational pull factors such as the number of job opportunities, more interesting jobs, and a better salary abroad are significant for the intention of Croatian students to leave their home country. This is consistent with the findings of the study on migration of young people from the Middle East and North Africa to European countries, which identifies employment status, salary, and other aspects of employment as the most important pull factors (Dibeh et al., 2019). Although it may appear that pull factors are counterbalanced by push factors, we propose a different perspective on the drivers of international migration. We argue that push factors are related to the home country context and the perception of a destination country as an alternative option is the next rational iteration in the migration decision process, but not the immediate one. The first option is weighing the pros and cons of remaining in the home country as a more convenient approach. Therefore, we introduce two additional groups of factors: Anchoring and Barrier factors. They refer to the study of staying or not migrating as an alternative to migration behavior among people with strong migration intentions. Anchoring factors explore the positive side of staying and affect non-migration behavior as an outcome of the migration-related decision-making process. They lead to compare and positively

evaluate the characteristics of the home country. At the macro level, the students in our sample estimated that they had a good chance of finding a job in their profession in their home country, even though youth unemployment was objectively high in several subsequent years. At the micro level, significant anchoring factors were associated with one's comfort zone, where friends and family are located. This is consistent with the findings of Hoffman et al.'s (2015) study, in which poorer relationships with family and friends were associated with a higher likelihood of youth migration aspirations. Other significant anchoring factors included geographic location, cultural fit, and pleasant climate, which were rated higher than some other economic and political factors. In contrast, it is the barrier factors that discourage people from moving. In our sample, students who rate their language skills lower tend to believe that they would not be successful in the international market and are therefore forced to stay in their home country despite strong migration intentions. This is consistent with several other studies that have found that knowing multiple languages has a positive impact on migration aspirations (Nowotny, 2014; Golovics, 2020; Marrow and Klekowski von Koppenfels, 2020).

5. Conclusion

The logic of the argument in our study is as follows: If migrations are usually studied in terms of migration intentions and aspirations, and only a small fraction of these tendencies seem to translate into actual migrations, then more attention should be paid to the incentives that lead potential migrants to change their minds. Push and pull factors are not sufficient for this purpose, as they do not cover all dimensions of an individual's migration decision. Therefore, we add additional elements that cover the comparison between the home and destination country contexts as well as the personal context - i.e., individual opportunities and threats. We refer to these elements as anchoring factors and migration barriers. Including them in migration research is the most important contribution of our study, as these factors complete the construction of migration theories by helping us to better understand this complex phenomenon.

Limitations of the study arise from the sample and the purpose of the study. We designed this study primarily to explore push and pull factors, and anchoring factors came to our attention as a byproduct of our initial investigation. The broader research plan, including a specific survey, was to be developed with an objective to specifically exploring the importance of anchoring and barriers factors on international migration decisions.

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References

1. Ådnanes, M. (2004) "Exit and/or Voice? Youth and Post-Communist Citizenship in Bulgaria", *Political Psychology*, Vol. 25, No. 5, pp. 795-815, doi: 10.1111/j.1467-9221.2004.00398.x
2. Agadjanian, V., Nedoluzhko, L., & Kumskov, G. (2008) "Eager to leave? Intentions to migrate abroad among young people in Kyrgyzstan", *International Migration Review,* Vol. 42, No. 3, pp. 620-651, doi:10.1111/j.1747- 7379.2008.00140.x
3. Apsite, E., Lundholm, E., & Stjernström, O. (2012) "Baltic state migration system: The case of Latvian immigrants in Sweden", *Journal of Northern Studies,* Vol. 6, No. 1, pp. 31-52,
4. Bahna, M. (2008) "Predictions of Migration from the New Member States after Their Accession into the European Union: Successes and Failures", *International Migration Review,* Vol. 42, No. 4, pp. 844-860, doi:10.1111/j.1747-7379.2008.00149.x
5. Bakina, A. V., Yaremtchuk, S. V., Orlova, O. A. & Krasnoperova, Y. V. (2019) "Life Satisfaction and Migration Intention of Youth", In *Proceedings of the International Scientific Conference "Far East Con"*, 2-4 October, Vladivostok, Atlantis Press, pp. 698-702, doi: 10.2991/iscfec-18.2019.158
6. Bastianon, C. D. (2019) "Youth Migration Aspirations in Georgia and Moldova", *Migration Letters,* Vol. 16, No. 1, pp- 105-121, doi:10.33182/ml.v16i1.596
7. Belmonte, M. & McMahon, S (2019) "Searching for Clarity: Defining and Mapping Youth Migration", *International Organization for Migration*, Geneva
8. Boneva, B. S., & Frieze, I. H. (2001) "Toward a Concept of a Migrant Personality", *Journal of Social Issues,* Vol. 57, No. 3, pp. 477-491
9. Carling, J. & Collins, F. (2017) "Aspiration, Desire and Drivers of Migration", *Journal of Ethnic and Migration Studies*, Vol. 44, No. 6, pp. 909–926, doi: https://doi.org/10.1080/1369183X.2017.1384134
10. De Haas, H. (2010) "Migration and Development: A Theoretical Perspective", *International Migration Review,* Vol. 44, No. 1, pp. 227-264, doi: https://doi.org/10.1111/j.1747-7379.2009.00804
11. De Haas, H. (2011) "The Determinants of International Migration: Conceptualizing Policy, Origin and Destination Effects", *International Migration Institute*, Oxford
12. Dibeh, G., Fakih, A., & Marrouch, W. (2019) "Labor market and institutional drivers of youth irregular migration in the Middle East and North Africa region", *Journal of Industrial Relations*, Vol. 61, No. 2, pp. 225-251, doi:10.1177/0022185618788085

13. Griffeth, R. W., Hom, P. W. & Gaertner, S. (2000) “A Meta-Analysis of Antecedents and Correlates of Employee Turnover: Update, Moderator Tests, and Research Implications for the Next Millennium”, *Journal of Management*, Vol.26, No. 3, pp. 26, doi: https://doi.org/10.1016/S0149-2063(00)00043-X

14. European Commission (2018) *International Migration drivers: A Quantitative Assessment of Structural Factors Shaping Migration*, Luxembourg: Publications Office of the European Union, doi: 10.2760/63833

15. Field, A. (2009): *Discovering statistics using SPSS*, SAGE Publications, Ltd., London

16. Frieze, I. H., Hansen, S. B., Boneva, B. (2006) “The migrant personality and college students’ plans for geographic mobility”, *Journal of Environmental Psychology*, Vol. 26, No. 2, pp. 170-177, doi: 10.1016/j.jenvp.2006.05.001

17. Golovics, J. (2020) “The role of loyalty in migration intentions: theory and evidence from the EU”, *Society and Economy*, Vol. 42, pp. 172-192, doi:10.1556/204.2019.010

18. Gosling, S. D., Rentfrow, P. J., & Swann Jr, W. B. (2003) “A very brief measure of the Big-Five personality domains”, *Journal of Research in Personality,* Vol. 37, No.6, pp. 504-528

19. Hoffman, S., Marsiglia, F., & Ayers, S. (2015) “Religiosity and Migration Aspirations among Mexican Youth”, *Journal of International Migration and Integration,* Vol. 16, No. 1, pp. 173-186, doi:10.1007/s12134-014-0342-8

20. Lee E.S. (1966) “A Theory of Migration”, *Demography,* Vol. 3, No. 1, pp. 47–57, doi: https://doi.org/10.2307/2060063

21. Marrow, H. B., & Klekowski von Koppenfels, A. (2020) “Modeling American Migration Aspirations: How Capital, Race, and National Identity Shape Americans’ Ideas about Living Abroad”, *International Migration Review,* Vol. 54, No. 1, pp. 83-119, doi:10.1177/0197918318806852

22. McDowell, C. & de Haan, A. (1997) “Migration and Sustainable Livelihoods: A Critical Review of the Literature”, *IDS Working Paper 65*, Brighton: IDS

23. Milasi, S. (2020) “What Drives Youth’s Intention to Migrate Abroad? Evidence from International Survey Data”, *IZA Journal of Development and Migration*, Vol. 11, No.12, pp. 2-3, doi: 10.2478/izajodm-2020-0012

24. Mobley, W. H., Griffeth, R. W., Hand, H. H. & Meglino, B. M. (1979) “Review and conceptual analysis of the employee turnover process”, *Psychological Bulletin*, Vol. 86, No. 3, pp. 493–522, doi: https://doi.org/10.1037/0033-2909.86.3.493

25. Nowotny, K. (2014) “Cross-border commuting and migration intentions: the roles of risk aversion and time preference”, *Contemporary Economics,* Vol. 8, No. 2, pp. 137-156, doi:10.5709/ce.1897-9254.137

26. Passaris, C. (1989) “Immigration and the Evolution of Economic Theory”, *International Migration*, Vol. 27, NO. 4, pp. 525-542, doi: org/10.1111/j.1468-2435.1989.tb00469.x

27. Radu, D. & Straubhaar, T. (2012) “Beyond ‘Push-Pull’: The Economic Approach to Modelling Migration”, In Martiniello, M. & Rath, J. ed., *An Introduction to International Migration Studies - European Perspectives*, Amsterdam University Press, doi: https://doi.org/10.2307/j.ctt6wp6qz

28. Ravenstein E. G. (1885) “The Laws of Migration”, *Journal of the Statistical Society of London*, Vol. 48, No. 2, pp. 167- 235, doi: https://doi.org/10.2307/2979181

29. Shuttleworth, I., Stevenson, C., Bjarnason, Þ., & Finell, E. (2020) “Geography, psychology and the ‘Big Five’ personality traits: Who moves, and over what distances, in the United Kingdom?”, *Population, Space and Place,* Vol. 27, No. 3, pp. 1-14, doi:https://doi.org/10.1002/psp.2418

30. Skeldon, R. (1990) *Population Mobility in Developing Countries: A Reinterpretation*, London: Belhaven

31. Tabor, A. S., Milfont, T. L., & Ward, C. (2015) “The migrant personality revisited: Individual differences and international mobility intentions”, *New Zealand Journal of Psychology,* Vol. 44, No. 2, pp. 89-95

32. Tapinos, G. P. (1990) *Development Assistance Strategies and Emigration Pressure in Europe and Africa*, Commission for the Study of International Migration and Co-operative Economic Development, Washington

33. UNDP (2009) *Overcoming Barriers: Human Mobility and Development,* New York: Human Development Report

34. Urbanski, M. (2022) “Comparing Push and Pull Factors Affecting Migration”, *Economies*, Vol. 10, No. 21, pp. 1-15, doi: https://doi.org/10.3390/ economies10010021

35. Van Breukelen, W., Van der Vlist, R. & Steensma, H. (2004) “Voluntary employee turnover: Combining variables from the ‘traditional’ turnover literature with the theory of planned behavior”, *Journal of Organisational Behavior*, Vol. 25, No. 7, pp. 893–914, doi: https://doi.org/10.1002/job.281

36. Van Hear, N; Bakewell, O. & Long, K. (2017) “Push-pull plus: reconsidering the drivers of migration”, *Journal of Ethnic and Migration Studies*, Vol. 44, No. 6, pp. 927-944, doi: https://doi.org/10.1080/1369183X.2017.1384135

37. Van Hear, N., & Sørensen, N.N. (2003) *The Migration-Development Nexus*, International Organisation for Migration, Geneva

38. Van Mol, C. (2016) “Migration aspirations of European youth in times of crisis”, *Journal of Youth Studies*, Vol. 19, No. 10, pp. 1303–1320, doi: https://doi.org/10.1080/13676261.2016.1166192

39. Williams, A., M., Jephote, C., Janta, H. & Li, G. (2018) “The Migration Intentions of Young Adults in Europe: A Comparative, Multilevel Analysis”, *Population, Space and Place*, Vol. 24, No. 1, pp. 1-16, doi: https://doi.org/10.1002/psp.2123

40. Zdrilic, I. & Sokolic, D. (2022) “Migration Intentions of Croatian Students” In *Proceedings of the 11th International Scientific Symposium Region, Entrepreneurship, Development*, 9-11 June, Osijek, Faculty of Economics Juraj Strossmayer University of Osijek, pp. 885-899

CHAPTER 25

Perceived level of competence and attitudees of university students towards migration[1]

Ana Štambuk[2], Andrea Arbula Blecich[3], Goran Karanović[4]

ABSTRACT

Globalisation and the EU integration process, as well as the growing trend of student mobility programs, have led to increased mobility of graduates and young adults. On the one hand, the mobility of graduates is encouraged by the many opportunities of a job offer abroad, and on the other hand, it enables employers abroad to find suitable (skilled and educated) employees. This migration effect has a positive impact on employment and the competitiveness of the host country. In Croatia, emigration exceeds immigration. The main objective of this paper is to analyse how students perceive the importance of competencies and how they perform in relation to these competencies. For this purpose, a survey was conducted among 661 full-time economics and business students using the Importance-Performance Matrix (IPA). The sample was divided into two groups: Students who plan to emigrate in the next five years and students who do not. Results indicate differences in the two groups' perceptions of employers' importance and student's performance in the observed competencies. Students who plan to emigrate perform better in language skills, but social skills should be improved. Students who do not plan to emigrate perform better in literacy skills, but should place more

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emphasis on entrepreneurial skills. Both groups provided interesting results suggesting that STEM competencies have a lower priority.

Key words: *Competencies, Importance-performance analysis - IPA, Students' perception, Migration*

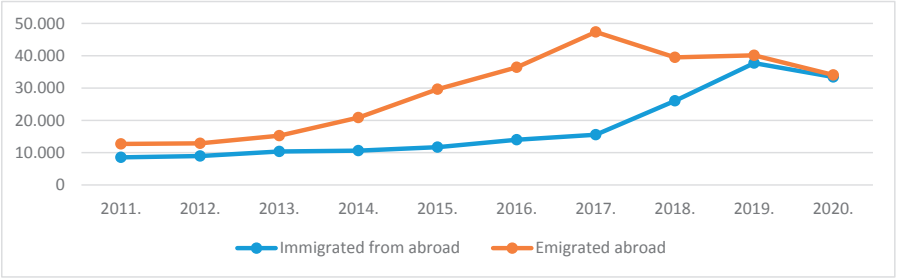
JEL classification: *F22, I23, J11, J61*

1. Introduction

The European Union integration process, and in particular the implementation of the Schengen area between EU countries, has facilitated the migration of more than 400 million people. As the borders of the EU and the Schengen area expand, the phenomenon of migration in this geographical area is increasing daily. Many EU countries are facing population outflows, with an additional existential problem being the massive migration of skilled workers from eastern to western EU member states. With Croatia's accession to the European Union and Schengen Area, the country became part of the EU's internal market, which means free movement of goods, services, capital and labour. It became easier for Croatian citizens to emigrate to other EU countries, which led to an accelerated migration of the Croatian population to developed economies where there is a labour shortage due to the increasing demand for highly skilled labour. In addition, globalisation led to increased international mobility of students between EU countries, which facilitated student out-migration. An important channel for high-skilled labour immigration is international student mobility. Many international students choose to remain and take up permanent residence in the host country after completing their studies. Therefore, student mobility is one of the most important sources of highly skilled labour immigration (Suter and Jandl 2006; Ritzen and Marconi, 2010). Arbula Blecich and Zaninović (2019) found a difference between students enrolled in an English-language programme, where pass rate is more important than grade, and students enrolled in a Croatian-language programme, where grade is important. Students enrolled in an English language programme are either existing Erasmus students or prospective Erasmus students. They are primarily motivated to fulfil their Erasmus contract requirements or to apply for the Erasmus programme, and the final grade is less important to them.

The following graph shows the external migration balance of the Republic of Croatia from 2011 to 2020. With the exception of 2020, when the world was hit by the pandemic COVID 19, Croatia recorded a significantly negative migration balance, as more people emigrated abroad than immigrated from abroad. The dramatic trend of negative net migration in Croatia combined with negative natural population growth is leading to a massive demographic crisis.

Graph 1: External migration of the population of the Republic of Croatia from 2011 to 2020

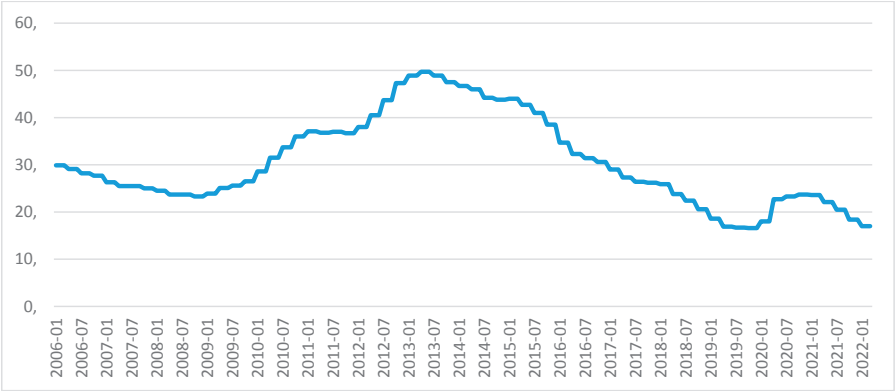


Source: Croatian national bureau (2021). Migracija stanovništva Republike Hrvatske u 2020. https://podaci.dzs.hr/2021/hr/9939

Since the global economic crisis in 2008, the emigration of young people with university degree in search of work outside the Croatian borders has increased dramatically. Of the total number of emigrants, the young population between 20 and 29 years of age accounts for 24.3%. One of the main reasons for emigration is unemployment among young people. Although the Graph 2 shows the trend of decreasing unemployment rate in recent years, we can see some concerns when we take a closer look.

The Bologna process was introduced into Croatian higher education in the academic year 2005/2006, when all university studies were harmonized according to the requirements of the Bologna Declaration. The first generation of students, enrolled in the academic year 2004/2005, obtained their Bachelor's degree in 2008 and their Master's degree in 2010. The number of students who graduated between 2008 and 2011 increased by more than 50%. The reasons for this are the increasing enrolment of students, the growing number of study programs, the opening of new universities and the requirements of the Bologna process in general (Krajina & Turkalj Krajina, 2014). This led to a sharp increase in youth unemployment since 2010 (Graph 2). High youth unemployment has been a major economic problem for Croatia, peaking in mid-2013 when youth unemployment approached 50%, and then gradually declining. At first glance, this seems to be a positive trend, but if we compare it to the external migration of the Croatian population shown in graph 1, we see that the emigration of the Croatian population increases rapidly right after 2013. As youth unemployment decreases, the number of emigrants increases. The same trend can be observed in March 2020 with the outbreak of the pandemic COVID 19, when at the same time youth unemployment increased and external migration decreased. Although the unemployment rate of the young population in Croatia is currently around 17%, which is one of the lowest rates in recent history, the problem described above indicates that one of the main reasons for the emigration of young people is their inability to find a job.

Graph 2: Youth unemployment in Croatia (2006 – 2022)



Source: Eurostat (2022). Unemployment by sex and age – monthly data https://ec.europa.eu/eurostat/databrowser/view/UNE_RT_M__custom_2710681/default/line?lang=en

The impact of increasing social mobility on the economy is significant. There is consensus that immigration of educated and highly skilled workers has a positive impact on the host economy by boosting economic growth. In addition to intellectual capital, immigrants also possess social capital, which leads to the exchange of knowledge and new ideas as well as an increase in international trade, foreign investment and production opportunities (Bonin et al. 2008). Research in a number of countries confirms that in countries with greater social mobility, people are better matched to employment opportunities and workers are more productive. In a society with greater social mobility, a job is more likely to be filled by someone with the greatest potential to do the job well (Jenkins et al., 2017). Recent studies also suggest that low social mobility negatively affects income inequality and economic growth, and that low levels of equality of opportunity can amplify the negative effects of income inequality on the rate of economic growth. Low social mobility exacerbates these inequalities and has negative effects on economic growth.

Over the past decade, there has been an emerging trend to combine traditional education with competency-based education. It is important for employers to know what competencies and skills their employees have. This issue has also been recognized by the European Commission, which defined eight key competencies for lifelong learning and included them in the Europe 2020 Strategy. Employability, knowledge and innovation issues are the main priorities of this document (Štambuk, Karanović & Host, 2019).

Although the pandemic COVID 19 led to a slowdown in the outflow of the Croatian population in the pandemic years (Eurostat, 2022), the problem of outflow of educated young people remains one of the fundamental demographic problems. The purpose of this paper is to examine how students perceive their competencies in relation to what they consider important to employers. In addition, perceptions of their competencies were examined in relation to their intention to emigrate in the next five years. For this purpose, the Importance-Performance Matrix (IPA), a two-dimensional importance-

satisfaction grid, was applied to the survey results of 661 full-time business students.

This paper consists of 5 sections. After the Introduction, Section 2 provides a literature review on the topic on students' and employers' perception on importance and satisfaction of students' competencies, Section 3 describes the Methodology followed by the results and discussion in Section 4, Section 5 concludes the paper.

2. Literature review

The importance of the competencies that students acquire after graduation became a central issue after the publication of the consultation paper on the EU Qualifications Framework in 2005 (Bologna Working Group, 2005). Since than, the importance of the competencies students acquire during their studies has become an increasingly important issue and is reflected in European Union policies and other important documents. Nowadays, in addition to knowledge of an academic subject, university graduates need to acquire other competencies that contribute to their employment prospects (Fallows and Steven, 2000). There is a consensus that university curricula need to be aligned with the needs of the labour market.

The literature distinguishes several approaches to assessing student competencies, from the perspective of a student, an employer, a university professor, or an approach that combines several of these perspectives (Štambuk, Karanović & Host, 2019).

The first approach is the one from the student's point of view. Osmani et al. (2017) analysed the perceptions of finance and accounting graduates in the Middle East and found that the most important skills among graduates, in order of importance, are communication skills, analytical skills, self-management, time management, and teamwork skills. The authors pointed out the problem that critical thinking and research skills are considered of low importance by graduates. Chen (2018) used IPA to assess the employability of students in Taiwan. The author concluded that the most important factor for university students' employability is "professional attitude". Career planning and professional knowledge are not important for students' employability after graduation. Febriani et al. (2020) examined the skills gap between manufacturing engineering graduates and industry. Hard skills competencies that need priority improvement include English proficiency and research skills. Soft competences that require attention include verbal communication skills, mathematical reasoning, fact-finding skills, high motivation, and independent work (Aiyar & Ebeke, 2020).

In higher education, employers are considered the most influential stakeholders (Tsitskari et al., 2017), so much of the research focuses on their perceptions of students' competencies. Štambuk, Karanović, and Host (2019) used IPA to gain insights into employers' perceptions of the importance and performance of bachelor's degree competencies in economics in Croatia. The research findings suggest that the mobility of highly skilled individuals

with a graduate degree may be conditioned by the existing level and quality of specific competencies. The results suggest that employers are satisfied with the specific competencies from the field of study, but the level of generic competencies that students possess is not satisfactory. Hsiung (2017) focused on the engineering competencies required in the electronics industry in Taiwan. The author identified the key competencies that electronics industry professionals consider that graduates must possess to enter the workforce. They listed “ambition and initiative,” “discipline and good manners,” and “loyalty and ethics” as key competencies. In their opinion, “global perspective” and “computer literacy” are not essential requirements for career success. Hamid, Islam, and Hazilah (2014) investigated employers’ perceptions of the employability of Malaysian graduates. The results suggest that graduates’ performance in employability skills are lower than the importance placed on these skills. Authors found the widest gap in communication skills, particularly the ability to use the English language. Similar findings regarding the underperformance of Malaysian graduates were also obtained by Ken, Ting, and Ying (2012) and Saludin and Salahudin (2015). Ņikitina et al. (2020) studied the skill needs of entrepreneurs in Finland, Latvia, and the Netherlands. The most important finding of this research is the similarities in stakeholders’ views on the required competencies for launching a start-up. Employers consider ethical and sustainable thinking as well as financial and economic knowledge to be the least important competencies. On the other hand, entrepreneurs in all three countries ranked motivation and perseverance as highly important. Ho, Nguyen, and Dao (2017) approached the problem from the manager’s perspective and used the IPA method to measure the importance of accountants’ competencies and their ability to meet job requirements. The research findings suggest that there is a gap between the requirements of workers and accounting students in Vietnamese universities.

Graduate employability is considered one of the most important outcomes of universities. This means that individuals must have basic self-development and networking skills to adapt to the ever- changing demands of the labour market. The role of universities in encouraging and enabling students to become employable is high and constantly increasing, as there is a positive relationship between education and employability (Sedlan König & Maškarin Ribarić, 2019). Since teaching has the greatest weight among the five relavant areas of higher education institutions (Cerović, Arbula Blecich & Štambuk, 2014; Arbula Blecich, 2020), the role of professors in the teaching process is crucial. Therefore, their perception of students’ competences is important, as their main task is to teach them and to check whether they achieve the intended learning outcomes. Sugahara and Coman (2010) compared differences in Japanese accounting teachers’ and practitioners’ perceptions of the importance of general skills for accountants. They found that teachers and practitioners viewed information literacy as the most important skill and behavioral skills as the second most important skill, while they tended to view interpersonal skills as less important.

The most comprehensive approach is the one that incorporates multiple perspectives, namely those of students, teachers, and employers. Sedlan König and Maškarin Ribarić (2019) examined employability in higher education from two perspectives, that of employers and that of higher education faculty. The authors emphasised that employers and Croatian higher education teachers share some commonalities in terms of graduate employability. Nevertheless, employers and university teachers have different views on the knowledge, skills, and attributes that are important for employment and on the contribution of higher education to improving these attributes. Similar results were obtained by Kabicher, Motschnig-Pitrik, and Figl (2009), who examined the competencies (they included two main categories "subject-specific competencies" and "generic competencies" and 18 subcategories) of computer science students from the perspective of faculty and employers. Wohlfart, Adam, and Hovemann (2022), Wohlfart and Hovemann (2019) investigated sport industry competencies from the perspectives of sport management students and sport industry representatives to determine the extent to which sport management students meet industry requirements. The research findings suggest a discrepancy between the importance these two groups attribute to certain competencies. Jackling and De Lange (2009) also looked at the problem from the perspective of employers and students. They examined the generic skills developed in the accounting programme from both the graduates' and employers' perspectives. The results indicate that employers require a wide range of generic competencies that graduates believe are not adequately taught in their accounting degree programme. The greatest discrepancies from the employers' perspective were in the areas of teamwork skills, leadership potential, verbal communication, and interpersonal skills.

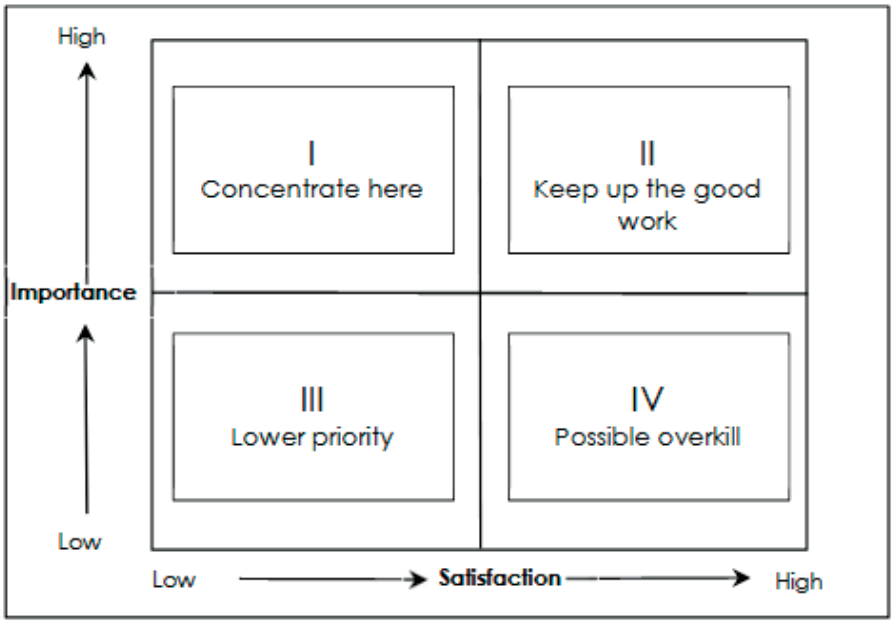
In this study, eight key competencies for lifelong learning defined by the European Commission are used as a starting point. These competences are literacy competence; multilingual competence; mathematical competence and competence in science, technology and engineering; digital competence; personal, social and learning to learn competence; citizenship competences; entrepreneurship competence and cultural awareness and expression competence. As part of the EU funded project "Povećanje zapošljivosti studenata kroz unapređenje Centra za karijere i razvoj stručne prakse - CEZAR", several focus groups were organised to identify the competencies of economics and business graduates that employers consider important. Of the eight competencies defined by the European Commission, employers pointed out six competencies that they consider important. These competencies are: literacy competence; multilingual competence; mathematical competence and competence in science, technology and engineering (STEM); digital competence; personal, social and learning to learn competence and entrepreneurship competence. Citizenship competences and cultural awareness and expression competence are not recognised by employers as competencies they believe graduates should possess to be competitive in the labour market. Accordingly, the six competencies emphasised by employers as key competencies were analysed in this paper from the perspective of students' perceptions.

3. Methodology

The Importance-Performance Matrix (IPA) was originally developed by Martilla and James (1977) for enhancement of elements marketing programs. The authors stated that in order to implement the IPA, some critical elements must be established. The first and most important step is to determine the attributes to be measured, then to position the vertical and horizontal elements on the grid - they suggest a 5-point or 7-point scale to obtain a suitable distribution. Additionally, median values should be used. The final step is to analyse the importance-performance grid and suggest appropriate actions for management. Originally developed for marketing purposes, the method has been used in various fields such as human resources (Del-Castillo-Feito et al., 2022; Pan, 2015; Rochaeni et al., 2019), education and training (Anthony & Bueno, 1993; Antunes, 2016; Nale et al., 2000; O'Neill & Palmer, 2004; Oliveira et al., 2020; Štambuk et al, 2019), tourism and hospitality (Azzopardi & Nash, 2013; Barbieri, 2010; Hemmington et al., 2018; Huang, 2010; Tovmasyan, 2019; Yeo et al., 2020; Yurcu et al., 2020), government and public administration (Mohammed et al., 2017; Wong et al., 2011), banking sector (Joseph et al., 2005; Rahi & Abd. Ghani, 2019; Tailab, 2020).

Originally, IPA technique was designed to combine two measures - importance and performance - of product/service beneficiary into a two-dimensional plot with four quadrants. QI – *concentrate here* is vital one in the plot; the elements positioned in this section are underperforming and due to high importance elements are pinpointed as inadequate. In support of elements of quadrant one management should increase resources. Elements in this quadrant should have highest priority of the management. II quadrant – *keep up the good work* indicates elements with high importance that are well performed. To maintain this level management should sustain resources. QIII – *lower priority* designate elements with low performance, however beneficiary recognised them as irrelevant. Resources invested in these elements should stay the same level. Quadrant IV – *possible overkill* indicates elements with low priority to the product/services beneficiaries but have high performance. Elements in this quadrant indicate waste of resources and management should make necessary cuts.

Figure 1: Importance-performance matrix



Source: Adapted from Martilla and James (1977).

For purpose of this study survey instrument was implemented with 28 attributes based on six key competencies for lifelong learning defined by EU Commission, redefined trough process of focus groups and emphasised by employers. Six categories that were investigated are literacy competence; multilingual competence; STEM; digital competence; personal, social and learning to learn competence and entrepreneurship competence.

The target population of this study were undergraduate and graduate students of the Faculty of Economics and Business in Rijeka. In order to find out which students are prone to migration depending on their competencies, a survey was conducted in February 2022 among 661 full-time undergraduate and graduate students from Croatia. Students were asked to rate how much employers value which competencies, and also to rate what level of those competencies they possess.

The level of importance and satisfaction of general and specific competencies were measured by the five-point Likert scale. Additionally, the data-centred approach have been implemented (Azzopardi & Nash, 2013) with the median as the centre.

3. Results and discussion

Students are grouped according to their intention to emigrate from Croatia in the next five years. Intention to emigration was assessed with the statement "In the next five years I plan to emigrate abroad". Students who don't agree with the statement (answers 1 and 2) are included in the group who don't intend to emigrate, while students who agree with the statement (answers 4 and 5) are considered as those who intend to emigrate. Students who gave neutral answer (3) are not included in analysis. Distribution of students with respect to propensity to emigrate is given in table 1.

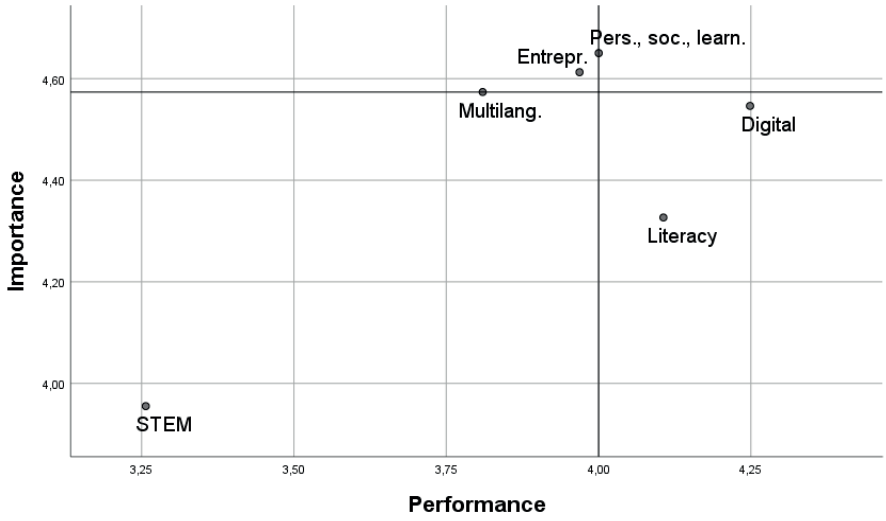
Table 1: Distribution of students according to their propensity to emigrate

Plan to emigrate within the next five years	No. of students	Perc. (%)
No	368	72.3
Yes	141	27.7
Total	509	100.0

Source: authors' calculation

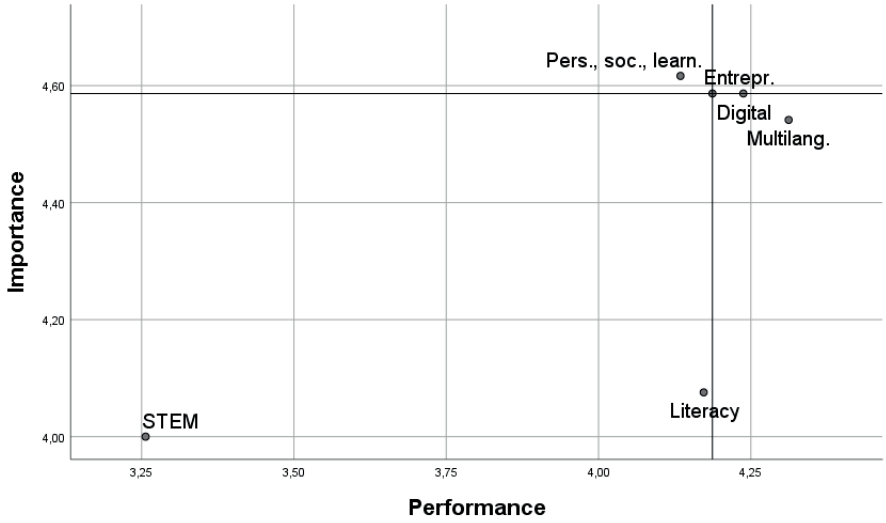
We can see that more than the one quarter (27.7%) of analysed students plan to emigrate from Croatia within the next five years. In order to explore the relationship between competencies and migration propensity we have developed separate importance-performance matrix for both groups of students, those who don't plan to migrate (Figure 2) and those who plan to migrate (Figure 3). In that way we can compare competencies of the two groups of students.

Figure 2: Importance-performance matrix of students who don't intend to migrate within the next 5 years



Source: authors' calculation

Figure 3: Importance-performance matrix of students who intend to migrate within the next five years



Source: authors' calculation

Students who intend to emigrate outperform in multilingual competence. Relationship between the multilingual competence and migration tendency is additionally shown by correlation between statements "In the next five years I plan to emigrate abroad" and "I wouldn't migrate because I don't know foreign language of the other country". The spearman non-parametric correlation between variables that are both 5-point Likert-type items, is negative, $rs(653) = -.200$, $p < .001$. Better language skills mean, among other things, easier assimilation in the host country, higher return on human capital, better employment opportunities and adaptation to the workplace, and better social integration (Adserà & Pytliková, 2016, 2015). Proficiency in the language of the destination country and the ability to learn it quickly play a key role in the decision to migrate and generally promote immigrants' success in the labor markets of destination countries.

Students with propensity to migrate should improve their personal, social, and learning to learn competence. As a further indicator of relationship between the migration and above mention competence, we look at the correlation between statement of planning to emigrate and two other statements: "I would migrate in a foreign country because of a partner" and "I would stay in Croatia because of family/partner/friends). Spearman non-parametric correlation between migration intentions and migration because of partner is positive, $rs(652) = .25$, $p < .001$, while between migration intentions and staying because of family/partner/friends is negative $rs(650) = -.40$, $p < .001$. Social networks such as proximity to parents, friends, partner, familiarity with the area and the people living there play a crucial role in the decision and represent one of the most important pull factors, i.e. those who have better social networks are less likely to migrate. (Borozan & Barković Bojanic, 2015; Massey & Aysa, 2005).

Students who don't intent to migrate outperform in literacy competence. Those students outdo understanding, analysing, and presenting information. Because of that, they could find it easier to comprehend and perform their tasks and are more satisfied, so they are less inclined to change environment. Those students need to pay more attention to entrepreneurial skills. Those who are less entrepreneurial are less likely to take risk and migrate. Students who intend to stay also exceed in digital competencies. Employers today consider digital skills as "more than desirable" (Bejaković & Mrnjavac, 2020). Those with better digital competencies have better opportunity on labour market (Bejaković & Mrnjavac, 2020; Peng, 2017), and are less likely to exit the labour market (Štambuk, Uroda & Anđelić, 2020).

It is interested to find that both groups of students treat STEM competencies as low priority, i. e. they treat it as low importance and low satisfaction.

5. Conclusions

The purpose of this study was to analyse the attitudes of business and economics students toward emigration and to examine the relationship between six categories: a) literacy; b) multilingual competence; c) STEM; d) digital competence; e) personal, social and learning to learn competence and f) entrepreneurial competence. The IPA method was used for this study. A sample of full-time business and economics students from Croatia was surveyed and the results were somewhat surprising. In addition, we examined employers and their perceptions of the competencies.

The results show that a significant proportion of the students surveyed plan to emigrate from Croatia in the next five years. This result was to be expected given the trend of emigration from Croatia over the past decade. However, it becomes interesting when we relate this effect of emigration to youth unemployment. The year 2013 (July 1) is the first year in which Croatia becomes a member of the EU. As a result of the global financial crisis (2009-2015), Croatia experienced six years of recession. The last time Croatia managed to overcome the recession was in 2015, but in the period 2013-2015 a decrease in youth unemployment was observed. This positive trend in unemployment is visible from 2013-2020, after which the global pandemic began. It can be concluded that it is popular among the young population of Croatia to pursue a career in the EU.

We compared attitudes toward emigration with six competencies and came to the following results: students who plan to emigrate outperformed in the multilingual competence and have less developed social networks. The main reason for emigrating is to have a partner in life. Students who plan to stay perform better in digital and literacy competences. Students who do not intend to emigrate should focus more on entrepreneurial skills, while students who do intend to emigrate should focus more on personal, social, and learning skills. The interesting result for STEM competence come from both groups it was denoted as lower priority. This results differs for similar studies.

The main limitation of this study is the availability of data for only one higher education institution. The survey was conducted on a sample of 661 full-time business students at a single higher education institution. Therefore, the results of this study cannot be generalized. We can conclude that the migration process of young people in Croatia is present and strong, which is an alarm signal for policy makers. There are several reasons for this. The first reason is the share of tourism in GDP (almost 20%) and its highly seasonal nature. Second is the reluctance of politicians to initiate structural changes in government and social policies. In the long term, this could have a major negative impact on the economy and especially on the pension fund.

References

1. Adserà, A., Pytliková, M. (2016) Language and Migration. In: Ginsburgh, V., Weber, S. (eds) *The Palgrave Handbook of Economics and Language*. Palgrave Macmillan, London. https://doi.org/10.1007/978-1-137-32505-1_13
2. Adserà, A., & Pytliková, M. (2015) The role of language in shaping international migration, *Economic journal*, Vol. 125, No. 586, pp. F49–F81, https://doi.org/10.1111/ecoj.12231
3. Aiyar, S., Ebeke, C. (2020) Inequality of opportunity, inequality of income and economic growth, World Development, Elsevier, Vol. 136, No. 1, 105115, DOI:10.1016/j.worlddev.2020.105115
4. Anthony, C. E., Bueno, D. Del. (1993) A performance-based development system. Nursing Management, Vol. 24, No. 6, pp. 32–34.
5. Antunes, F. (2016) Economising education: From the silent revolution to rethinking education. A new moment of Europeanisation of education?, *European Educational Research Journal*, Vol. 15, No. 4, pp. 410–427, https://doi.org/10.1177/1474904116641696
6. Arbula Blecich, A. (2020) Factors affecting relative efficiency of higher education institutions of economic orientation, *Management*, Vol. 25, No. 1, pp. 45-67, https://doi.org/10.30924/mjcmi.25.1.3
7. Arbula Blecich, A., Zaninović, V. (2019) Insight into students' perception of teaching: Case of economic higher education institution, *Management*, Vol. 24, No. 1, pp. 137-152, https://doi.org/10.30924/mjcmi.24.1.9
8. Azzopardi, E., Nash, R. (2013) A critical evaluation of importance-performance analysis. *Tourism Management*, 35, pp. 222–233, https://doi.org/10.1016/j.tourman.2012.07.007
9. Barbieri, C. (2010) An importance-performance analysis of the motivations behind agritourism and other farm enterprise developments in Canada. *Journal of Rural and Community Development*, Vol. 5, No. 1, pp. 1–16, https://doi.org/10.1080/09669582.2012.685174

10. Bejaković, P., Mrnjavac, Ž. (2020) The importance of digital literacy on the labour market. *Employee Relations*, Vol. 42 No. 4, pp. 921-932, https://doi.org/10.1108/ER-07-2019-0274

11. Bologna Working Group (2005*) A Framework for Qualifications of the European Higher Education Area, Bologna Working Group Report on Qualifications Frameworks*, Copenhagen, Available at: <http://www.vtu.dk> [Accessed: May 25, 2022]

12. Borozan, Dj, Barković Bojanic, I. (2015) Migration motives of university students: An empirical research, International migration Vol. 53, No. 1, pp. 66-82, doi: 10.1111/imig.12016

13. Cerović, Lj., Arbula Blecich A., Štambuk, A. (2014). Relevant Areas and Indicators of Quality in Higher Education Institutions: Evaluating the System of Higher Education in Economics, *Management: Journal of Contemporary Management Issues*, Vol. 19, No. 2, pp. 89-116.

14. Chen, Y.-C. (2018) Applying importance-performance analysis to assess student employability in Taiwan, *Journal of Applied Research in Higher Education*, Vol. 10 No. 1, pp. 76-86, https://doi.org/10.1108/JARHE-10-2017-0118

15. Croatian national bureau (2021) *Migracija stanovništva Republike Hrvatske u 2020*, Available at: <https://podaci.dzs.hr/2021/hr/9939> [Accessed: May 10, 2022]

16. European Commission (2019). *Key competences for lifelong learning, Luxemburg*, Publications office of the European Union, Available at: <https://op.europa.eu/en/publication-detail/-/publication/297a33c8-a1f3-11e9-9d01-01aa75ed71a1/language-en> [Accessed: May 13, 2022]

17. Del-Castillo-Feito, C., Blanco-González, A., Hernández-Perlines, F. (2022) The impacts of socially responsible human resources management on organizational legitimacy. *Technological Forecasting and Social Change*, Vol. 174, https://doi.org/10.1016/j.techfore.2021.121274

18. Eurostat, (2022) Emigration by age group, sex and country of birth, Available at: <https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=migr_emi4ctb&lang=en> [Accessed: May 13, 2022]

19. Fallows, S., Steven, C. (2000) Building employability skills into the higher education curriculum: a university-wide initiative, *Education Training*, Vol. 42, No. 2, pp. 75-83, doi:10.1108/00400910010331620

20. Febriani, R. A., Suseno, S., Budiman, J., Saefudin, A. S., Danadibrata, A. P. (2021) Gap Analysis of Graduates Competencies in Manufacturing Engineering Department with the Industry, I*nternational Journal of Management, Entrepreneurship, Social Science and Humanities*, Vol. 4, No. 2, pp. 75–84, https://doi.org/10.31098/ijmesh.v4i2.625

21. Hamid, M.N., Islam, R., Hazilah, A.M.N. (2014) Malaysian graduates' employability skills enhancement: an application of the importance performance analysis, *Journal for Global Business Advancement*, Vol.7, No.3, pp. 181 – 197, DOI:10.1504/JGBA.2014.064078

22. Hemmington, N., Kim, P., & Wang, C. (2018) Benchmarking hotel service quality using two-dimensional importance-performance benchmark vectors (IPBV), *Journal of Service Theory and Practice*, Vol. 28, No. 1, pp. 2–25, https://doi.org/10.1108/JSTP-06-2017-0103

23. Ho, P.M.D., Nguyen, Q.T. and Dao, N.P. (2017). Evaluating the level of meeting working requirements of graduated accounting student by using Important-Performance Analysis (IPA), *Rhetoric and Communications*, Issue 31, Available at: <https://rhetoric.bg/phan-minh-duc-ho-quoc-tu-nguyen-nguyen-phi-dao-evaluating-the-level-of-meeting-working-requirements-of-graduated-accounting-student-by-using-important-performance-analysis-ipa> [Accessed: May 13, 2022]

24. Hsiung T.-L. (2017) Importance and Performance of Engineering Graduates' Competences: An Electronics Industry Perspective, *International Journal of Education and Research*, Vol. 5, No. 2, pp. 317-326.

25. Huang, S. (2010) A revised importance-performance analysis of tour guide performance in China, *Tourism Analysis*, Vol. 15, No. 2, pp. 227–241, https://doi.org/10.3727/108354210X12724863327803

26. Jenkins, H. English, K. L., Hristova, O., Blankertz, A., Pham, V., Wilson, C. (2017) *Social mobility and economic success: How social mobility boosts the economy*, Oxera raport, July 2017. Available at: <https://www.suttontrust.com/wp-content/uploads/2020/01/Oxera-report_WEB_FINAL.pdf> [Accessed: May 10, 2022]

27. Joseph, M., Allbright, D., Stone, G., Sekhon, Y., Tinson, J. (2005) Importance-performance analysis of UK and US bank customer perceptions of service delivery technologies, *International Journal of Financial Services Management*, Vol. 1, No. 1, pp. 66-88, https://doi.org/10.1504/ijfsm.2005.007985

28. Kabicher, S., Motschnig-Pitrik, R., Figl, K. (2009) "What competences do employers, staff and students expect from a Computer Science graduate?,", *39th IEEE Frontiers in Education Conference*, 2009, pp. 1-6, doi: 10.1109/FIE.2009.5350536.

29. Kahanec, M., Zimmermann, K. F. (2011) High-Skilled Immigration Policy in Europe*, SSRN Electronic Journal*, 10.2139/ssrn.1767902

30. Ken, S., Ting, T., Ying, C. Y. (2012) Business Graduates' Competencies in the Eyes of Employers : An Exploratory Study in Malaysia, *World Review of Business Research*, Vol. 2, No. 2, pp. 176–190.

31. Krajina, J., Turkalj Krajina,A. (2014) The Implementation of the Bologna Process in Republic of Croatia, *Proceedings of 3th International Scientific Symposium „Gospodarstvo istočne Hrvatske – vizija i razvoj*, June 2014., Osijek, pp. 169-175.

32. Lowell, B.L., Findlay, A. (2001) *Migration Of Highly Skilled Persons From Developing Countries: Impact And Policy Responses,* Synthesis Report, International Migration Papers, Available at: <https://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---migrant/documents/publication/wcms_201706.pdf#page=11&zoom=100,0,0> [Accessed: May 13, 2022]

33. Martilla, J. A., James, J. C. (1977) Importance-Performance Analysis, *Journal of Marketing*, Vol. 41, No. 1, pp. 77-79, https://doi.org/10.2307/1250495

34. Massey, D.S., Aysa, M. (2005) Social Capital and International Migration from Latin America, UN/POP/EGM_MIG/2005/04. Nunnally, J.C, Available at: <https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/unpd-egm_2005_11-12_p04_massey_aysa.pdf > [Accessed: May 25, 2022]

35. Mohammed, F., Alzahrani, A. I., Alfarraj, O., Ibrahim, O. (2017) Cloud Computing Fitness for E-Government Implementation: Importance-Performance Analysis. *IEEE Access*, Vol. 6, pp. 1236–1248. https://doi.org/10.1109/ACCESS.2017.2778093

36. Nale, R. D., Rauch, D., Wathen, S., Barr, P. B. (2000) An exploratory look at the use of importance-performance analysis as a curricular assessment tool in a school of business. *Journal of Workplace Learning*, Vol. 12, No. 4, pp. 139–145, https://doi.org/10.1108/13665620010332048

37. Ņikitina T, Lapiņa I, Ozoliņš M, Irbe MM, Priem M, Smits M, Nemilentsev M. (2020) Competences for Strengthening Entrepreneurial Capabilities in Europe. *Journal of Open Innovation: Technology, Market, and Complexity*, Vol. 6, No. 3, https://doi.org/10.3390/joitmc6030062

38. O'Neill, M. A., & Palmer, A. (2004). Importance-performance analysis: a useful tool for directing continuous quality improvement in higher education, *Quality Assurance in Education*, Vol. 12, No.1, pp. 39–52. https://doi.org/10.1108/09684880410517423

39. Oliveira, L. D. de, Haubert, J. D. S., Sakis, A., Machado, C. D. S., Dos Santos, B. M. (2020) Application of matrix importance-performance in the maintenance sector of an higher education institution, *Independent Journal of Management & Production*, Vol. 11, No. 3, pp. 1096-1109, https://doi.org/10.14807/ijmp.v11i3.1108

40. Osmani, M. W., Hindi, N., Al-Esmail, R., Weerakkody, V. (2017) Examining graduate skills in accounting and finance: the perception of Middle Eastern students, *Industry and Higher Education*, Vol. 31, No. 5, pp. 318–327, https://doi.org/10.1177/0950422217721759

41. Pan, F. C. (2015) Practical application of importance-performance analysis in determining critical job satisfaction factors of a tourist hotel, *Tourism Management*, Vol. 46, pp. 84–91, https://doi.org/10.1016/j.tourman.2014.06.004

42. Peng, G. (2017) Do computer skills affect worker employment? An empirical study from CPS surveys. *Computers in Human Behavior*, Vol. 74, pp. 26-34, https://doi.org/10.1016/j.chb.2017.04.013

43. Rahi, S., & Abd. Ghani, M. (2019) Does gamified elements influence on user's intention to adopt and intention to recommend internet banking?, *International Journal of Information and Learning Technology*, Vol. 36, No. 1, pp. 2–20, https://doi.org/10.1108/IJILT-05-2018-0045

44. Rochaeni, S., Nurita, S., Dwiningsih, E., Soeyatno, F. (2019) GAP competency analysis for employee of Animal Feed Warehouse Department, *International Journal of GEOMATE*, Vol. 17, No. 62, pp. 17–22, https://doi.org/10.21660/2019.62.4532

45. Ritzen, J. M. M. (2010) *A Chance for European Universities*, Amsterdam University Press, Amsterdam.

46. Saludin, M. N., Salahudin, S. N. (2015) "Employability Competencies of Business Management and Accounting Employed Graduates (COBA Employed Graduates): Producing Graduates Who Meet Employer Expectation", in National Symposium & Accounting (NSEBA 2014) Empowering Social Transformation through Business Innovation",pp. 1–18.

47. Sedlan König, Lj., Maškarin Ribarić, H. (2019) Is there a mismatch between employers' and university teachers' perceptions on graduate employability in Croatia, Management, Vol. 24, No. 1, pp. 87-102 doi:https://.org/10.30924/mjcmi.24.1.6

48. Suter B., Jandl M. (2006) *Comparative study on policies towards foreign graduates: Study on admission and retention policies towards foreign students in industrialized countries,* International Center for Migration Policy Development (ICMPD), Vienna, Available at: http://www.icmpd.org/fileadmin/ICMPDWebsite/Research/REV_Comparative_Study_on_Graduated_Students_Final.pdf> [Accessed: May 13, 2022]

49. Štambuk, A., Karanović, G., Host, A. (2019) Employers' Perceptions of Business and Economics Graduates' Competencies in Croatia, *Business Systems Research*, Vol. 10, No. 2, pp. 108-123, https://doi.org/10.2478/bsrj-2019-021

50. Štambuk, A., Uroda, I., Anđelić, N. (2020) Adjustment and early retirement intentions of the older workers in the Croatian public sector. *Ekonomski Vjesnik*, Vol. 33, No. 1, pp. 175-190.

51. Tailab, M. M. K. (2020) Using Importance-Performance Matrix Analysis to Evaluate the Financial Performance of American Banks During the Financial Crisis, *SAGE Open*, Vol. 10, No. 1,pp. 1-17, https://doi.org/10.1177/2158244020902079

52. Tsitskari, E., Goudas, M., Tsalouchou, E., Michalopoulou, M. (2017) Employers' expectations of the employability skills needed in the sport and recreation environment, Journal of Hospitality, Leisure, *Sport and Tourism Education*, Vol. 20, No. 1, pp. 1-9, https://doi.org/10.1016/j.jhlste.2016.11.002

53. Tovmasyan, G. (2019) Assessment of tourist satisfaction index: evidence from Armenia. *Marketing and Management of Innovations*, No. 3, pp. 22–32. https://doi.org/10.21272/mmi.2019.3-02

54. Wohlfart O, Adam S, Hovemann G. (2022) Aligning competence-oriented qualifications in sport management higher education with industry requirements: An importance–performance analysis, *Industry and Higher Education, Vol.* 36, No. 2, pp. 163-176, doi:10.1177/09504222211016284

55. Wohlfart, O., & Hovemann, G. (2019) Using Importance–Performance Analysis to bridge the information gap between industry and higher education. Industry and Higher Education, Vol. 33, No. 4, pp. 223-227, doi:10.1177/0950422219838465

56. Wong, M. S., Hideki, N., & George, P. (2011). The Use of Importance-Performance Analysis (IPA) in Evaluating Japan's E-government Services, *Journal of Theoretical and Applied Electronic Commerce Research*, Vol. 6, No. 2, pp. 17–30, https://doi.org/10.4067/S0718-18762011000200003

57. Yeo, S. F., Tan, C. L., Lim, K. B., Lam, E. (2020) Influencing factors of facial spa treatment on visit intention: An importance-performance matrix analysis (IPMA) approach. *International Journal of Business and Society*, Vol. 21, No. 3, pp. 1087–1100, https://doi.org/10.33736/ijbs.3313.2020

58. Yurcu, G., Akinci, Z., Kucuker, C. (2020) Tourist Perceptions About Food Service Characteristics in Accommodation Enterprises: an Importantance-Performance Analysis. *Journal of Mehmet Akif Ersoy University Economics and Administrative Sciences Faculty*, Vol. 7, No. 3, pp. 656–680, 10.30798/makuiibf.789941

CHAPTER 26

Students' views on migrations - why do they choose to move and what can we learn from this?

Zoran Ježić[1]

ABSTRACT

Lack of economic and professional opportunities in the home country is the main reason for migration, followed by political factors. Migrants usually look for an economic pull factor in the host country because the economy in their home country is such a strong driver. This paper aims to contribute to the economic discussions on the impact of migration at the macro level and at the personal level. At the macro level, the paper will explain the relationship between migration and economic growth and development. Based on the research conducted, the author will suggest policies relevant to managing migration of young people, i.e. students. The individual-level research on which the conclusions in this paper are based was conducted as part of the project "MI" - Migration Challenges - Yesterday, Today, Tomorrow. Within the project, a questionnaire was developed, which aimed to determine the level of competence of students at the Faculty of Economics in Rijeka, their satisfaction with their studies, but also with life in the Republic of Croatia and the decision to emigrate from the Republic of Croatia. The questionnaire with 132 questions was completed by 714 students, of which 545 were female (76.3%) and 474 were male (66.4%).

Key words: *migrations, economic growth and development, economic impact of migrations*

JEL classification: *O10, O15*

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1. Introduction

Migration and economic growth are closely intertwined, as the movement of people from one place to another has a significant impact on the economies of both the home and host countries. Migration can have both positive and negative impacts on economic growth and development, and understanding these impacts is essential for policymakers to make informed decisions about immigration policy.

There are many ways in which migration can help the economy to flourish. Migration can have a significant impact on economic development, which refers to the process of improving the standard of living and quality of life in a country or region. Migration can contribute to economic development in a number of ways, including:

a. Increased human capital: the transfer of skills and knowledge from one region to another as a result of migration can increase a region's human capital. This can result in increased productivity and inventiveness, which can promote economic growth.

b. An increase in remittances: Remittances from migrants to their families back home can promote economic development and progress. Remittances can be used to fund essential services such as health care, education, and other necessities, raising the standard of living in the recipient's home country.

c. More cultural diversity: migration can lead to a more diverse population, which can foster creativity and innovation. People from different backgrounds bring a variety of viewpoints and ideas, which can lead to new commercial ventures and economic growth.

Yet, migration may also have detrimental impacts on the expansion of the economy. For instance, a loss of human capital and slower economic growth may result if highly skilled employees leave a region in search of greater possibilities elsewhere. Large-scale migration can also hinder the potential for economic development by straining public services like healthcare and education.

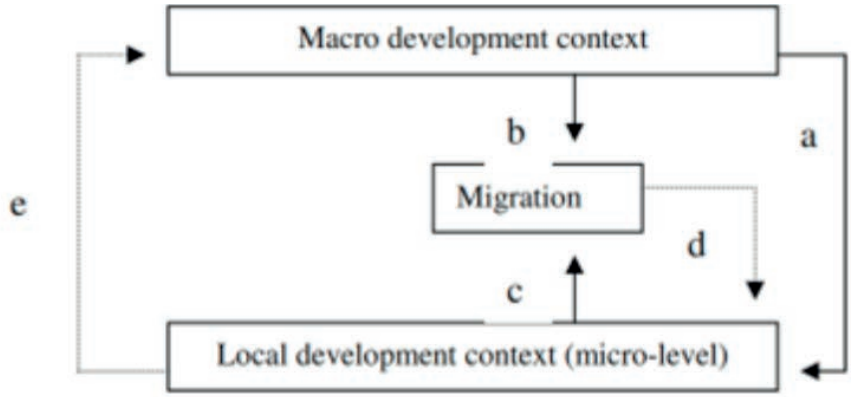
Migration may contribute to economic growth, but it is not necessarily synonymous with economic development. Economic growth can occur without a corresponding improvement in living standards, and in some cases can even lead to greater inequality and poverty. Economic development, on the other hand, requires a focus on improving the standard of living and quality of life for all members of society, including disadvantaged groups.

Thus, policymakers must consider both economic growth and economic development when formulating immigration policy. A policy that focuses exclusively on economic growth does not necessarily benefit all members of society, while a policy that focuses exclusively on economic development does not necessarily lead to more economic growth. For example, a policy that prioritizes the recruitment of highly skilled workers may contribute to economic growth, but does not necessarily benefit less skilled workers, who may be more vulnerable to displacement. In contrast, policies that prioritize

family reunification and humanitarian migration do not necessarily lead to more economic growth, but may contribute to social cohesion and the development of inclusive societies.

Migration is a sub-process that is integrated into a larger transformation process that is part of development, but it also tends to have its own internal dynamics that sustain and self-destruct and impact the larger transformation process in and of itself. In other words, migration is an endogenous variable and not an independent variable that cannot be studied. Moreover, because of its connection to broader transformation processes, it cannot have a unilateral effect on development; rather, migration and broader development are processes that reinforce each other. The latter can be considered in terms of several variables. In other words, migration can have an impact on development at different levels, including the macroeconomic level, the local and regional level, and the individual level (de Haas, 2007).

Graph 1: Migration development interactions



Source: de Haas, H. 2007. Migration and Development: A Theoretical Perspective, Bielefeld: COMCAD.

On the one hand, the macroeconomic development context influences the local development context through laws, taxes, markets, infrastructure, etc. (a), but it also influences the level of migration opportunities through labor, income, and immigration policies, which affects the scale, nature, and selectivity of migration (b). People's propensity to migrate is determined by their desires and capabilities (financial, social, and human variables) to migrate, depending on the local development situation (c). Through system feedbacks on labor, investment, consumption, ambitions, social satisfaction, culture, etc., migration also impacts the local development context. These impacts affect a person's ability and aspiration to migrate. Movement is also motivated by the growth of capital (d). In addition, the macro environment can be affected by the local development context. (de Haas, 2007).

This paper is intended to enrich the economic discussion on the macro and micro effects of migration. Based on part of the study conducted, the author will propose strategies that are crucial to control the migration of young people, especially students. The study at the individual level, which served as the basis for the results in this paper, was conducted within the framework of the project “MI” - Migration Issues - Yesterday, Today, Tomorrow. As part of the project, a questionnaire was created to determine the abilities of students at the Faculty of Economics in Rijeka, as well as their satisfaction with life in the Republic of Croatia and their decisions about emigration from the Republic of Croatia. The main hypothesis of the study is: for young people in the Republic of Croatia (students) the most important factors for migration are economic factors.

2. Literature Review

Many studies have been conducted on the relationship between migration and economic development and growth, with varying results. While some studies point to a negative impact of migration on economic development and growth, others have found a positive impact. This section analyses some of the most influential articles in this area and their findings.

Borjas (1995) in his paper *The Economic impact of immigration* examines the impact of immigration on the U.S. economy. He finds that immigration has a positive impact on economic growth, as it leads to an increase in the size of the labour force and an increase in productivity. However, Borjas also notes that immigration can have negative impacts on certain groups of workers, particularly those with lower levels of education.

Immigrants and Economic Growth: An Empirical Analysis (2018) by OECD and Peri examines the relationship between immigration and economic growth in the United States from 1960 to 2010. According to the analysis, immigration has a positive impact on economic growth, as it leads to an increase in productivity and innovation. Peri also notes that immigrants are more likely to start new businesses than native-born workers, which can contribute to economic growth.

Huber, Landesmann, and Stehrer’s (2010) paper examines the impact of immigration on economic growth in the OECD countries from 1986 to 2006. They find that immigration has a positive impact on economic growth, as it leads to an increase in the size of the labour force and an increase in productivity. They also note that immigration can lead to greater cultural diversity, which can lead to increased creativity and innovation.

The work by Kerr, Kerr, and Lincoln (2011) offers a thorough analysis of the research on the economic impacts of immigration. They discover that because immigration increases the size of the labour force and productivity, it has a beneficial effect on economic growth. They also point out that immigration may benefit entrepreneurship and creativity. They do, however, issue a warning that certain categories of workers, particularly those with less education, may be negatively impacted by immigration.

Ottaviano and Peri's (2008) paper examines the impact of immigration on human capital formation and economic growth. They find that immigration has a positive impact on human capital formation, as it leads to an increase in the size of the labor force and an increase in productivity. They also note that immigration can lead to increased innovation and the development of new industries, which can contribute to economic growth.

International Migration and Economic Growth by Hung-Ju Chen (2006) examines the impact of international migration on economic growth in developing countries. He finds that migration has a positive impact on economic growth, as it can lead to an increase in productivity and an increase in investment. He also notes that migration can have positive impacts on education and human capital formation, which can contribute to sustainable economic development.

Over the past few years, there have been several important papers published on the connection between migration and economic growth and development. Sequeira, Nunn and Quian (2019) in their paper *Immigrants and Making of America* argue that immigrants have played a significant role in driving economic growth in the United States over the past few decades. They noted that immigrants have contributed to innovation, entrepreneurship, and the expansion of the labor force, which has helped to drive economic growth.

The paper *Immigrants and Firms' Outcomes: Evidence from France* (2017) examines the impact of immigration on firm outcomes in France. The authors find that firms that hire immigrants tend to be more productive, innovative, and export-oriented than firms that do not. They also note that the positive impact of immigration on firm outcomes is stronger in industries that require high levels of skill.

Paper *The Impact of Refugees on Native Workers: Evidence from Syrian Refugees in Turkey* (2017) examines the impact of refugees on native workers in Turkey. The authors find that the influx of Syrian refugees into Turkey had a positive impact on the employment and wages of native-born workers, as refugees tended to take jobs that were seen as undesirable by native-born workers. The authors also note that the positive impact of refugees on native workers was stronger in regions with lower levels of education and higher levels of unemployment.

These publications emphasize the intricate connection between migration and global economic development. Immigration has been shown to increase economic growth and productivity, but there may also be some unfavourable effects on native-born workers and public services. However, a variety of factors, including the country in issue, the type of industry, and the skill level of the immigrants, may influence how migration affects economic growth and development.

The leading papers in this field have generally found that migration has a positive impact on economic growth and development. However, they have also noted that migration can have negative impacts on certain groups of workers and can put pressure on public services. Therefore, policymakers must carefully consider the potential benefits and drawbacks of migration when formulating immigration policies.

3. Methodology

Regarding the methodology used in the paper, several important papers were analysed: Survey instruments and survey data on migration aspirations by Carling J and Mjelva MB (2021), *Measuring migration motives with open-ended survey data: Methodological and conceptual issues* (2021), *Variations in migration motives over distance* (2019), *Anatomy of a Misfit: International Migration Statistics* (2021), *Motivations, Beliefs, and Expectations of Spanish Nurses Planning Migration for Economic Reasons: A Cross-Sectional, Web-Based Survey* (2019) and *Environmental migration and displacement: a new theoretical framework for the study of migration aspirations in response to environmental changes* (2019).

Surveys can provide comprehensive information about the characteristics of migrants, their reasons for migrating, and the economic and social impacts of migration, making them an invaluable tool for studying migration. When using surveys to study migration, there are some crucial points that were considered when writing this paper, but also when working on the project "MI" - Migration Challenges - Yesterday, Today, Tomorrow, which focused on migrations: a. Understanding the characteristics of migrants: Surveys can be used to collect data on migrants' demographic characteristics, such as age, gender, education level, and occupation. This information can help researchers better understand who migrates and why. b. Studying motivations for migration: surveys can also be used to collect data on motivations for migration, such as economic, social, or political factors. This information can help researchers better understand why people choose to migrate and how policies can be designed to address the underlying causes of migration. c. Analysing the economic impact of migration: surveys can be used to collect data on the economic impact of migration, such as changes in wages, employment, and business activity. This information can help researchers better understand the economic benefits and costs of migration for both migrants and host communities. d. Understanding the social impacts of migration: surveys can also be used to collect data on the social impacts of migration, such as changes in social cohesion, cultural diversity, and social capital. This information can help researchers better understand the social benefits and costs of migration for both migrants and host communities. e. Policy Impact Analysis: Surveys can be used to collect data on public attitudes toward migration and policy preferences related to migration. This information can help policymakers better understand the public's views on migration and design policies that better address the needs and concerns of various stakeholders.

It is crucial to emphasise that surveys have their limitations and may not be able to fully capture the migration experience. For instance, surveys cannot capture the experiences of undocumented migrants or the social and cultural impacts of migration, which are difficult to quantify. By combining survey data with other methods, such as qualitative research and econometric analysis, researchers can gain a more comprehensive understanding of migration and its impacts. However, it is important to use surveys in conjunction with other methods, as surveys alone may not be able to capture the full complexity

of migration. Another difficulty with using surveys to study migration is the potential for response bias. Migrants may be reluctant to participate in surveys out of concern for their privacy, distrust of researchers, or fear of consequences. Some immigrant groups, such as those who immigrated illegally or suffered discrimination or other forms of social exclusion, may therefore be underrepresented.

The survey was conducted online, using a tool to collect and analyze responses. The results of the survey were clustered. Grouping or clustering objects is a technique used in data analysis to divide a set of objects into groups or clusters based on their similarities. The goal of clustering is to group objects that are similar to each other and different from the rest.

In addition, desk research was used to analyse previous work on migrations. Desk analysis is a technique for studying migration that involves collecting and examining information from existing sources, including official statistics, academic research, and reports from nongovernmental organizations. Desk analysis has helped discover important issues and concerns related to migration by providing a comprehensive picture of migration patterns and trends.

4. Empirical Data and Analysis

As previously stated, a survey was created for this research. The survey had 130 claims / questions to answer. Surveys are a useful tool for analysing migration since they can reveal vital information about the traits, causes, and effects of movement. Survey that was made gathered a variety of demographic, economic, and social aspects of migration. Also, essential data on demographic elements including sex, place of residence, and status/education was gathered. We used this data to better understand how migrants are distributed among various demographic groups and to throw insight on the potential driving forces for migration. Another key area of data that was collected is previous work experience, including both student jobs and current work status. This information can provide insights into the employment opportunities and challenges that migrants face, and can also help researchers understand the factors that may be driving migration for economic reasons.

In addition to economic factors, survey collected the data on the total amount of money that migrants have at their disposal each month, as well as the highest completed level of parental education. These data can help researchers understand the socioeconomic background of migrants and can provide insights into the factors that may be driving migration for social and educational reasons. Surveys also collected data on self-assessment, including necessary means for life, knowledge of foreign languages, and general and specific competences. These data can help researchers understand the skills and resources that migrants bring with them, as well as the challenges they may face in adapting to new social and economic environments.

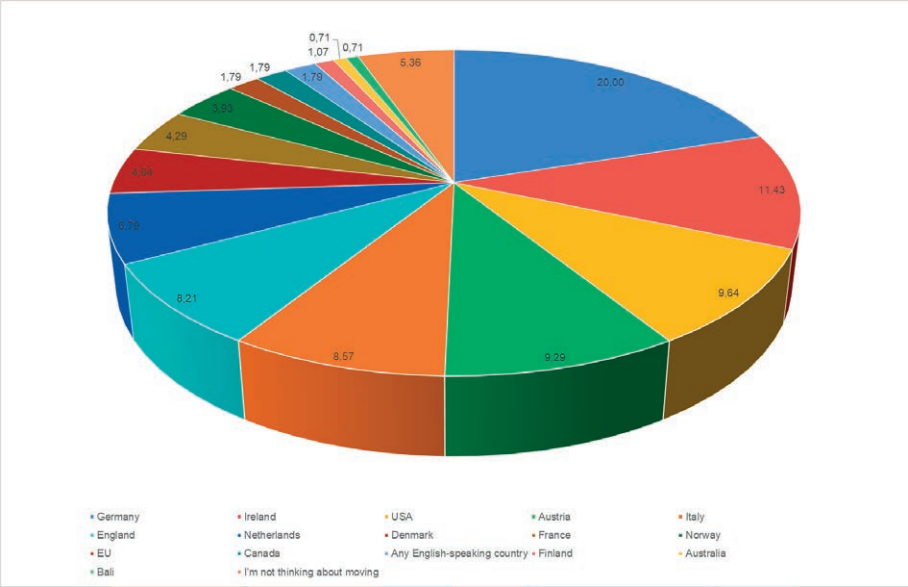
Finally, conducted survey collected the data on migration issues and the factors that motivate migration. This included information on the push and pull factors that influence migration decisions, as well as the specific challenges and opportunities that migrants face when settling in a new location. Understanding these factors can help policymakers develop more effective interventions and support programs for migrants.

The total sample included 714 students, of whom 545 were female (76.3%), 474 were undergraduate students (66.4%), and 240 (33.6%) were graduate students. All students surveyed were from all over Croatia and the sample was based on the work of Carling, J. and Mjelva MB. Survey instruments and survey data on migration aspirations (2021) and Carling, J. Translating migration theory into empirical propositions (2020). In their study, Carling and Mjelva conducted a compilation of surveys (meta-analysis) that included 212 surveys on migration aspirations. The following rules were applied: First, the survey must be quantitative, meaning it must be formatted with pre-written, standardized questions. However, no upper limit was set for the sample size to distinguish quantitative from qualitative research. Second, at least one question about respondents' migration preferences must be included in the survey. Residential mobility, internal migration, international migration, or movement at different geographic thresholds may be the subject of the survey. However, the survey must not focus on respondents' past migration experiences, but must address the possibility of future migration. Third, at least some data about the survey and the survey instrument must be accessible.

5. Results and Discussions

Although the survey included a large number of questions and statements for evaluation, this paper deals only with the students' decision to leave the Republic of Croatia, as well as the reasons for their potential departure and stay.

Graph 2: Plan to move abroad in next five years



Source: authors calculation

47.52 % of surveyed students has the intention to leave the Republic of Croatia in the next five years. The most common countries to which they plan to emigrate are those countries where they will have less language barriers, but there are also a whole host of other reasons. This coincides with previously conducted research on migration in the Republic of Croatia (DZS, 2022).

Table 1: Reasons for migrations

Rank	Grade	Reasons	Cluster of reasons
1	4,21	Better wages abroad	Economic
2	4,04	Improving their competencies abroad (eg learning a new language, business skills,…	Economic
3	3,93	Better working conditions abroad (working hours, difficulty of work, possibility of training,…	Economic
4	3,93	Better economic situation abroad	Economic
5	3,91	Easier to find a job abroad	Economic
6	3,89	Meeting new people and gaining new experiences abroad	Social
7	3,76	Greater respect for the employee abroad	Economic
8	3,7	More interesting business abroad	Economic
9	3,55	Better social and health care abroad	Economic
10	3,53	Better political situations abroad	Political
11	3,51	High corruption rates in the Republic of Croatia	Political
12	3,45	Better social life abroad	Social
13	3,45	Unethical use of acquaintances in the Republic of Croatia	Political
14	3,36	Greater concern for human rights and freedoms and animal rights abroad	Political
15	3,31	Continuing education abroad	Social
16	3,21	Increased awareness of climate change and environmental protection abroad	Social
17	3,16	Family / friends I have abroad	Social
18	3,13	Partner living abroad	Social
19	2,8	Previous experience in the country of immigration	Social

Source: authors calculation

It is important to note that these results reflect the perceptions of a specific group of respondents and may not necessarily reflect the views of the wider population. Additionally, the relative importance of these factors may vary depending on individual circumstances and the specific context of migration.

Overall, the data provides valuable insights into the factors that motivate migration, and can be used by policymakers and researchers to better understand the drivers of migration and develop more effective policies and interventions to support migrants.

While migration can offer many opportunities and benefits, it is not the right choice for everyone. There are several reasons why some people may choose not to migrate, even if they are facing difficult circumstances in their home country.

One reason why some individuals may choose not to migrate is because they believe that they can achieve success and a comfortable life in their home country. They may feel that they have better opportunities to progress in their career and improve their financial situation by staying in their home country. For some individuals, migrating may not be worth the risk and uncertainty involved in leaving behind familiar surroundings and starting anew in a foreign country.

Another factor that can influence a person's decision to emigrate is their mentality. Some people have strong ties to their home country and culture and do not want to give up these aspects of their identity. Others may have personal or family ties to their home country that they are reluctant to leave. Quality of life is also a key factor in a person's decision to emigrate. Some people feel that they have a good quality of life in their home country, with access to health care, education, and other services. They may feel that these benefits outweigh the potential benefits of emigrating to another country. Political parties and ideologies may also play a role in a person's decision to emigrate. Some people feel that they can best enforce their political beliefs by staying in their home country and working toward change from there. Others may be more politically motivated to emigrate to a country where their beliefs are better represented. Less racism and homophobia may also be a reason for some people. They may feel that they are discriminated against or harassed in their home country because of their race, ethnicity, or sexual orientation. However, they may also feel that these problems are not unique to their home country and that they face similar problems in other countries. Finally, there are also people who do not want to emigrate because they believe that the situation in the Republic of Croatia is slowly deteriorating and that things will improve in the future. They may think that they can survive the current difficulties and look forward to a better future in their home country.

The decision to emigrate is a deeply personal one, influenced by a variety of factors. While some people feel that migration is the best choice for them, others choose to remain in their home country for a variety of reasons. These include a desire for faster career advancement, mentality, quality of life, political parties, less racism and homophobia, or a belief that their home country has the potential to improve in the future.

Table 2: Reasons for staying in the Republic of Croatia

Rank	Grade	Reasons	Clusters of reasons
1	3,999	Air, water and natural beauty qualities in the Republic of Croatia	Social
2	3,968	Family / friends in Croatia	Social
3	3,837	Familiar environment (“comfort zone”) and acquaintances in the Republic of Croatia	Social
4	3,727	Cheaper study in the Republic of Croatia	Economic
5	3,552	Partners in the Republic of Croatia	Social
6	3,373	Better social life than abroad (going out, hobbies, etc.)	Social
7	3,17	Availability and quality of business opportunities in the Republic of Croatia	Economic
8	3,138	Better social and health care than abroad	Social
9	3,114	Lower living costs in the Republic of Croatia	Economic
10	3,068	Better quality of life than abroad	Economic
11	2,817	Better working conditions in the Republic of Croatia (working hours, difficulty of work, possibility of training)	Economic
12	2,788	Good salary and investment work in the Republic of Croatia	Economic
13	2,786	Faster / easier career progress in the Republic of Croatia	Economic
14	2,404	Better economic situation than abroad	Economic
15	2,382	Better political situations than abroad	Political
16	2,379	Opportunities to work “in the shadow” in the Republic of Croatia	Economic

Source: authors calculation

The data presented highlights various factors that motivate people to stay in the Republic of Croatia instead of migrating abroad. One of the top reasons is the natural beauty of the country, including the quality of air and water, which makes it an attractive place to live in. In addition, having family and friends in Croatia is another important factor that keeps people rooted to their homeland. The familiar environment and established acquaintances in Croatia create a “comfort zone” that people find difficult to leave. Another factor that may influence the decision to stay is the cheaper cost of studying in Croatia compared to other countries. Partners in Croatia also play a significant role in people’s decision to stay, as leaving the country may mean separation from their loved ones.

The availability and quality of business opportunities, along with better social and health care services, are also important factors that keep people in Croatia. Additionally, the lower living costs in Croatia compared to other countries, as well as the better quality of life and working conditions, are significant reasons for people to stay. Some people choose not to migrate because they believe that with a little effort, they can still have a good life in Croatia, and unlike in other countries, it is not common to hold two jobs at once, despite the lower salaries.

The potential for faster and easier career progress and a good salary, including investment work, are factors that motivate people to continue working in Croatia instead of migrating abroad. The data suggests that a combination of personal and economic factors can influence a person's decision to stay in the Republic of Croatia rather than migrating abroad. It is important to consider these factors when exploring migration patterns and their impact on economic development.

To address the issue of emigration, it is important to encourage a national discussion about why people should stay in their home country. This could be achieved through various channels such as public debates, media campaigns, and educational programs.

Developing modern education programs that are skills-based and emphasize employment opportunities could also play a key role in stemming the tide of emigration. By providing young people with the skills and knowledge necessary to succeed in the job market, they may be more likely to see a future for themselves in their home country. Initiatives that support entrepreneurship and small businesses could also create new employment opportunities, which could provide a further incentive for people to stay in their home country rather than emigrate.

Finally, policies to improve the overall quality of life, including better access to health care, affordable housing, and public services, could also help reduce emigration rates. By creating a more favourable environment for citizens to thrive, people may be more inclined to stay in their home country and contribute to its development.

5. Conclusions

The decision to emigrate or not is a difficult one that has many facets and is influenced by a variety of circumstances. Often, migration is attributed to economic factors, such as higher income and better job prospects. However, other aspects of the decision process, such as individual motives, social and cultural aspects, and political concerns, are equally important.

The results of our study show that among the most important factors for people considering emigration are higher salaries abroad, broadening their skills, and better working conditions. Other key factors include expanding one's social network and gaining new experiences, gaining the appreciation of colleagues, and taking advantage of exciting business opportunities.The data also show that people choose to stay in Croatia because of the air, water

and beauty of nature, as well as the presence of family and friends, pleasant atmosphere and lower cost of living. Better social and health services, better economic prospects and better working conditions are frequently cited as reasons for staying.

It is crucial to emphasize that some people might decide against migrating because they think that, despite the reduced earnings, they can still lead happy lives in Croatia with a little effort. This means that in addition to resolving other issues that may need to be addressed, there may be a need to concentrate on enhancing the nation's economic status.

In addition, the data indicates that the mentality of individuals also plays a significant role in migration decisions. Individuals who have a more open and adventurous mindset may be more likely to migrate, while those who prefer a familiar environment and established social connections may choose to stay.

Our survey results highlight the complex and dynamic nature of migration decision-making. While economic factors are important, they are not the only consideration. Personal motivations, social and cultural factors, and political issues are also significant influencers. By understanding these factors, policymakers and other stakeholders can better address the needs and concerns of individuals considering migration, and work to create policies and programs that support both those who choose to stay and those who choose to leave.

There are some limitations of this research: Surveys have certain limitations when it comes to capturing complex or nuanced information about migration, such as the social, cultural, and political factors that influence migration decisions and experiences. Surveys often rely on self-reported data, which may be subject to social desirability bias or other forms of bias, leading to potential inaccuracies or incomplete information. Another limitation of surveys is that they may not account for the context-specific nature of migration, which can vary greatly depending on the country of origin and destination, the specific reasons for migration, and the social, economic, and political factors at play. In future papers this limitations will be examined.

There are a number of intriguing avenues for future research in the subject of migration studies that could deepen our understanding of migration dynamics and their effects: Climate change and migration, Digital migration and the potential impacts of digital migration on labour markets, social networks, and culture, Forced migration because of conflicts and others forms of violence and Intersectionality and migration. As migration continues to be a key global issue, there is a growing need for interdisciplinary research that considers the complex social, economic, political, and environmental factors that shape migration dynamics and their impacts.

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References

1. Ahmad-Yar, A.W.; Bircan, T. (2021). Anatomy of a Misfit: International Migration Statistics. Sustainability, 13, 4032. https://doi.org/10.3390/su13074032
2. Akresh, I. R. (2006). Occupational mobility among legal immigrants to the United States. International Migration Review, 40, 854-885.
3. Berry, R. A., Soligo, R. (1969). Some welfare aspects of international migration. Journal of Political Economy, 77, 778-794.
4. Boheim, R., Mayr, K. (2005). Immigration and Public Spending. Bonn: Institute for the Study of Labour.
5. Borjas, G. (1995). The Economic Benefits from Immigration. Journal of Economic Perspectives, 9(2), 3-22.
6. Carling, J., & Mjelva, M.B. (2021). Survey instruments and survey data on migration aspirations. QuantMig Project Deliverable D2.1. Southampton: University of Southampton. Retrieved from https://www.quantmig.eu/res/files/QuantMig%20D2.1%20Survey%20instruments%20and%20survey%20data%20on%20migration%20aspirations%20v1.1.pdf
7. Ceritoglu, E., Yunculer, H., Torun, H., et al. (2017). The impact of Syrian refugees on natives’ labor market outcomes in Turkey: evidence from a quasi-experimental design. IZA Journal of Labor Policy, 6(5). https://doi.org/10.1186/s40173-017-0082-4
8. Chen, H.-J. (2006). International Migration and Economic Growth: A Source Country Perspective. Journal of Population Economics, 19(4), 725-748.
9. Cristina Mitaritonna, Gianluca Orefice, Giovanni Peri (2017). Immigrants and firms’ outcomes: Evidence from France. European Economic Review, 96, 62-82. https://doi.org/10.1016/j.euroecorev.2017.05.001
10. de Haas, H. (2007). Migration and Development: A Theoretical Perspective. Bielefeld: COMCAD.
11. Državni zavod za statistiku Republike Hrvatske. (2020). PROCJENA STANOVNIŠTVA REPUBLIKE HRVATSKE U 2019. Retrieved from https://www.dzs.hr/Hrv_Eng/publication/2020/07-01-03_01_2020.htm

12. Gea-Caballero, V., Castro-Sánchez, E., Díaz-Herrera, M.Á., Sarabia-Cobo, C., Juárez-Vela, R., & Zabaleta-Del Olmo, E. (2019). Motivations, Beliefs, and Expectations of Spanish Nurses Planning Migration for Economic Reasons: A Cross-Sectional, Web-Based Survey. Journal of Nursing Scholarship, 51(2), 178-186. https://doi.org/10.1111/jnu.12455

13. Gillespie, B. J., Mulder, C. H., Eggleston, C. M. (2021). Measuring migration motives with open-ended survey data: Methodological and conceptual issues. Population, Space and Place, 27, e2448. https://doi.org/10.1002/psp.2448

14. Huber, P., Landesmann, M., Robinson, C., Stehrer, R. (2010). Migrants' Skills and Productivity: A European Perspective. National Institute Economic Review, 213, 20-34.

15. Van Praag, L. (2019). Environmental migration and displacement: a new theoretical framework for the study of migration aspirations in response to environmental changes. Environmental Sociology, 5(4), 413-430. https://doi.org/10.1080/23251042.2019.1613030

16. OECD/International Labour Organization (2018). Immigration and economic growth. In How Immigrants Contribute to Developing Countries' Economies. International Labour Organization, Geneva/OECD Publishing, Paris.

17. Ottaviano, G. I. P., D'Amuri, F., Peri, G. (2008). The Labor Market Impact of Immigration in Western Germany in the 1990s. FEEM Working Paper No. 16.2008. Available at SSRN: https://ssrn.com/abstract=1105317 or http://dx.doi.org/10.2139/ssrn.1105317

18. Sequeira, S., Nunn, N., Qian, N. (2020). Immigrants and the Making of America. The Review of Economic Studies, 87(1), 382-419. https://doi.org/10.1093/restud/rdz003

19. Kerr, S. P., Kerr, W. R. (2011). Economic Impacts of Immigration: A Survey. NBER Working Papers 16736. National Bureau of Economic Research, Inc.

20. Thomas, M., Gillespie, B., Lomax, N. (2019). Variations in migration motives over distance. Demographic Research, 40, 1097–1110. https://www.jstor.org/stable/26727027

CHAPTER 27

Worker well-being in the post-pandemic job design

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ABSTRACT

Workers all over the world experienced physical and mental challenges during the COVID-19 pandemic which brought new work-related recommendations and changes to job characteristics. The present study aims to provide insight into differences in the well-being of workers in the post-pandemic era and explore how job demands and job resources affected workers' exhaustion and work engagement. We expand upon the job demands-resources theory and confirm the model in a new context. We surveyed workers who continued to work from the office throughout the pandemic, and those working from home during the pandemic. Our multi-group structural equation model shows that social support positively affects engagement in both groups and that their exhaustion is positively predicted by their workload and work-family conflict. The engagement of those workers working from home during the pandemic was positively influenced by their perceived job autonomy while the same effect was not observed for the group commuting to work throughout the pandemic. Exhaustion of the commuters was negatively affected by the perceived family-work conflict, while those that worked from home did not experience such an effect. The opposite is observed for the role ambiguity's relationship with exhaustion. The post-pandemic changes in the workplace positively reflected the worker's well-being, where the interchange between working from home and working from the office leads to lower levels of exhaustion in workers.

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JEL classification: *J81, M54, I15, I31*

1. Introduction

On March 11th, 2020 the World Health Organization declared a pandemic due to the COVID-19 outbreak. This has caused governments to impose infection control measures worldwide, which signified numerous lockdowns around the world, implying strict regulations restricting movement and physical contact. This forced companies to shift work remotely from home in various occupational areas, using telework to ensure the continuation of business to avoid a social and economic crisis. Teleworking implies performing work-related activities remotely during the whole or a part of the working week while using various communication and information technologies (Taskin and Bridoux, 2010; Allen, Golden and Shockley, 2015). The forced transition to telework implied rapid changes and new adjustments regarding ways of working, on top of the strain of volatility and uncertainty the pandemic brought upon workers. The acceleration of shifting to telework, in addition to it not being voluntary nor formalized, prompted additional stress on workers. More than two-thirds of workers view this pandemic as the most significant stressor during their entire career (Ginger, 2020). Radical changes and the government instructions heightened social isolation, which also restrained workers from accessing social support from co-workers and management.

During the early pandemic stages, around 50% of the companies had over 80% of workers shifting to telework - working remotely from home (Baker, 2020). There are, however, workers that remained working from the office even during the pandemic since they cannot work remotely. Healthcare professionals remained on the frontline. Protective service workers, cashiers, maintenance workers, truck drivers and production and food processing workers also remained in their work position despite the outbreak, making them essential workers that cannot feasibly work from home. Research by Dingel & Neiman (2020) in the USA shows that only 37% of jobs can be performed at home in their entirety (varying across industries and cities).

As the strict bans started to lift and governments lifted lockdowns, we entered the post-pandemic era. There is no exact period in which this happened, it rather depends on governments and different situations across the nations. The post-pandemic era brought new changes and permanent shifts in the working world. Many companies (74%) plan to transfer employees to permanent remote work due to many benefits discovered (Lavelle, 2020). As the choice to return to the office or continue working from home appears, the limitations to telework start to get clearer. Autonomous, high-skilled workers can remain in such a structure, such as in finance or academic professions (Welz and Wolf, 2010; Noonan and Glass, 2012). Others who need more monitoring or teamwork may have to return to the office - depending on the nature of the job.

The adaptation to new situations at work during the pandemic caused changes in workers' well-being, where they faced new stressors and experienced emotional exhaustion, depression and psychological problems (Abdel Hadi, Bakker and Häusser, 2021). However, since some time has passed in such an environment, workers adjusted to new conditions in the post-pandemic

era. Since there are workers who remained working from home even after COVID-19 or worked part-time from the office and part-time at home, we wanted to test their well-being and the difference between these workers and the ones who had to work from the office during the whole outbreak. After the COVID-19 pandemic, many papers explore the worker well-being of healthcare professionals through the JD-R model (Barello et al., 2021; Mojtahedzadeh et al., 2021; Zhou et al., 2022). Works so far emphasized the novelty of the pandemic and the lack of theoretical explanations of workplace recommendations and changes implemented to fight the pandemic (Bilotta et al., 2021).

The main objective of this study is to provide a framework for organizations to empower decision-makers in shaping a job design suitable for employees. Such job design caters to their well-being while retaining the organisational performance benefits post-pandemic changes brought. We offer solutions regarding the understanding of changes reflected in worker well-being in the post-pandemic era, where many workers now combine work from home with regular office hours. The theoretical model to support this research is the job demands-resources model (JD-R model) by Demerouti et al. (2001).

The paper is structured as follows: after the introduction, we cover the theoretical background of our research and an overview of the research published so far regarding this topic. After that, we describe the method and model used to depict worker well-being in this context, followed by results and discussion. Finally, we conclude with our findings after limitations are discussed.

2. Literature review

Fonner & Roloff (2010) discovered that workers which working from home more than 50 per cent of the week experience diverse stressors and motivators relative to those working from the office. Such workers experience lower work-life conflict but also poorer co-worker relationship quality. There are various stressors which affect worker well-being, including work tasks, regulations, equipment or conditions workers face while performing their work (Konradt, Hertel and Schmook, 2003). They also differ depending on work arrangements. Therefore, workers working from home experience different stressors than those working from the office due to differences in the work environment. There are different private situations each worker has to face, such as household duties (cleaning, cooking), caring for children or the elderly or home-improvement projects. The shortcomings of working from home include work uncertainties, inadequate tools and home office constraints (Ipsen et al., 2021)(ii.

A special challenge in the post-pandemic area and increasing work-from-home arrangements is the work-home interference, where workers have family responsibilities on top of work demands (Bakker et al., 2011). The physical line that existed parting office work and home responsibilities disappeared completely and suddenly during the COVID-19 pandemic, and it is still blurry in the post-pandemic era. This work-life conflict can go in both

directions - work-family conflict and family-work conflict. The first refers to the demands of work which interfere with family duties, while the second (family-work conflict) explores the family demands one has and how they interfere with work duties (both working from home and the office). Family-work conflict occurs most in parents with young children, who oftentimes work outside regular work hours (nights, weekends) to maintain their productivity level (Couch, O'Sullivan and Malatzky, 2021).

On the other hand, advantages to working from home include increased morale, job satisfaction and productivity, as well as better work-life balance accompanied by increased family time, among others (Baard and Thomas, 2010). Higher employee productivity and improved work-life balance were also connected to those working from home (Fonner and Roloff, 2010). Even during the pandemic, the overall experience of working from home turned out to be predominantly positive. Workers were able to spend more time with family but also focus on work tasks more efficiently (Ipsen et al., 2021)(ii.

The future of work in the post-pandemic era is marked by high levels of work autonomy, both regarding the execution of work and selecting tasks to perform (Manko, 2021). Although autonomy is high while working from home, there is the paradox of maintaining a work-life balance since workers are always connected to work (Malhotra, 2021). There is research, however, mentioning work-life balance as an advantage of working from home alongside improved work efficiency and greater work control (Ipsen et al., 2021)(ii.

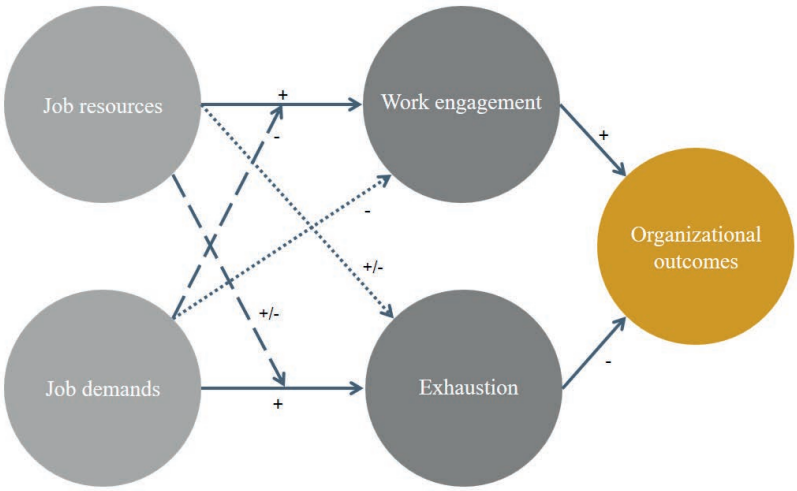
Although there is still a scarce body of work exploring worker well-being in the post-pandemic era (Cairns et al., 2021; Nieuwenhuis and Yerkes, 2021), we can still conclude on some work aspects which may positively or negatively impact worker well-being based on the literature review. Job autonomy is singled out as an important aspect of the new job design, alongside work-family and family-work conflict. Role ambiguity is less mentioned, but an important aspect of the new conditions. Every position in an organization should have a specified set of work tasks and responsibilities expected from workers for their positions. Role ambiguity represents employees' perceived clarity of tasks assigned to them alongside expectations regarding those tasks and peers (Rizzo, House and Lirtzman, 1970). There is potentially a lack of information necessary for performing a role well (Shamir and Salomon, 1985). Since workers working from home have greater challenges communicating with their managers and peers, they may experience uncertainty regarding their work tasks (Sardeshmukh, Sharma and Golden, 2012).

Social support is also mentioned as a potentially changed aspect of the post-pandemic job design of working from home. Workers experience less support from peers and managers due to the fact they don't have direct contact with them anymore (Sardeshmukh, Sharma and Golden, 2012). Workload may also change, or at least the distribution of workload, where workers distribute the work throughout the whole day since there is no longer a distinct barrier dividing work and family life (Wu and Chen, 2020).

2.1. JD-R model

Based on the literature so far, we explore worker well-being through the job demands-resources model to test how identified job characteristics impact worker engagement and exhaustion. There are four important theoretical models in the occupational health literature that concern worker well-being. Worker well-being in an organisation is theoretically explained through the job demands control model by Karasek (1979), the effort-reward imbalance model by Siegrist (2016), the person-environment fit model by Dawis (1992) and the job demands-resources model by (Demerouti et al., 2001). The job demands-resources (JD-R) model is most appropriate in this context since it tries to find the balance between demands posed on the worker and the resources they have to deal with those demands. The JD-R model was first developed by Demerouti et al. (2001), exploring antecedents of burnout. The key assumption in the model is that job strain appears in times of high job demands and with limited job resources. Job demands positively influence exhaustion, while job resources positively influence work engagement. There are also buffering effects. Job resources can be a buffer for different job demands and diminish the impact of job demands on worker exhaustion. There is also moderation of certain job demands on job resources and work engagement, which enhances the impact of job resources on work engagement. For example, compassion satisfaction (job resource), buffers the relationship between job demands and job strain (Tremblay and Messervey, 2011). Figure 1 presents the theoretical JD-R model.

Figure 1: The job demands-resources theoretical model



Source: adjusted from various research (e.g. Demerouti et al., 2001; Bakker, Demerouti and Verbeke, 2004; Bakker and Demerouti, 2007, 2017)

The JD-R is a logical choice for this research since the application of the model is widespread. This model is very responsive to various contexts (not dependent on any industry or type of work), so the variables used to represent

job demands or job resources adjust depending on the analysed situation. They may be unique (not used in other areas) or especially relevant to a specific context (Sokal, Trudel and Babb, 2020). JD-R assumes employee well-being (health and motivation) may be affected by any demands and resources, so a wide range of working conditions can be incorporated in the analysis of employee well-being.

Job demands include physical, social, or organizational job components necessitating sustained physical or mental effort. Such demands incur physiological and psychological costs such as exhaustion (Demerouti et al., 2001). Examples of job demands across literature include role overload (Schaufeli et al., 2009), work intensification (Lawrence, Loi and Gudex, 2019), time pressure (Kattenbach and Fietze, 2018), qualitative and quantitative workload (Olafsen and Frølund, 2018), etc. In short, they represent all the requirements from the employer which imply certain efforts from the worker. The main model assumes high job demands lead to exhaustion in workers, which impacts their well-being negatively. On the other side of the model, job resources represent physical, psychological, social, or organizational characteristics of the job that could be functional in attaining work objectives, lessen job demands (reducing physiological and psychological costs) and promote personal growth and development (Demerouti et al., 2001). They positively impact work engagement and may reduce the negative impacts of job demands. Some examples include job control (Schaufeli, 2015), co-worker or management support (Vendrig, Wijnvoord and Schaafsma, 2019) for matching effective interventions and for deciding when to resume work can be of great value. However, no validated tools exist for self-employed workers. The purpose of this study is to adjust and to validate the Work and Wellbeing Inventory (WBI, feedback (Dijkhuizen et al., 2016), job security (Molino, Bakker and Ghislieri, 2016) and similar.

Overall, there is no finite list of job resources or job demands which may be applied in companies. Each context requires adjustments to the model, identifying what are the predominant demands required and resources offered. Following this, we conclude there are numerous job demands and job resources applicable to worker well-being in this context. We examine six specific variables which theoretically may contribute to worker exhaustion and engagement the most while working from home, as discovered from the literature. We chose four job demands and two job resources used in similar studies that would also be distinctive to the organizational setting of the current study.

It is assumed that the level of autonomy increases when working from home as opposed to the office. Workers now have more freedom in performing required tasks (Saragih, Margaretha and Anantyanda, 2021) and they can modify work requirements aligning them with their own needs and preferences (Van Wingerden, Bakker and Derks, 2017). However, in this context job autonomy increases while working from home depending on work hours and methods used to finish a job, but decreases due to home demands (care responsibilities and similar) (Shamir and Salomon, 1985).

H1: Job autonomy will have a positive effect on work engagement for workers working from home.

Social support may buffer the work-family conflicts that occur while working from home (Pluut *et al.*, 2018). It may include both supportive supervisors and supportive spouses. Support from both sides heightens the work-family balance and impacts worker satisfaction both at work and in the family (Ferguson *et al.*, 2012). Based on these findings, we conclude that:

H2: Social support will have a positive effect on work engagement for workers working from home.

The crucial job demands when exploring work from home refer to workload (Bakker et al., 2011), role ambiguity, work-family conflict and family-work conflict. Working from home intensifies the workload and decreases worker efficiency, mainly because of technical issues workers face (Wu and Chen, 2020). There is a direct effect between work overload and stress (Ingusci et al., 2021). Therefore, we conclude:

H3: Workload will have a positive effect on exhaustion for workers working from home.

Role ambiguity increases when looking at the quality of working life while working from home, contingent on the type of a worker's role, their level of training and skill visibility and the fairness of the appraisal system (Shamir and Salomon, 1985). There are very few studies researching role ambiguity in the work-from-home context (Charoensukmongkol and Puyod, 2021; Nikmah, Indrianti and Pribadi, 2021)this research's background was to break the chain of virus spread, and the government requires physical distancing. Working from home, which causes many employees to work from home, creates conflicts for married female workers. The research objective is to examine and analyze the direct effect of job demands, role conflict, role ambiguity on work-family conflicts. Data were obtained through questionnaires and submitted online to 100 married women who work in universities in East Java, Indonesia, both public and private, and then the analysis was carried out using Partial Least Square (PLS, but there is evidence it is heightened in telework (Sardeshmukh, Sharma and Golden, 2012). What is more, role ambiguity positively relates to work-family conflict (Nabavi and Shahryari, 2012), which is greater while working from home (Van der Lippe and Lippényi, 2020). Based on this, we conclude:

H4: Role ambiguity will have a positive effect on exhaustion for workers working from home.

The strict line between work and home life disappears as there is no more physical, social and temporal boundary to divide the two. The demands from both the work and family sides appear simultaneously and are often conflicting (Shamir and Salomon, 1985), which may additionally burden workers. This may especially occur in households with children. In the literature, it is often called work-family and family-work interference (Geurts and Demerouti, 2003; Nabavi and Shahryari, 2012), but it has yet to be researched in the new, post-pandemic work environment. There are both demands from work

activities which impact family conflict (work-family conflict), and activities at home which impact work conflict (family-work conflict), and we claim that:

H5: Work-family conflict will have a positive effect on exhaustion for workers working from home.

H6: Family-work conflict will have a positive/negative effect on exhaustion for workers working from home.

3. Methodology

3.1. Sample

Empirical data were collected from the online pool of participants available through Prolific[5]. A total of 201 participants were sampled from the population counting 1500 available participants satisfying the set criteria. These criteria include participants between 18 and 67 years old, residing in a European Union state, fluent in English, and employed either full or part-time with more than two years of organization tenure to account for employment during the peak pandemic period. Additionally, to increase the confidence in the obtained results, participants who completed at least five studies on Prolific and whose approval rating was 99% or 100% were taken into account.

Each participant received 0,56 pounds for their involvement with the study lasting for an average of six minutes (M = 5,99 minutes; sd = 3,36 minutes) of their time. A common problem with online samples is estimating how seriously participants approach the survey. That is why an ostensible question that served as an attention check was used to control for participants' mindless answering. Total of eight participants who answered with anything other than "Disagree strongly" or "Disagree a little" to a statement "I have to swim across the Atlantic Ocean to get to my job" were excluded from further analysis as we were suspicious of their honesty in answering all the other questions. Finally, additional six participants were excluded from the analysis because the information on their work arrangement was missing, leaving us with the final sample of 187 participants.

3.2. Measures

Independent variables included both constructs connected to job demands and job resources. This includes job autonomy, social support, workload, role ambiguity, work-family conflict and family-work conflict. Dependent variables are work engagement and exhaustion. Most of the statements used in this questionnaire stem from the JD-R literature. All the items included in this study have, in one way or another, been used in different contexts studying worker well-being. Job resources were represented through job autonomy and social support. Job autonomy was measured with four items (Karatepe, 2011) and social support was measured with seven different items (e.g. "I feel

5 Prolific is an online service that connects researchers with the potential participants. Their participation is paid. The app also offers variety of different screening procedures in order to provide access to the homogenous sample.

valued by my manager or supervisor") (Schaufeli, 2015; Vendrig, Wijnvoord and Schaafsma, 2019). On the job demands side, workload consists of six items (Schaufeli, 2015; Van Den Oetelaar et al., 2016) and role ambiguity of two (Babakus, Yavas and Ashill, 2009). Both work-family conflict and family-work conflict consist of five items (Netemeyer, Boles and McMurrian, 1996). A seven-point Likert rating scale was used for all mentioned constructs, where the scale ranged from one (strongly disagree) to seven (strongly agree).

Work engagement as a dependent variable was measured through items representing vigor, dedication and absorption (Salanova, Agut and Peiró, 2005)engagement, and service climate. Furthermore, customers (N ϭ 1,140. In total, work engagement consisted of 17 items. Exhaustion included both physical and emotional exhaustion, and it was measured with 11 items (Karatepe, 2011; McDowell et al., 2019). A seven-point Likert rating scale was used for this side of the model, as well.

3.3. Empirical data and analysis

The descriptive statistics, along with reliability and validity indicators for each factor included in the model is presented in the Table 2. As can be seen from the table, Cronbach's alpha exceeds Nunnally's (1978) ,70 cut-off, which indicates a reliable measures. Convergent validity of the factors is established on the basis of all average variance extracted (AVE) being higher than ,50 (Fornell and Larcker, 1981) except for the workload which is close enough to be regarded as not being problematic (0,49). Additionally, all factor loadings, for all indicators, were significantly different from zero, further lending support for the convergent validity (Anderson and Gerbing, 1988).

The key analysis was testing how the new surrounding of doing work moderated the effect of job autonomy and social support on engagement, and the effects of workload, role ambiguity, work-family and family-work conflict on exhaustion. For this purpose, a multi-group structural equation model approach was used whereby the model was first fitted to both groups of participants (i.e. those that continued to commute to work, and those that started working from home once the pandemic broke).

The model showed somewhat satisfactory fit (χ^2 = 2677,17; df = 1510; CFI = ,85, RMSEA = ,06) thus providing support for its validity. The model is pictured in Figure 3. Next, the model was fitted separately for participants who continued to work from their office throughout the pandemic and others, who have started working from home during that time. The key manipulation of the study was differentiating the sample between those participants whose work routine was not changed during the COVID pandemic (they were still commuting to work) and those who had to adapt and start working from home. Approximately half of the participants belonged to each group (46,20% were still commuting to work). The two groups were equally old (t = ,15; df = 185; p=,88) with each group being 37,24 years old on average (sd = 9,29 years). The distribution of male and female workers was also not significantly different between the groups (χ^2 = 1,51; df = 1; p=,22). These was taken as an evidence that the two groups come from the same sociodemographic

population, and that any observed differences cannot be attributed to their age or gender differences.

Table 2: Correlation between constructs

	JA	RA	SS	WL	WF	FW	EN	EX
JA	1							
RA	-0,36	1						
SS	0,43	-0,59	1					
WL	-0,12	-0,03	-0,18	1				
WF	0,02	0,01	-0,15	0,42	1			
FW	0	-0,01	-0,03	0,33	0,61	1		
EN	0,44	-0,43	0,4	0,27	0,17	0,15	1	
EX	-0,28	0,27	-0,39	0,3	0,42	0,19	-0,44	1
CR	0,9	0,82	0,89	0,85	0,94	0,94	0,95	0,89
AVE	0,69	0,61	0,59	0,49	0,75	0,77	0,51	0,52
M	3,92	2,07	3,82	2,71	2,73	2,14	4,22	3,83
sd	0,9	0,91	0,78	0,89	1,57	1,36	1,04	1,08

Note: JA = Job Autonomy, RA = Role Ambiguity, SS = Social Support, WL = Workload, WF = Work-Family Conflict, FW = Family-Work Conflict, CR = construct reliability (Cronbach's alpha), AVE = average variance extracted. All correlations greater than ,15 (in absolute terms) are significant at $p<0.05$. Source: authors

Before comparing the effects of job demands and job resources on exhaustion and engagement, it was necessary to establish that the studied phenomena measure the underlying constructs in the same way in both groups (Horn and McArdle, 1992), in other words, a measurement invariance had to be established. Despite chi-square showing a significant worsening of the fit when moving from configural to measurement invariance, neither the CFI, nor RMSEA showed a degradation. Due to this fact, and because chi-square is primarily dependent on the size of the sample, we take this as evidence of establishing both the configural and measurement invariance (Table 3).

Table 3: Measurement invariance between the commuters and work-from-home workers

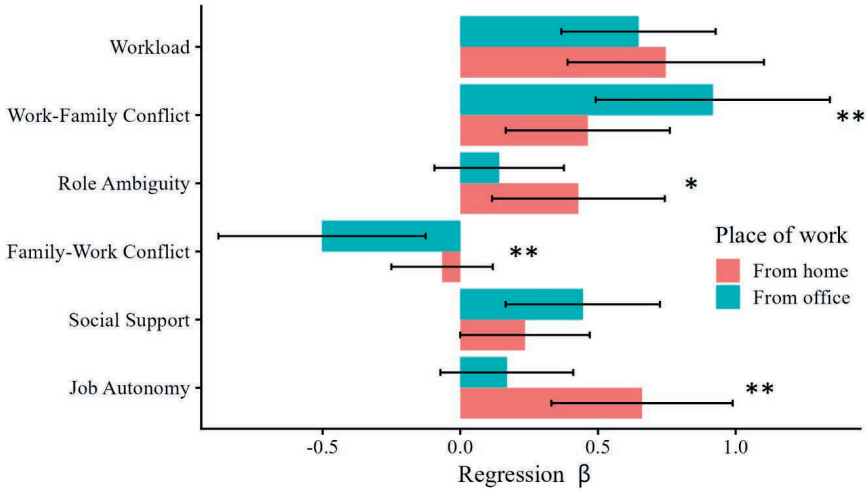
	Chi-square	df	CFI	RMSEA
Non-restricted measurement model	5157	3020	,76	.09
Full metric invariance (L(X)Y=IN)	5238	3069	,76	.09

Note: Full metric invariance is supported [$\Delta\chi2$ (49) = 80,98, $p<.01$], IN = invariance. Source: authors

After confirming the assumption of invariance, both groups were fitted with the full-metric invariant model and their structural relationships were compared (see Figure 3). The model fit was acceptable ($\chi 2$ = 5238,72; df = 3069; CFI = ,76; RMSEA = .09). RMSEA is just above the threshold of the acceptable fit, while $\chi 2/df$ <2 which is indicative of a good fit (Alavi et al., 2020). The main issue lies with CFI fit measure which compares the baseline model with the hypothesized one. A rather low number of participants, paired with a complex model might lead to lower values of CFI. However, due to other indicators pointing toward an acceptable fit, we proceed with interpretation.

Structural parameters were estimated freely and compared between the two groups. The results are graphically presented in Figure 2 (bar chart comparing the sizes of the relationships between the groups) and Figure 3 (path diagram for both groups). The two groups differ in the size of the relationships between work-family and family-work conflicts/role ambiguity and exhaustion and job autonomy/social support and engagement. The summary of results can be grouped based on the dependent variable in question. When examining what contributes to workers' engagement, the answer is different depending on the place of work. Those participants who started working from home during the pandemic were more engaged with their work the more their job was autonomous. On the other hand, the engagement of the workers working from their offices was affected more by the amount of social support they experienced, while this social support was less of a factor, if any, for the other group.

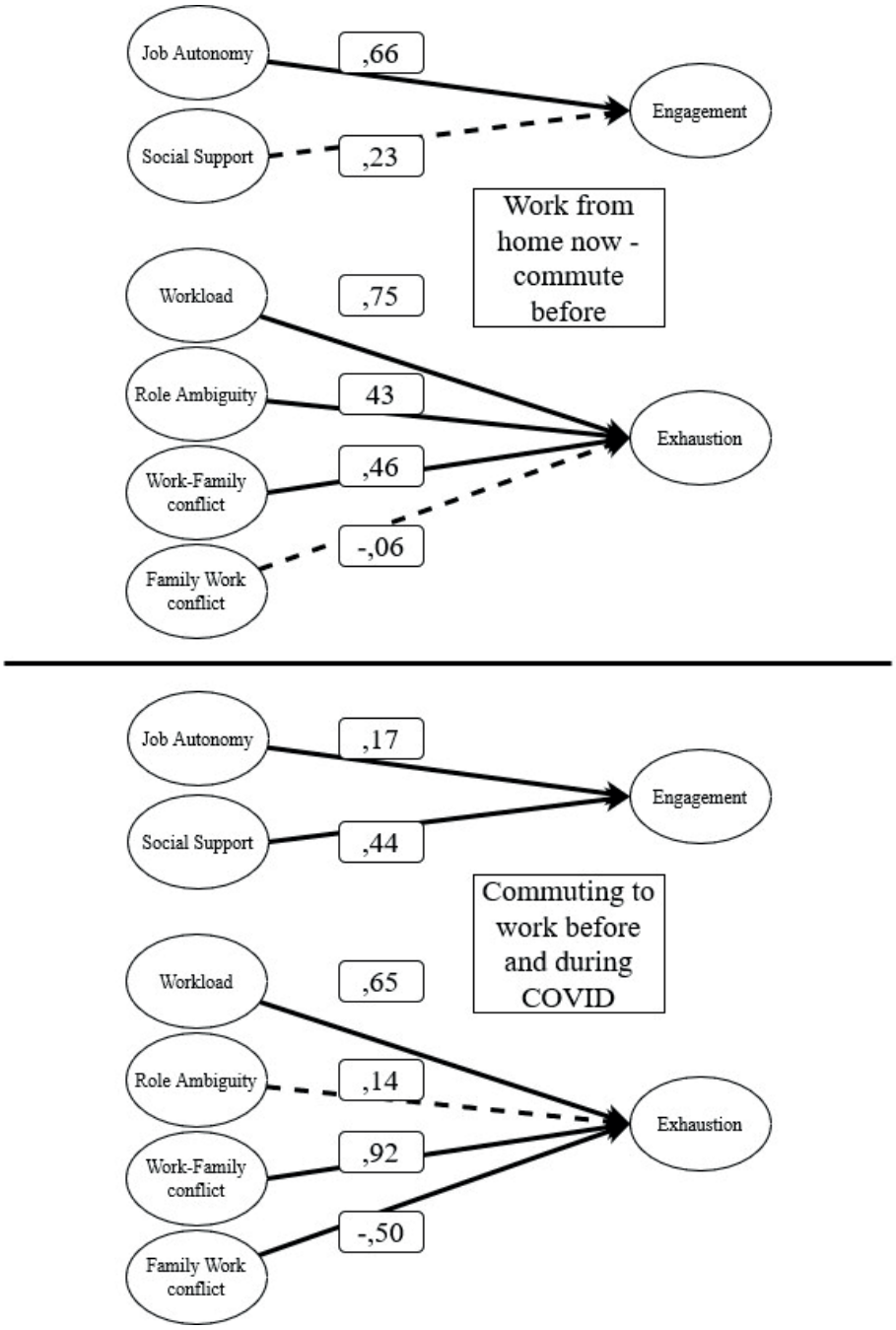
Figure 2: Comparison of estimated relationships between the exogenous and endogenous variables between the two groups of workers



**p<0,05

* p<0,10

Figure 3: Path diagram for two groups of workers



Source: authors

What contributes to the work-related exhaustion also depends on how the work was done during the pandemic. Commuters' exhaustion was related the most to the amount of work-family conflict they had experienced, while the family-work conflict negatively affected their exhaustion. This conflict was not related to exhaustion for workers who worked from home. A different type of conflict affected both types of workers' exhaustion positively, but more so for those who had to commute to work. The final difference between the groups was the effect of role ambiguity on exhaustion. The more their work role was ambiguous, the more exhausted the workers who worked from home were, while commuters' exhaustion was not related to the level of their role ambiguity

4. Results and discussion

We have found that role ambiguity increases exhaustion in workers working from home, but it is not a significant factor for exhaustion for those remaining in the office. These observations are in line with previous research, according to which workers working from home may experience professional isolation (Golden, Veiga and Dino, 2008; Garg and van der Rijst, 2015), or a lack of role clarity (Mangla, 2021). However, some observed no relationship between role ambiguity and place of work (Nikmah, Indrianti and Pribadi, 2021).

While there are some challenges in working from home, teleworkers still experience higher satisfaction than employees working from the office (Fonner and Roloff, 2010). Although working from home may inhibit communication, there is less work-life conflict (Gajendran and Harrison, 2007). Since there is less stress regarding work interruptions and less awareness of organizational politics, workers from home enjoy higher job autonomy (Gajendran and Harrison, 2007; Fonner and Roloff, 2010), leading to greater work engagement. Our research also follows propositions made by Wang et al. (2021) who claim that employees with higher levels of job autonomy will show high-performance levels and experience higher well-being. In our research, there is a significant difference between the two researched groups. Although both groups of workers show a positive relationship between job autonomy and engagement, workers working from home show exceptionally higher results.

We confirm the findings of social support having a positive relationship with engagement when remaining working from the office (Taipale et al., 2011; Othman and Nasurdin, 2013). However, there are no such findings in the group of participants working from home. Gajendran and Harrison (2007) mention that relationships between co-workers tend to deteriorate as a result of teleworking. This may be one of the challenges remote and hybrid work models pose (Babapour Chafi, Hultberg and Bozic Yams, 2021) since collaboration and innovation are hindered by the lack of synchronous communication remote work brings (Yang et al., 2022). Based on our findings, it is hard to argue that social support affects worker engagement while working from home. Employees working from home lack frequent interactions with managers and colleagues, thus receiving less feedback (Gajendran and

Harrison, 2007). Such workers are also denied the benefits that supporting peers can offer (Shamir and Salomon, 1985).

Work-home interference is identified as one of the key remote work challenges (Wang et al., 2021). There is a higher degree of uncertainty regarding the home-office constraints, insufficient tools and lack of technical support (Ipsen et al., 2021)(ii. Overall, there is a high role ambiguity in the current work situation (Ipsen et al., 2021)(ii. A study from Geurts and Demerouti, (2003) showed that work-home interference (demands from work which interfere with workers' personal lives) happens more often than home-work interferences (where demands from home interfere with work-life). This is also in line with our findings. There is a positive relationship between work-family conflict and exhaustion both in workers working from home and in the office, but this conflict was more pronounced in the group of workers working from the office. We may conclude working from home requires careful balancing between work and home life. Since the boundaries between work and home life disappear, there may be simultaneous and conflicting demands from both work and home (Shamir and Salomon, 1985).

The most surprising finding was the observed effect of family-work conflict on exhaustion which is not significant for workers that work from home after the pandemic, but significant and negative for the group of workers that remain working from the office. One possible explanation of such observation may be that the physical barrier between work and home prevents interferences from home when performing job-related duties. There is also a possibility that the family-work conflict is created by family and the consequences are also experienced in the family (Bagherzadeh et al., 2016). Therefore, spouses (in such home environments) respect the boundary between work and home and do not put pressure on fulfilling family duties when working, so it negatively impacts the exhaustion from work. There was no significant relationship between family-work conflict and exhaustion in the group of workers working from home.

5. Conclusions

To build a sustainable new post-pandemic job environment, organizations must redesign existing work models to fit employee needs. This research facilitates the understanding of job resources provided in new job design alongside job demands required from workers. It has become evident there is no more "one size fits all" recipe for work. New job design will surely have implications for work organization, but also occupational health (Bentley et al., 2021). Organisations have the opportunity, in the face of radical change, to reshape the work so it includes satisfied workers and quality work (Thomason and Williams, 2020). To help, this research provides insights into new work design. Our findings help both managers and organizations to effectively organize remote work. Initial transfer from the office to working from home replicated the same work mechanisms in an online environment, but our findings may help guide the new work design to effectively shape work from home, taking into account various stressors employees may face while

working remotely. Our study suggests a job design that enhances worker autonomy since employees are looking for more flexibility (Babapour Chafi, Hultberg and Bozic Yams, 2021) but also clearly stating the expectations regarding workers' roles and clarifying the duties a role encompasses. Due to distance and diminished communication, social support may be lacking. Managers must find ways to provide adequate support so workers show greater engagement in work. Working from home implies a high workload leading to exhaustion. Combined with role ambiguity and work-family conflict, we conclude the new work design should include higher levels of support for workers and understanding of various contexts workers must adapt to since the line between work and private life gets blurred. There is a need for tracking the worker productivity and making the job design more flexible – adopting the hybrid approach, dependent on the business process phase to optimize production and maintain a sustainable business.

There are several limitations of this study. We did not specify an industry/sector the participants came from. There is a possibility different job demands or job resources occur depending on the industry, which may affect the overall model and show different results regarding worker well-being. This may be one of the future research directions regarding post-pandemic job design.

We tested the model with several job characteristics we identified from the literature as the most prominent in this context. There is a possibility that some important job demands and job resources which may affect worker well-being in the post-pandemic job design were unintentionally omitted. We also have to take into account numerous changes which occurred as a consequence of the pandemic. The results may be a consequence of the difference in available equipment, resources and comfort when working from home versus the office. For these reasons, we suggest future research to qualitatively explore various job demands and job resources workers face working remotely. Future research could further analyse the effects of said job demands and resources on overall organisational performance, or job satisfaction of workers. Also, due to a small number of participants, we could not further explore the possible relationships in the JD-R model (buffer effects and moderation). We suggest further research explores potential moderations and buffers to get further insight into nuances of worker well-being while working from home.

Future research may also include dividing and comparing the women working from home as opposed to men since there are different expectations regarding household care depending on the gender in some cultures (Caligiuri and De Cieri, 2021; Couch, O'Sullivan and Malatzky, 2021; Foley and Cooper, 2021). Also, the personality of the worker may have a meaningful impact on the perception of working from home and effects on engagement and exhaustion. Additionally, there are implications on the differences in worker efficiency dependent on whether there are children in the household or not (Ipsen et al., 2021), so it would benefit to also find out whether well-being differs depending on the household type, too.

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References

1. Abdel Hadi, S., Bakker, A.B. and Häusser, J.A. (2021) 'The role of leisure crafting for emotional exhaustion in telework during the COVID-19 pandemic', *Anxiety, Stress, & Coping*, 34(5), pp. 530–544. doi:10.1080/10615806.2021.1903447.
2. Allen, T.D., Golden, T.D. and Shockley, K.M. (2015) 'How effective is telecommuting? Assessing the status of our scientific findings', *Psychological science in the public interest*, 16(2), pp. 40–68. doi:10.1177/1529100615593273.
3. Anderson, J.C. and Gerbing, D.W. (1988) 'Structural equation modeling in practice: A review and recommended two-step approach.', *Psychological Bulletin*, 103(3), pp. 411–423. doi:10.1037/0033-2909.103.3.411.
4. Baard, N. and Thomas, A. (2010) 'Teleworking in South Africa and challenges', *SA Journal of Human Resource Management*, 8(1), pp. 1–10.
5. Babakus, E., Yavas, U. and Ashill, N.J. (2009) 'The Role of Customer Orientation as a Moderator of the Job Demand–Burnout–Performance Relationship: A Surface-Level Trait Perspective', *Journal of Retailing*, 85(4), pp. 480–492. doi:10.1016/j.jretai.2009.07.001.
6. Babapour Chafi, M., Hultberg, A. and Bozic Yams, N. (2021) 'Post-pandemic office work: Perceived challenges and opportunities for a sustainable work environment', *Sustainability*, 14(1), p. 294 (1–20). doi:10.3390/su14010294.
7. Bagherzadeh, R. et al. (2016) 'Relationship of work-family conflict with burnout and marital satisfaction: cross-domain or source attribution relations?', *Health promotion perspectives*, 6(1), p. 31.
8. Baker, M. (2020) 'Gartner HR Survey Reveals 41% of Employees Likely to Work Remotely at Least Some of the Time Post Coronavirus Pandemic', *Gartner, Inc.*, 14 April. Available at: https://www.gartner.com/en/newsroom/press-releases/2020-04-14-gartner-hr-survey-reveals-41--of-employees-likely-to-.
9. Bakker, A.B. et al. (2011) 'Applying the job demands–resources model to the work–home interface: A study among medical residents and their partners', *Journal of Vocational Behavior*, 79(1), pp. 170–180. doi:10.1016/j.jvb.2010.12.004.

10. Bakker, A.B. and Demerouti, E. (2007) ‘The Job Demands - Resources model: state of the art’, *Journal of Managerial Psychology*, 22(3), pp. 309–328. doi:10.1108/02683940710733115.

11. Bakker, A.B. and Demerouti, E. (2017) ‘Job demands–resources theory: Taking stock and looking forward.’, *Journal of Occupational Health Psychology*, 22(3), pp. 273–285. doi:10.1037/ocp0000056.

12. Bakker, A.B., Demerouti, E. and Verbeke, W. (2004) ‘Using the job demands-resources model to predict burnout and performance’, *Human Resource Management*, 43(1), pp. 83–104. doi:10.1002/hrm.20004.

13. Barello, S. et al. (2021) ‘Factors associated with emotional exhaustion in healthcare professionals involved in the COVID-19 pandemic: an application of the job demands-resources model’, *International Archives of Occupational and Environmental Health*, 94(8), pp. 1751–1761. doi:10.1007/s00420-021-01669-z.

14. Bentley, T. et al. (2021) ‘State of science: the future of work – ergonomics and human factors contributions to the field’, *Ergonomics*, 64(4), pp. 427–439. doi:10.1080/00140139.2020.1841308.

15. Bilotta, I. et al. (2021) ‘Using the job demands-resources model to understand and address employee well-being during the COVID-19 pandemic’, *Industrial and Organizational Psychology*, 14(1–2), pp. 267–273. doi:10.1017/iop.2021.43.

16. Cairns, P. et al. (2021) ‘Interventions for the well-being of healthcare workers during a pandemic or other crisis: scoping review’, *BMJ open*, 11(8), p. e047498. doi:10.1136/bmjopen-2020-047498.

17. Caligiuri, P.M. and De Cieri, H. (2021) ‘Predictors of Employees’ Preference for Working from Home Post-Pandemic’, *Business and Economic Research*, 11(2), pp. 1–9. doi:10.5296/ber.v11i2.18411.

18. Charoensukmongkol, P. and Puyod, J.V. (2021) ‘Influence of transformational leadership on role ambiguity and work–life balance of Filipino University employees during COVID-19: does employee involvement matter?’, *International Journal of Leadership in Education*, pp. 1–20. doi:10.1080/13603124.2021.1882701.

19. Couch, D.L., O’Sullivan, B. and Malatzky, C. (2021) ‘What COVID-19 could mean for the future of “work from home”: The provocations of three women in the academy’, *Gender, Work & Organization*, 28(S1), pp. 266–275. doi:10.1111/gwao.12548.

20. Dawis, R.V. (1992) ‘Person-environment fit and job satisfaction’, *Job satisfaction*, pp. 69–88.

21. Demerouti, E. et al. (2001) ‘The job demands-resources model of burnout.’, *Journal of Applied Psychology*, 86(3), pp. 499–512. doi:10.1037//0021-9010.86.3.499.

22. Dijkhuizen, J. et al. (2016) ‘Feeling successful as an entrepreneur: a job demands — resources approach’, *International Entrepreneurship and Management Journal*, 12(2), pp. 555–573. doi:10.1007/s11365-014-0354-z.

23. Dingel, J.I. and Neiman, B. (no date) ‘How Many Jobs Can be Done at Home?’, *Journal of Public Economics*, 189, p. 104235. doi:10.1016/j.jpubeco.2020.104235.

24. Ferguson, M. et al. (2012) ‘Support at work and home: The path to satisfaction through balance’, *Journal of Vocational Behavior*, 80(2), pp. 299–307. doi:10.1016/j.jvb.2012.01.001.

25. Foley, M. and Cooper, R. (2021) ‘Workplace gender equality in the post-pandemic era: Where to next?’, *Journal of Industrial Relations*, 63(4), pp. 463–476. doi:10.1177/00221856211035173.

26. Fonner, K.L. and Roloff, M.E. (2010) ‘Why teleworkers are more satisfied with their jobs than are office-based workers: When less contact is beneficial’, *Journal of Applied Communication Research*, 38(4), pp. 336–361.

27. Fornell, C. and Larcker, D.F. (1981) ‘Structural Equation Models with Unobservable Variables and Measurement Error: Algebra and Statistics’, *Journal of Marketing Research*, 18(3), pp. 382–388. doi:10.2307/3150980.

28. Gajendran, R.S. and Harrison, D.A. (2007) ‘The good, the bad, and the unknown about telecommuting: Meta-analysis of psychological mediators and individual consequences.’, *Journal of Applied Psychology*, 92(6), pp. 1524–1541. doi:10.1037/0021-9010.92.6.1524.

29. Garg, A.K. and van der Rijst, J. (2015) ‘The benefits and pitfalls of employees working from home: Study of a private company in South Africa’, *Corporate Board Role Duties and Composition*, 11, pp. 36–49. doi:10.22495/cbv11i2art3.

30. Geurts, S.A. and Demerouti, E. (2003) ‘Work/non-work interface: A review of theories and findings’, *The handbook of work and health psychology*, 2, pp. 279–312. doi:10.1002/0470013400.

31. Ginger (2020) *COVID-19: Four Radical Changes in U.S. Worker Mental Health Needs*. Ginger. Available at: https://go.ginger.io/4-covid-mental-health-insights.

32. Golden, T.D., Veiga, J.F. and Dino, R.N. (2008) ‘The impact of professional isolation on teleworker job performance and turnover intentions: does time spent teleworking, interacting face-to-face, or having access to communication-enhancing technology matter?’, *Journal of Applied Psychology*, 93(6), p. 1412. doi:10.1037/a0012722.

33. Horn, J.L. and McArdle, J.J. (1992) ‘A practical and theoretical guide to measurement invariance in aging research’, *Experimental aging research*, 18(3), pp. 117–144.

34. Ingusci, E. et al. (2021) 'Workload, techno overload, and behavioral stress during COVID-19 emergency: the role of job crafting in remote workers', *Frontiers in psychology*, 12, p. 1141.

35. Ipsen, C. et al. (2021) 'Six Key Advantages and Disadvantages of Working from Home in Europe during COVID-19', *International Journal of Environmental Research and Public Health*, 18(4), p. 1826. doi:10.3390/ijerph18041826.

36. Karasek, R.A. (1979) 'Job Demands, Job Decision Latitude, and Mental Strain: Implications for Job Redesign', *Administrative Science Quarterly*, 24(2), pp. 285–308. doi:10.2307/2392498.

37. Karatepe, O.M. (2011) 'Do job resources moderate the effect of emotional dissonance on burnout?: A study in the city of Ankara, Turkey', *International Journal of Contemporary Hospitality Management*, 23(1), pp. 44–65. doi:10.1108/09596111111101661.

38. Kattenbach, R. and Fietze, S. (2018) 'Entrepreneurial orientation and the job demands-resources model', *Personnel Review*, 47(3), pp. 745–764. doi:10.1108/PR-08-2016-0194.

39. Konradt, U., Hertel, G. and Schmook, R. (2003) 'Quality of management by objectives, task-related stressors, and non-task-related stressors as predictors of stress and job satisfaction among teleworkers', *European Journal of Work and Organizational Psychology*, 12(1), pp. 61–79. doi:10.1080/13594320344000020.

40. Lavelle, J. (2020) 'Gartner CFO survey reveals 74% intend to shift some employees to remote work permanently', *Gartner, Inc.*, 4 March. Available at: https://www.gartner.com/en/newsroom/press-releases/2020-04-03-gartner-cfo-surey-reveals-74-percent-of-organizations-to-shift-some-employees-to-remote-work-permanently2.

41. Lawrence, D.F., Loi, N.M. and Gudex, B.W. (2019) 'Understanding the relationship between work intensification and burnout in secondary teachers', *Teachers and teaching*, 25(2), pp. 189–199. doi:10.1080/13540602.2018.1544551.

42. Malhotra, A. (2021) 'The Postpandemic Future of Work', *Journal of Management*, 47(5), pp. 1091–1102. doi:10.1177/01492063211000435.

43. Mangla, N. (2021) 'Working in a pandemic and post-pandemic period – Cultural intelligence is the key', *International Journal of Cross Cultural Management*, 21(1), pp. 53–69. doi:10.1177/14705958211002877.

44. Manko, B.A. (2021) 'Considerations in the Use of Work-From-Home (WFH) for Post-Pandemic Planning and Management', *Management*, 25(1), pp. 118–140. doi:10.2478/manment-2019-0062.

45. McDowell, W.C. et al. (2019) 'The price of success: balancing the effects of entrepreneurial commitment, work-family conflict and emotional exhaustion on job satisfaction', *International Entrepreneurship and Management Journal*, 15(4), pp. 1179–1192. doi:10.1007/s11365-019-00581-w.

46. Mojtahedzadeh, N. et al. (2021) ‘Job demands, resources and strains of outpatient caregivers during the COVID-19 pandemic in Germany: A qualitative study’, *International Journal of Environmental Research and Public Health*, 18(7), p. 3684. doi:10.3390/ijerph18073684.

47. Molino, M., Bakker, A.B. and Ghislieri, C. (2016) ‘The role of workaholism in the job demands-resources model’, *Anxiety, Stress, & Coping*, 29(4), pp. 400–414. doi:10.1080/10615806.2015.1070833.

48. Nabavi, A.H. and Shahryari, M. (2012) ‘Linkage Between Worksite Support with Work Role Expectation, Role Ambiguity and It’s Effects on Work-Family Confl ict’, *Canadian Social Science*, 8(4), pp. 112–119. doi:10.3968/j.css.1923669720120804.2930.

49. Netemeyer, R.G., Boles, J.S. and McMurrian, R. (1996) ‘Development and validation of work–family conflict and family–work conflict scales.’, *Journal of applied psychology*, 81(4), pp. 400–410. doi:10.1037/0021-9010.81.4.400.

50. Nieuwenhuis, R. and Yerkes, M.A. (2021) ‘Workers’ well-being in the context of the first year of the COVID-19 pandemic’, *Community, Work & Family*, 24(2), pp. 226–235. doi:10.1080/13668803.2021.1880049.

51. Nikmah, F., Indrianti, T. and Pribadi, J.D. (2021) ‘The Effect of Work Demand, Role Conflict, and Role Ambiguity on Work-Family Conflict (Impact of Work From Home due to The Covid-19 Pandemic): The Effect of Work Demand, Role Conflict, and Role Ambiguity on Work-Family Conflict (Impact of Work From Home due to The Covid-19 Pandemic)’, *Journal of Family Sciences*, 5(2), pp. 92–102. doi:10.29244/jfs.v5i2.32644.

52. Noonan, M.C. and Glass, J.L. (2012) ‘The hard truth about telecommuting’, *Monthly Lab. Rev.*, 135, pp. 38–45.

53. Nunnally, J.C. (1978) *Psychometric theory*. 3rd edn. New York: McGraw-Hill (McGraw-Hill series in psychology).

54. Olafsen, A.H. and Frølund, C.W. (2018) ‘Challenge accepted! Distinguishing between challenge- and hindrance demands’, *Journal of Managerial Psychology*, 33(4/5), pp. 345–357. doi:10.1108/JMP-04-2017-0143.

55. Othman, N. and Nasurdin, A.M. (2013) ‘Social support and work engagement: A study of Malaysian nurses’, *Journal of nursing management*, 21(8), pp. 1083–1090. doi:10.1111/j.1365-2834.2012.01448.x.

56. Pluut, H. et al. (2018) ‘Social support at work and at home: Dual-buffering effects in the work-family conflict process’, *Organizational Behavior and Human Decision Processes*, 146, pp. 1–13. doi:10.1016/j.obhdp.2018.02.001.

57. Rizzo, J.R., House, R.J. and Lirtzman, S.I. (1970) ‘Role conflict and ambiguity in complex organizations’, *Administrative science quarterly*, pp. 150–163. doi:10.2307/2391486.

58. Salanova, M., Agut, S. and Peiró, J.M. (2005) 'Linking Organizational Resources and Work Engagement to Employee Performance and Customer Loyalty: The Mediation of Service Climate.', *Journal of Applied Psychology*, 90(6), pp. 1217–1227. doi:10.1037/0021-9010.90.6.1217.

59. Saragih, S., Margaretha, M. and Anantyanda, L. (2021) 'Job autonomy, job crafting and employees' well-being during working from home', *Jurnal Manajemen dan Kewirausahaan*, 23(2), pp. 177–185. doi:10.9744/jmk.23.2.177-185.

60. Sardeshmukh, S.R., Sharma, D. and Golden, T.D. (2012) 'Impact of telework on exhaustion and job engagement: a job demands and job resources model: Impact of telework on exhaustion and job engagement', *New Technology, Work and Employment*, 27(3), pp. 193–207. doi:10.1111/j.1468-005X.2012.00284.x.

61. Schaufeli, W.B. *et al.* (2009) 'Workaholism among medical residents: It is the combination of working excessively and compulsively that counts.', *International Journal of Stress Management*, 16(4), pp. 249–272. doi:10.1037/a0017537.

62. Schaufeli, W.B. (2015) 'Engaging leadership in the job demands-resources model', *Career Development International*, 20(5), pp. 446–463. doi:10.1108/CDI-02-2015-0025.

63. Shamir, B. and Salomon, I. (1985) 'Work-at-home and the quality of working life', *Academy of Management Review*, 10(3), pp. 455–464.

64. Siegrist, J. (2016) 'Chapter 9 - Effort-Reward Imbalance Model', in Fink, G. (ed.) *Stress: Concepts, Cognition, Emotion, and Behavior*. San Diego: Academic Press, pp. 81–86. doi:10.1016/B978-0-12-800951-2.00009-1.

65. Sokal, L.J., Trudel, L.G.E. and Babb, J.C. (2020) 'Supporting Teachers in Times of Change: The Job Demands- Resources Model and Teacher Burnout During the COVID-19 Pandemic', *International Journal of Contemporary Education*, 3(2), pp. 67–74. doi:10.11114/ijce.v3i2.4931.

66. Taipale, S. et al. (2011) 'Work engagement in eight European countries: The role of job demands, autonomy, and social support', *International Journal of Sociology and Social Policy*, 31(7/8), pp. 486–504. doi:10.1108/01443331111149905.

67. Taskin, L. and Bridoux, F. (2010) 'Telework: a challenge to knowledge transfer in organizations', *The International Journal of Human Resource Management*, 21(13), pp. 2503–2520. doi:10.1080/09585192.2010.516600.

68. Thomason, B. and Williams, H. (2020) 'What will work-life balance look like after the pandemic', *Harvard Business Review*, 2020, pp. 1–4.

69. Tremblay, M.A. and Messervey, D. (2011) 'The Job Demands-Resources model: Further evidence for the buffering effect of personal resources', *SA Journal of Industrial Psychology*, 37(2), pp. 10–19. doi:10.4102/sajip.v37i2.876.

70. Van Den Oetelaar, W. et al. (2016) ‘Balancing nurses’ workload in hospital wards: study protocol of developing a method to manage workload’, *BMJ open*, 6(11), p. e012148. doi:10.1136/bmjopen-2016-012148.

71. Van der Lippe, T. and Lippényi, Z. (2020) ‘Beyond formal access: Organizational context, working from home, and work–family conflict of men and women in European workplaces’, *Social Indicators Research*, 151(2), pp. 383–402. doi:10.1007/s11205-018-1993-1.

72. Van Wingerden, J., Bakker, A.B. and Derks, D. (2017) ‘Fostering employee well-being via a job crafting intervention’, *Journal of Vocational Behavior*, 100, pp. 164–174. doi:10.1016/j.jvb.2017.03.008.

73. Vendrig, L., Wijnvoord, L. and Schaafsma, F. (2019) ‘Reliability and Validity of the Work and Well-Being Inventory (WBI) for Self-Employed Workers: Test Norms of Employees Are Not Suitable for Entrepreneurs’, *Journal of Occupational Rehabilitation*, 29(3), pp. 595–608. doi:10.1007/s10926-018-9821-7.

74. Wang, B. et al. (2021) ‘Achieving Effective Remote Working During the COVID-19 Pandemic: A Work Design Perspective’, *Applied Psychology*, 70(1), pp. 16–59. doi:10.1111/apps.12290.

75. Welz, C. and Wolf, F. (2010) ‘Telework in the European union’, *Eurofound* [Preprint].

76. Wu, H. and Chen, Y. (2020) ‘The impact of work from home (WFH) on workload and productivity in terms of different tasks and occupations’, in. *International Conference on Human-Computer Interaction*, Springer, pp. 693–706. doi:10.1007/978-3-030-60152-2_52.

77. Yang, L. et al. (2022) ‘The effects of remote work on collaboration among information workers’, *Nature human behaviour*, 6(1), pp. 43–54. doi:10.1038/s41562-021-01196-4.

78. Zhou, T. et al. (2022) ‘Burnout and well-being of healthcare workers in the post-pandemic period of COVID-19: a perspective from the job demands-resources model’, *BMC Health Services Research*, 22(1), p. 284. doi:10.1186/s12913-022-07608-z.

CHAPTER 28

Analysis of opportunity costs of students' time

Boris Zatezalo, Davor Mance[1]

ABSTRACT

The paper presents the findings of a student survey on the opportunity costs of their leisure time, with the goal of better understanding their time management decisions. Several hypotheses were tested, including the relationship between leisure time and hourly wages, gender differences in attitudes, and the correlation between daily schedules and time substitution choices. Among other results, it seems that male students were far more optimistic than females about leaving university for a high-paying job, and that the more hours the respondents were willing to sacrifice from a part-time job, the more they were also willing to sacrifice for some other social event together with people important to them.

Keywords: *time endowment, opportunity cost, students time allocation*

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1. Introduction

Three hypotheses were presented for this master's thesis. The first hypothesis related to the master's thesis title, i.e., people's readiness to forgo their free time and labor an additional hour in exchange for an hourly wage. The following is how the null hypothesis and the proposed hypothesis were laid out:

$H0_1$ = A 50 kn hourly wage is insufficient to persuade most people to give up their free time in favor of work.

$H1_1$ = Most people can be persuaded to give up their free time in favor of work with an hourly wage of 50 kn.

The second theory focused on how views about time substitution varied between the sexes. The following is how the null hypothesis and the proposed hypothesis were laid out:

$H0_2$ = There are no appreciable attitudes about time substitution between the sexes.

$H1_2$ = Genders have significantly different views on time substitution.

The last hypothesis focused on the relationship between people's daily time investment choices and their readiness to switch to other activities from their preferred companion's favorite activity. The following is how the null hypothesis and the proposed hypothesis were laid out:

$H0_3$: The amount of time people are willing to trade off between doing their favorite activity with their chosen companion and the amount of time they spend each day on particular activities is unrelated.

$H1_3$ = There is a correlation between the amount of time spent on particular activities each day and the amount of time people are willing to give up to spend time doing their favorite activity with their preferred companion.

Inductive-statistical model testing via questionnaire and statistical analysis are two of the scientific methodologies employed in the research. Six sections make up the graduate thesis. The questions, subjects, aims, aim, and purpose of this graduate thesis, as well as the scientific techniques employed, are discussed in the introduction. All of the statistical techniques are described in the first section. The second section discusses several additional studies and surveys connected to the topic of this thesis. The third section outlines the questionnaire's format and the data it produced. The fourth section gives a description of the analysis done and the findings. The fifth and final section examines the results' conclusions as well as ideas for additional research.

2. Statistical Methods

This chapter discusses numerous statistical methods and values that were used in the survey and analysis undertaken for this bachelor thesis. A Likert scale, a "psychometric response scale primarily employed in questions to

obtain participants' preferences or degree of agreement with a statement or collection of assertions," was used in one section of the questionnaire (Aasa, 2016). The data were statistically analyzed using a variety of techniques, such as the t-test, the ANOVA test, and Pearson's correlation coefficient. The t-test, which is used in statistical hypothesis testing to ascertain whether there are significant differences between the means of two groups, was thus used in this study to ascertain whether there are differences in attitudes among genders. However, ANOVA is used to assess whether there are significant differences between more than two groups. It is used in a manner similar to the t-test (Voxco, 2022). Thus, it was used to compare the attitudes of individuals who were only working, those who were only studying, those who were working and studying, and those who were neither working nor studying. The relationship between two groups and their propensity to change collectively are measured by Pearson's correlation coefficient (Kenton, 2021) (Boslaugh and Watters, 2008). It was utilized to ascertain how respondents' daily schedules and time substitution preferences related to one another. The p-value was employed in each of these studies to assess statistical significance. The p-value is a statistical indicator used to check a hypothesis against actual facts (Beers, 2022). It represents the likelihood that the null hypothesis is correct. In an effort to disprove the alternative hypothesis, which asserts that there is a relationship between the two variables, the null hypothesis states that there is none (McLeod, 2019).

2.1. Time Use and Leisure Time Studies

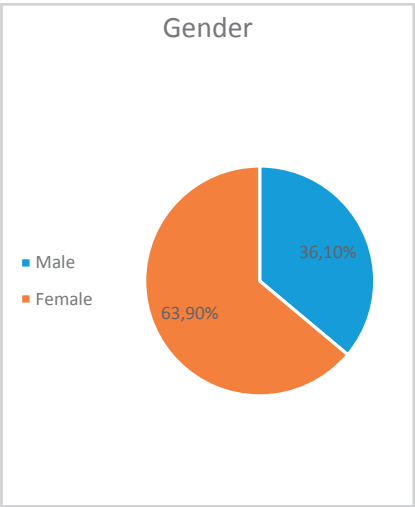
This chapter examines and presents a number of studies on how people use their free time. One of these examined regional variations, namely variations in time allocation between nations. According to research, people in wealthier nations tend to have more free time, but there are other variances because of different cultural norms (Ortiz-Ospina, Giattino, & Roser, 2020). (OECD, 2021). Additionally, it was found that there is a large gender discrepancy in the amount of free time available, with women often having less free time than men (Ortiz-Ospina, Tzvertkova & Roser, 2018). Other research looked at the degree to which people enjoyed various activities as well as how their relationships with others changed over the course of their lives. While certain activities, like having a second job, had a wide range in satisfaction, others, like doing homework, were significantly less fun than, say, attending a concert. Who people spend time with changes over the course of their life when it comes to companionship: parents when they are young, friends and partners when they are older, children and coworkers as they get older. Last but not least, as people age, they spend more and more time alone themselves. In 2020, Ortiz-Ospina, Giattino, and Roser. As seen by the growing amount of time spent online, modern times also come modern problems. The average individual uses the internet for 6 hours and 58 minutes every day, or 40% of their waking hours (Kemp, 2022). The COVID-19 epidemic was another contemporary occurrence that significantly altered how the typical person spends their time. It was discovered that although time spent on housework and leisure activities increased and work-related activities decreased, overall satisfaction declined (Lee & Tipoe, 2021). Students who work while

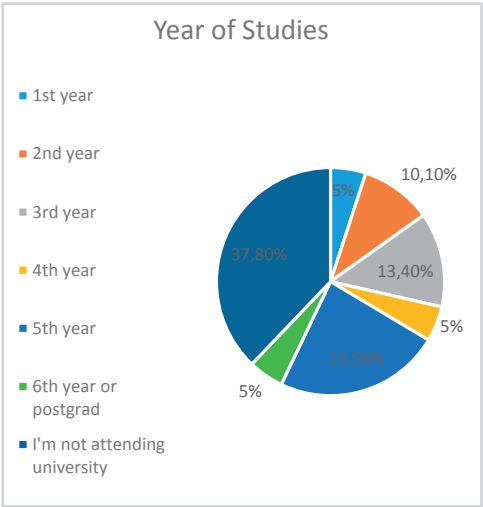
studying have superior time management skills and are less inclined to delay, according to research, in particular (Bertsch et al., 2017). Last but not least, working too much can lead to serious health issues including diabetes and heart disease (Chandola, Brunner & Marmot, 2006).

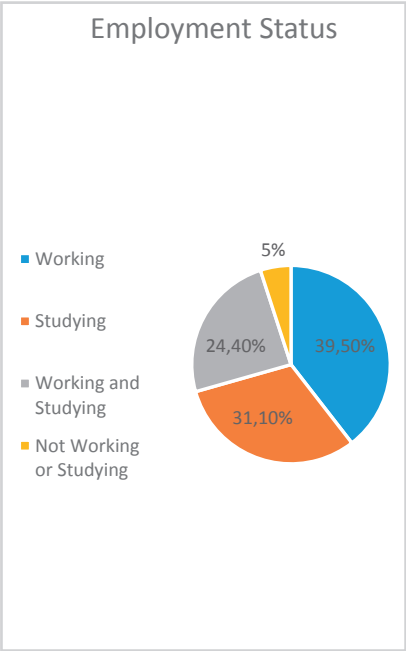
2.2. Questionnaire Regarding Time Management

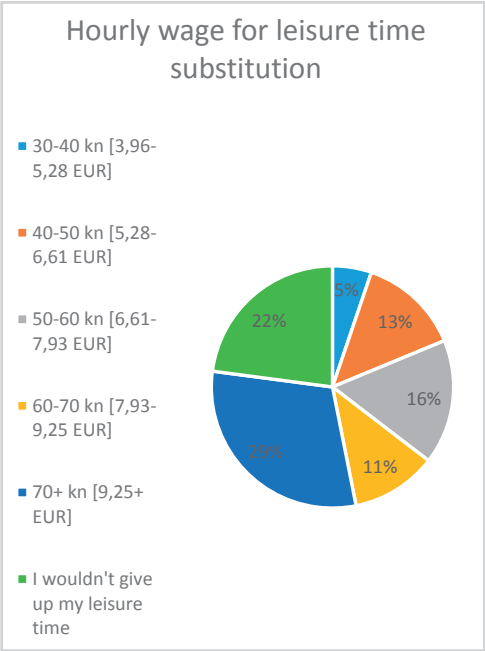
For the purposes of this master thesis, a questionnaire was conducted in regards to respondents' schedules, how they chose to spend their leisure time, and how many hours of each activity in their day they would substitute for their favorite leisure activity. The survey was conducted over a period of 3 weeks, throughout which answers from 117 respondents were sampled. The questionnaire was anonymous, and was mostly structured towards a student population, although people that have finished their studies and are working were also sampled. Most of the respondents were Croatian and from the city of Rijeka, although a few international students in other countries were also sampled. For this reason, the questionnaire was available in both Croatian and English. The questionnaire had a 5-part structure: a *General Information* section, a *Time Diary* section, a *Leisure Time* section, a *Time Management Decisions* section, and a *Leisure Vs. Other Activities* section.

In the *General Information* section, respondents were asked about their gender, their year of studies, their employment status, and how high their hourly wage would have to be for them to give up one hour of their leisure time. Accordingly, most respondents identified as female, while the highest percentage weren't attending university, although the absolute majority were, in fact students. When it comes to their employment status, most respondents stated they were only working, although nearly as many said they were studying while almost a quarter were working and studying. Finally, most respondents would require a wage of 70+ kn/h to give up one hour of their leisure time, while nearly as many wouldn't give up their leisure time at all.

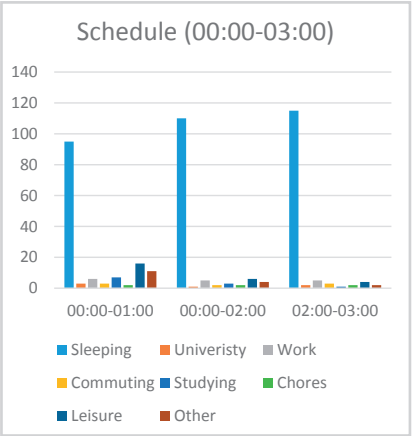








In this section, respondents were asked to document their typical daily routine in a 24-hour period. They did this by marking which activity they did each hour using checkboxes in the questionnaire. Each row represented an hour, while each column represented an activity. Among the available activities were *Sleeping, University, Work, Commuting, Studying, Chores, Leisure Time*, and *Other*. From the results, it is evident that most respondents sleep from midnight to 7 AM, which isn't surprising. From then on, they either go to work or university, and remain there until 4 PM. From there, they do various other activities, such as studying, chores, and leisure. From 6 PM to 11 PM, leisure becomes the most popular activity for respondents, until it is once again overtaken by sleep.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Leisure
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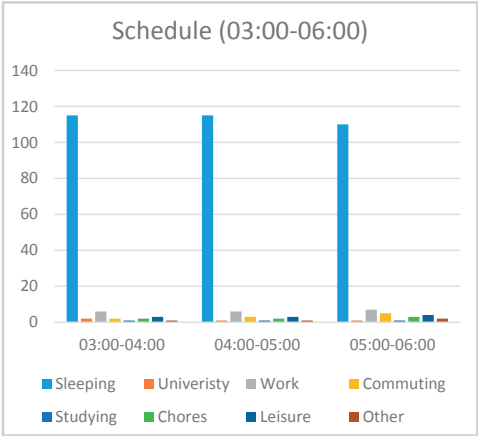
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Leisure
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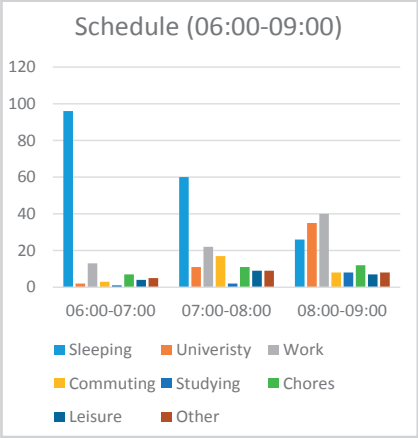
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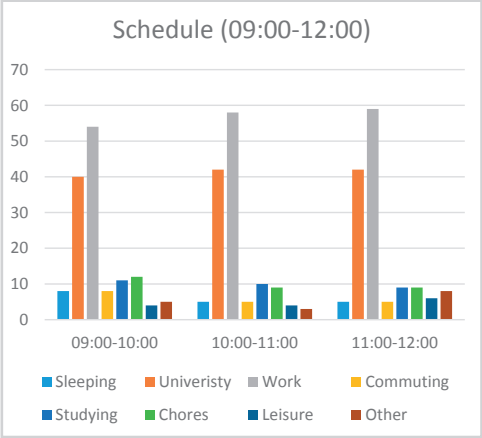
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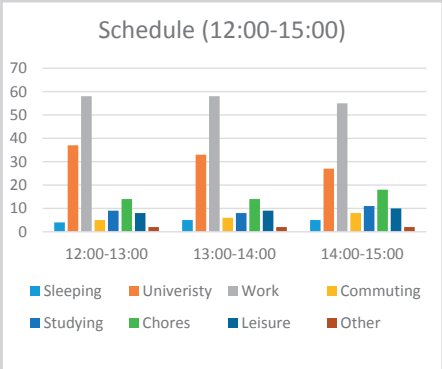
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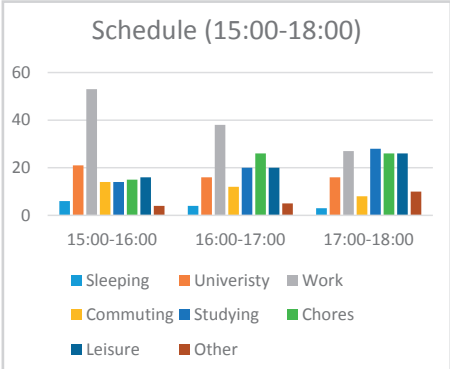
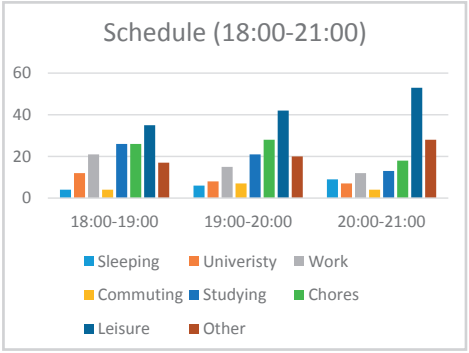
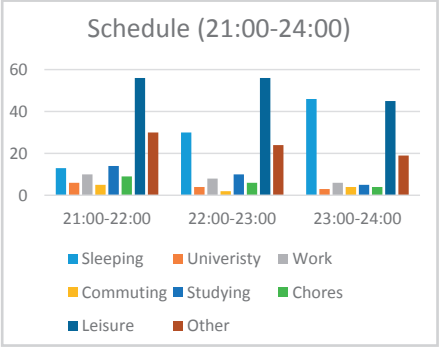
12:00-13:00
13:00-14:00
14:00-15:00
Sleeping
Univeristy
Work
Commuting
Studying
Chores
Leisure
Other

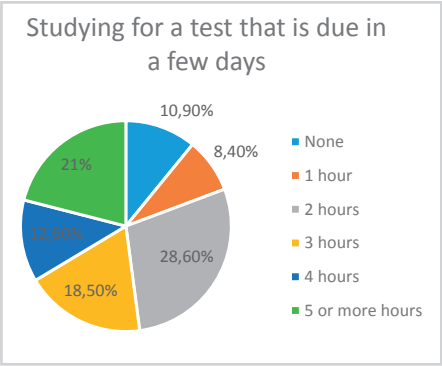

Schedule (15:00-18:00)
60
40
20
0
15:00-16:00
16:00-17:00
17:00-18:00
Sleeping
Univeristy
Work
Commuting
Studying
Chores
Leisure
Other

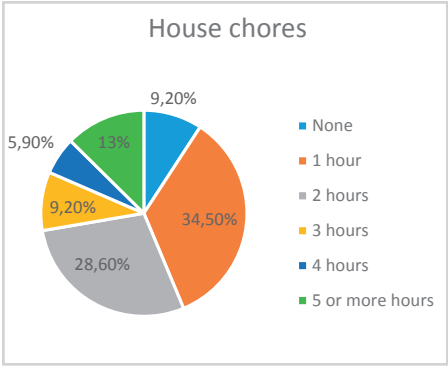


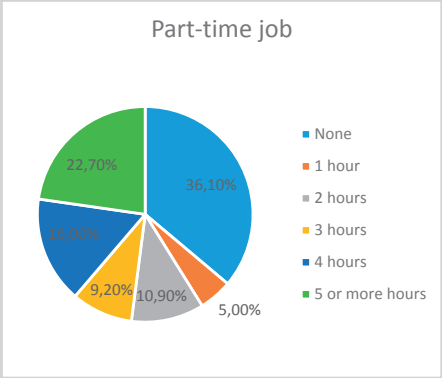


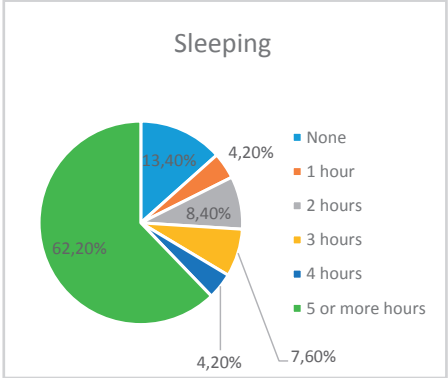
In the section *Time Management decisions,* respondents were asked to record their opinion on ten statements on a five-point Likert scale, ranging from *completely disagree* to *completely agree*. Respondents expressed a mostly negative opinion on the statements: *Working while attending university isn't worth it, since it takes time away from studying, I prefer studying in advance rather than right before the test, I wouldn't cancel social arrangements, even if there was an important test the day after, I would rather work a part-time job on the weekends than go out with my friends, Attending lectures isn't all that important,* and *I'd rather buy a ready-made meal than cook one from scratch.* On the other hand, respondents expressed a mostly positive opinion to the statements*: I would take time off work to study for a test and I'd rather do my house chores immediately than let them pile up*. Lastly, respondents expressed mixed opinions on the statements *I prefer online lectures to in-person ones* and *If I was offered a chance to work a high-paying job at a good firm, I would take it even if I had to quit college.*

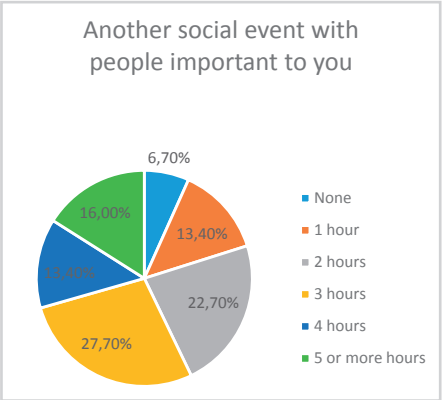
Finally, in the section *Leisure vs. Other Activities,* respondents were asked to detail the amount of time they would sacrifice from other activities to do their favorite activity with their preferred companion. These activities included *studying for a test that is due in a few days, house chores, part-time job, sleeping (tomorrow is a workday),* and *another social event with people important to you.* Most chose to give up two hours from *studying,* one hour from *house chores,* no time from a *part-time job,* five or more hours from sleeping, and three hours from *another social event with people important to you.*


Studying for a test that is due in a few days
10,90%
8,40%
21%
12,60%
28,60%
18,50%
None
1 hour
2 hours
3 hours
4 hours
5 or more hours


House chores
9,20%
5,90%
13%
9,20%
34,50%
28,60%
None
1 hour
2 hours
3 hours
4 hours
5 or more hours


Part-time job
22,70%
36,10%
16,40%
9,20%
10,90%
5,00%
None
1 hour
2 hours
3 hours
4 hours
5 or more hours

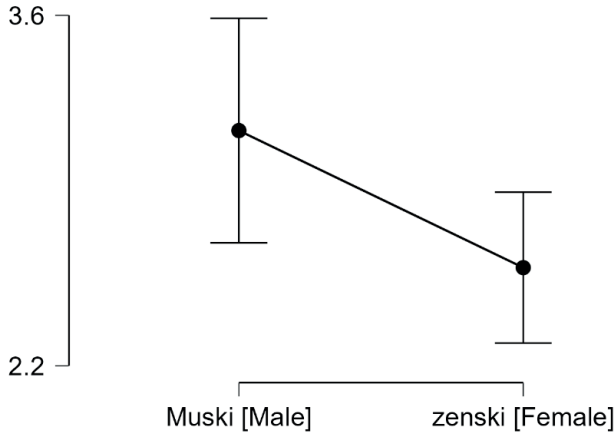

Sleeping
13,40%
4,20%
8,40%
62,20%
4,20%
7,60%
None
1 hour
2 hours
3 hours
4 hours
5 or more hours

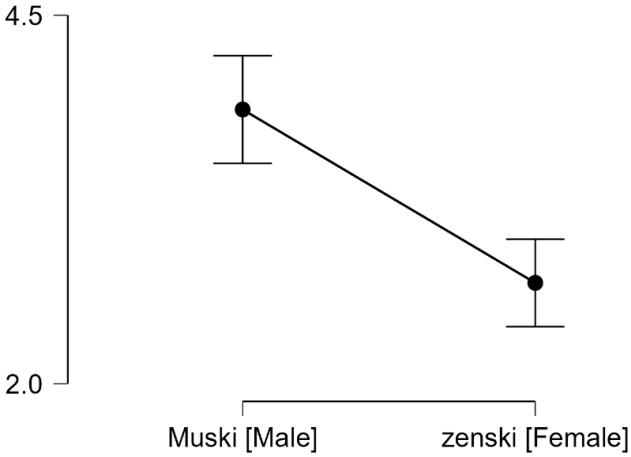

Another social event with people important to you
6,70%
16,00%
13,40%
13,40%
22,70%
27,70%
None
1 hour
2 hours
3 hours
4 hours
5 or more hours

3. Results

With a significant amount of data gathered in the survey, a statistical analysis was performed with said data. The data was analyzed using JASP. The differences in attitudes between genders were analyzed using a t-test, and found two statistically significant results, relating to the statements *Attending lectures isn't all that important* and *If I was offered a chance to work a high-paying job at a good firm, I would take it even if I had to quit college.* In both statements, males expressed a more positive opinion than females.

Differences between genders in attitudes towards statements *Attending lectures isn't all that important* (left) and *If I was offered a chance to work a high-paying job at a good firm, I would take it even if I had to quit college* (right).

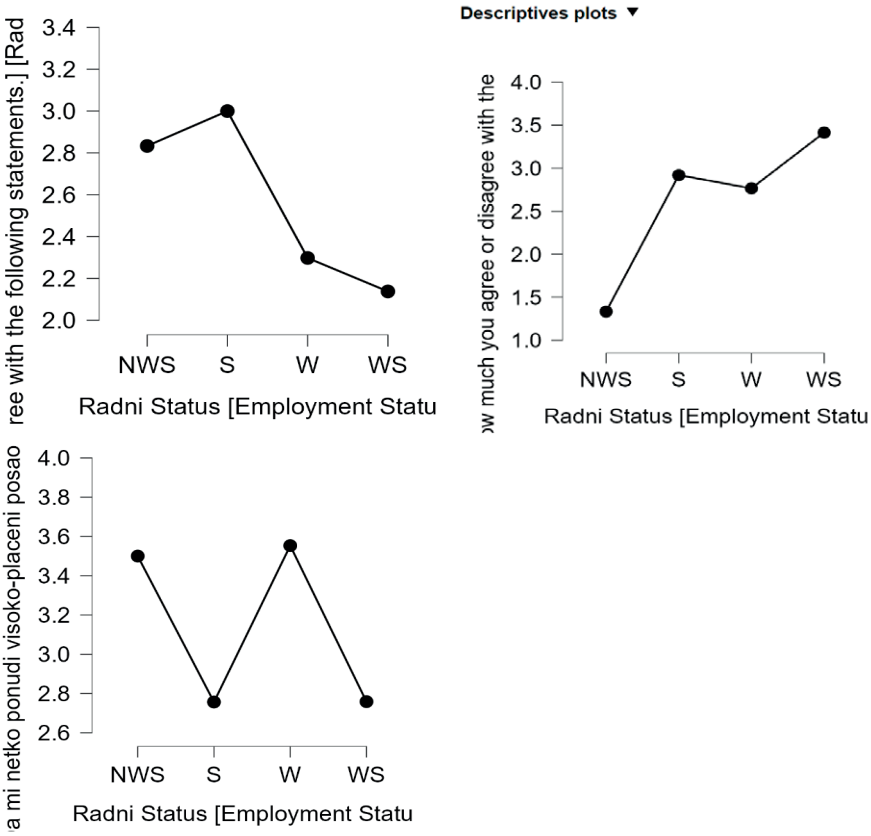




The differences in attitudes between students, workers, those that were both working and studying, and those that were neither working nor studying was analyzed using ANOVA. Three statistically significant results were found,

relating to the *statements Working while attending university isn't worth it, since it doesn't leave time for studying, I prefer online lectures to in-person ones*, and *If I was offered a chance to work a high-paying job at a good firm, I would take it even if I had to quit college.*

Differences in attitudes between the four aforementioned categories for the statements *Working while attending university isn't worth it, since it doesn't leave time for studying* (left), *I prefer online lectures to in-person ones* (center), and *If I was offered a chance to work a high-paying job at a good firm, I would take it even if I had to quit college* (right).



When it comes to the relationship between time allocation in respondents' daily schedule, and time substitution in favor of their favorite activity, no significant relationship was found. However, upon analyzing the time substitution section alone, one significant relationship was found. This was the relationship between amount of time one was willing to take out of another social event with people important to them and the amount of time one was willing to take out of their part-time job to do their favorite activity with their preferred companion. These two factors were positively correlated.

4. Discussion

Numerous relationships were examined in the analysis done for this thesis. Relationships between the sexes, between workers and students, between respondents' daily schedules and their time preferences, and examination of the time preference itself are a few examples of these.

The first hypothesis was tested with the question "Taking into account your current schedule, how high would your hourly wage have to be for you to give up one hour of your leisure time?". To this question, most respondents, 78%, answered that 50 kn would not be enough for them to give up an hour of their leisure time. With that, hypothesis $H1_1$ = *Most people can be persuaded to give up their free time in favor of work with an hourly wage of 50 kn* is rejected, while hypothesis $H0_1$ = *A 50 kn hourly wage is insufficient to persuade most people to give up their free time in favor of work* cannot be rejected.

The second hypothesis tested was tested with the application of t-tests on the data collected using the Likert scale, as part of the questionnaire. Two of these tests were found to be significant. One pertained to the importance of attending lectures. While males found attending lectures to be less important than females, both generally had a less-than-favorable view of not attending lectures. Given that the Likert scale is ordinal and doesn't have equal intervals, this result isn't significant enough to warrant further examination. On the other hand, males expressed a much more positive opinion than females in regards to leaving college for a high-paying job. Moreover, there wasn't any overlap between the scores of males and females, reinforcing a significant difference in attitude. It is the opinion of this author that this difference warrants further research. Regardless, with these tests hypothesis *H02 = There are no appreciable attitudes about time substitution between the sexes* is rejected, while hypothesis *H12 = Genders have significantly different views on time substitution* is accepted.

The third claim was put to the test by utilizing Pearson's correlation coefficient to examine the connections between respondents' daily schedules and the time they chose to substitute for their preferred pastime. No significant relationships were discovered at the end of this investigation. None of the associations passed the assumption checks, despite several having a small p-value. It's probable that the data used for this, especially the information about the respondents' daily schedules, was skewed. As it turns out, several respondents either misunderstood how to fill out this section of the questionnaire or lacked the time to do so. Respondents were required to check the box next to the activity they were engaged in throughout each hour of the day. However, several responders checked out so many activities that it seemed logistically impossible for them to finish them all in an hour. Unfortunately, there was no way to stop this using Google Forms because there was no way to restrict how many checks a respondent could submit in a single row or hour. Using sliders for each activity might be a more natural approach for respondents to enter their time log. The overall number of hours for all activities would be fixed at 24, but each slider would be placed on a scale of 1 to 24. The disadvantage of this approach is that respondents

would not be able to indicate when time of day they perform these activities, but the information might be more insightful. The time substitution section of the questionnaire, which asked respondents to indicate how much time they would sacrifice to engage in their favorite activity, might use a similar approach. It could be interesting to ask respondents to choose which of their regular daily activities they would put off in order to complete their chosen activity, and to copy their time logs into this section of the questionnaire. Alas, with no statistical significance found, hypothesis *H13 = There is a correlation between the amount of time spent on particular activities each day and the amount of time people are willing to give up to spend time doing their favorite activity with their preferred companion* is rejected, while *H03: The amount of time people are willing to trade off between doing their favorite activity with their chosen companion and the amount of time they spend each day on particular activities is unrelated* cannot be rejected.

Numerous other linkages were investigated in addition to the concept. Their responses varied significantly in a few categories when it came to the distinctions between students, workers, students who are working, and those without a job who aren't working either. The question of whether it is worthwhile to study while working was the first of these grounds of disagreement. Students who didn't work generally indicated a much more positive opinion of not working while attending college than did students who worked and studied simultaneously or who worked alone. Research could be done to find out why some students choose to work while others do not, even if this is not surprising given the nature of the topic. Regarding attending lectures, the aforementioned groups strongly disagreed on another issue. These results, however, cannot be regarded as significant because significance tests revealed substantial differences within each group. The only significant difference in respondents' preferences for online lectures over in-person lectures was between those who were neither working nor studying, who had a more negative impression, and those who were both. It is not unexpected that people who work and attend school find online lectures handy because they have more time for other activities because they don't have to commute as much. Last but not least, when it came to leaving college for a well-paying job, groups disagreed sharply once more. However, similar to attending lectures, no differences were discovered when assumption checks and post-hoc testing were performed.

The only statistically significant relationship that was discovered after analyzing time preference alone and passing the assumption tests was the one between the number of hours respondents were willing to give up for a part-time job and the number of hours they were willing to give up for another social event with people who mattered to them. The Pearson correlation coefficient indicated a favorable relationship between the number of hours given up from a part-time employment and the number of hours given up from attending another social event with significant others. It's likely that this was a statistical fluke as there doesn't seem to be any clear connection between the two activities.

References

1. Aasa, O. (2016) *Analyses and methods for Likert scale data,* viewed 25 April 2022, https://www.researchgate.net/publication/343017856_Analyses_and_methods_for_Likert_scale_data
2. Beers, B. (2022) *P-Value,* viewed 05 May 2022, https://www.investopedia.com/terms/p/p-value.asp#:~:text=A%20p%2Dvalue%20is%20a,significance%20of%20the%20observed%20difference
3. Bertsch, A., Ondracek, J., Saeed, M.O., Stone, C., Erickson, K., Opdahl, K., Fitterer, J. & Magana, S. (2017) 'Free Time Management of University Students in The USA', *GE-International Journal of Management Research,* vol. 5, no. 8, pp. 63-84, viewed 9 April 2022, https://www.researchgate.net/publication/320624833_FREE_TIME_MANAGEMENT_OF_UNIVERSITY_STUDENTS_IN_THE_USA
4. Chandola, T., Brunner, E. & Marmot, M. (2006) 'Chronic stress at work and the metabolic syndrome: prospective study', *BMJ,* vol. 332, no. 7540, pp. 521-525, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1388129/
5. Hayes, A. (2022) *T-Test,* viewed 03 May 2022, https://www.investopedia.com/terms/t/t-test.asp
6. Kemp, S. (2022) Digital 2022: *Time Spent Using Tech Continues to Rise*, viewed 04 April 2022, https://datareportal.com/reports/digital-2022-time-spent-with-connected-tech#:~:text=Internet%20time,the%20internet%20across%20all%20devices
7. Kenton, W. (2021) *Pearson's Coefficient,* viewed 2 May, 2022, https://www.investopedia.com/terms/p/pearsoncoefficient.asp
8. Lee, I. & Tipoe, E. (2021) 'Changes in the quantity and quality of time use during the COVID-19 lockdowns in the UK: Who is the most affected?', *PLoS ONE,* vol. 16, no. 20, viewed 07 April 2022, https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0258917#sec002
9. McLeod, S. (2019) *What a p-value tells you about statistical significance,* viewed 05 May 2022, https://www.simplypsychology.org/p-value.html
10. OECD (2021) *Time Use,* viewed 02 April, 2022, https://stats.oecd.org/Index.aspx?DataSetCode=TIME_USE
11. Ortiz-Ospina, E., Giattino, C. & Roser, M. (2020) *Time Use,* viewed 02 April 2022, https://ourworldindata.org/time-use
12. Ortiz-Ospina, E., Tzsvetkova, S. & Roser, M. (2018) *Women's Employment,* viewed 02 April 2022, https://ourworldindata.org/female-labor-supply
13. Voxco (2022) *ANOVA vs t-test: with a comparison chart,* viewed 04 May 2022, https://www.voxco.com/blog/anova-vs-t-test-with-a-comparison-chart/

CHAPTER 29

Digital Skills in Europe and Student Migration

Igor Cvečić[1], Alen Host[2]

ABSTRACT

Europe needs digitally empowered and capable citizens, a digitally skilled workforce and way more digital experts for the sake of its economic and social development. Basic digital skills for all citizens and the opportunity to acquire specialized skills in the Information and Communication Technology sector for the workforce are a prerequisite to participate actively in the European 'Digital Decade', which was set as a priority in the period 2020-2030. Now, many economies in Central & Eastern Europe (like Croatia) are experiencing a significant 'brain drain', especially the emigration of young people with higher levels of education and better digital skills. These skills are vital for living, working, studying, and entertaining oneself in an information (digital) society. Therefore, it is crucial to comprehend the specifics of such migrations which could have significant effects on outward labour markets, as well as the young Europeans themselves. This research explores Croatia's specifics, compared to other European 'peers', focusing on estimated levels of digital skills and relating them to students' perceptions and preferences regarding migration. Although Croatian students of economy and business estimate their level of digital skills as relevant, the differences in those levels seem not to have a decisive impact on their decision to migrate.

Key words: *digital skills, migrations, Croatia, European Union, students*

JEL classification: *F66, F22, J24, L86*

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1. Introduction

Living, but especially working in the European Union has never been so much influenced by specific and particular requirements of the integrated and extensive European labour market as today. Skills and specific knowledge need to be developed by all European economies, as the fast growing economies (under the influence of globalization and other fast-changing trends) rely ever more on the digital and automated activities, the exchange of information and knowledge, and the smart use of resources (energy, raw materials, time, human capital…). In this respect, the efficient use of resources, including capable labour, becomes an increasing burden for every country and especially for those which lack digitally skilled labour. According to CEDEFOP (2018), more than 7 in 10 EU employees need at least some fundamental ICT-related skills level to be able to perform their jobs, but about 1/3 of those employees are at risk of a digital skills gap. According to the Digital Economy and Society Index 2022 Thematic Chapters, 87% of people (aged 16-74) used the internet regularly in 2021, but only 54% possessed at least basic digital skills (European Commission: The Digital Economy and Society Index, 2022).

As skill-equipped labour usually rely on their qualifications and experiences for engaging in the search for better jobs, and living conditions, this implies a logic of more considerations about a possible new job abroad, especially among younger and skilled Europeans. Therefore, the *problem* of this research takes into account the complexity of European youth migrations in the context of the Digital Decade, i.e. the crucial question regards the relevance of the digital knowledge and skills for young European migrants. This issue has not yet been meaningfully elaborated by the scientific community. Consequently, the *working hypothesis* of this paper considers that a certain level of digital skills encourages young migrants to seek opportunities in other countries to a greater (but not necessary a very significant) extent. This hypothesis is tested with a group of young Croatian students who are studying economics and business studies.

In order to address the main hypothesis and the research subject, several *issues and questions* appear, including: the importance and specifics of the digital transition of the economy and society; the necessity of digital skills for the contemporary labour market; the political and policy priorities and activities connected with the digitalization of the economy and society; the migration and digital environment context of the European labour market; the perceptions and perspectives of young European/Croatian students regarding their digital skills, employment opportunities and migration preferences.

These issues were incorporated in the overall research, and accordingly, the *structure* of the paper was formed as follows: (1) Introduction; (2) Literature Review – with a substantial overview of the main terms and theoretical concepts related to the research topic; (3) Quantitative review of digitalisation and migration data for the EU – which includes statistical representations of secondary data, as well as the foundations of the empirical survey conducted within the questionnaire of Croatian students and their migration preferences;

(4) Methodological and empirical framework; (5) Results and Discussion – with major outcomes of the analysis and the interpretation of related issues determined in the previous sections of the paper; (6) Conclusion.

2. Literature review

When dealing with the digital context in contemporary science, a crucial aspect would be to clarify the terms and the settings associated with any particular research idea and topic. Digitalization can have many aspects – social, cultural, technological, economical, business-related, educational and other. As a new and evolving phenomenon it poses numerous questions and requires a good comprehension of different aspects of the digital society and economy. As the focus of this research is on digital skills, and its relation to the migration preferences of the European youth, it is crucial to clarify related terms and theoretical concepts, such as digitalization, digital skills, digital literacy and/or competences, the Digital Decade, etc.

An interesting and potent induction is the interpretation of the *digital literacy* notion, as a survival skill in the digital era, according to Eshet-Alkalai (2004). He explains that it is *more than the mere ability to use software or operate a digital device,* and proposes a more integrative concept than just the technology-oriented, or the cognitive and socio-emotional perspective, as a way to improve understanding and communication between researchers and those who develop learning digital environments. In the publication from the Data-Pop Alliance and Internews institute (2015), the authors point out that digital literacy is just a modern type of literacy which interacts with other types (statistical, scientific, media, computational, information) forming together *data literacy*, which represents *the desire and ability to engage constructively in society through and with data*.

In the recent decade, the digital environment has immensely evolved, creating new perspectives and even encouraging discussions about the distinction of digital 'literacies', as a plural (Lankshear and Knobel, 2008). However, most of the literature points to *the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills* (ALAIR, 2011). Spires and Bartlett (2012) depict digital literacy as a way to organize social and cognitive processes based on the ability to locate and consume, create or communicate digital content. This ability should support the youth in their full participation in the increasingly digital society.

Although Fieldhouse and Nicholas point out (*in: Lankshear and Knobel, 2008; pp. 50*), that the terms like *literacy* and *competency* both describe the ability to find, evaluate and place information, Van Dijk and Van Deursen (2014) prefer the term *skills*. According to them, digital skills, as a multidisciplinary term, seems more appropriate for the broad set of digital activities it covers: Not just reading, writing and understanding, but also interactions with programs and other people, transactions of goods or services, and a continuing process of making decisions. Basically, digital media require additional skills as the nature of today's digital media is creative, more complex and multifunctional

(technically, informationally, interactively). Furthermore, they prefer to leave aside the term *competency*, because it indicates a potential rather than a capacity that is utilized (Van Dijk and Van Deursen, 2014).

Helsper et al. (2020) while building a youth Digital Skills Indicator (yDSI), in order to assess digital skills of the youth, pointed that the dominant literature leads to a framework which identifies the following dimensions of digital skills: (1) technical and operational skills; (2) information navigation and processing skills; (3) communication and interaction skills; and (4) content creation and production skills.

Giving the increasing complexity of the digital environment, especially its new technologies, in order to adequately use them (*appropriation*) and avoid the *digital divide*, it is necessary to firstly boost the motivation and social support (with the diffusion of the technology, especially among younger generations, the motivation and more positive attitude prevailed), as well as the material (physical) access to the digital technology. Meanwhile, the companies widely recognize the importance of new technologies for their competitiveness and future business. Therefore, the majority plans to hire new professionals with required skills or to collaborate with external providers of necessary skills (Seňová and Šebeščáková, 2020).

Motivation and physical access assured, it is crucial to develop adequate digital skills – operational, formal, information, communication, content creation and strategic. This depends on education and training, as well as practice and stimulating policies. By avoiding any knowledge gap, the access to technology should enable a complete process of appropriation, allowing everybody to live, work, study, and entertain oneself in an 'information'/'digital' society (Van Dijk and Van Deursen, 2014). As Aguilar and Girzadas (2019) put it, digital solutions are the most advanced level of managing costs, while digital technologies distinctly meet expectations of companies in which they have already been implemented.

Human capital can be valued differently, depending on its location (Lulle et al., 2021). Young students' skills in Croatia (for instance) can be perceived less useful compared to them in Germany, Austria or Ireland, where the labour market needs more workers with such skills. This shows the importance of free movement of human resources, which can have significant repercussions on the individual level (of particular people who might migrate), on the labour market (which lacks or abounds with labour and/or skills) and the economy itself. As the present-day labour market undergoes significant and accelerated changes, this especially influences the most sensitive categories, such as the youth. They will increasingly rely on these changes and trends.

Factors such as unemployment, the lack of job opportunities or career advancement are well-documented *drivers* of youth migration in the economic literature (Zdrilić and Sokolić, 2022). Institutional and socioeconomic environment, as well as human capital development usually contribute significantly to the determination of migration intentions according to most authors (Van Mol, 2016; Milasi, 2020). However, personal relationships and social ties might depend on the sample of surveyed respondents. Zdrilić and

Sokolić (2022) argue that Croatian university students primarily study in their home country planning their future without clear migration plans, especially when they study in their domestic language. However, they recognize the potential changes which happen after they spend some time on the labour market. On the other hand, Van Hear et al. (2018), Milasi (2020) and Aslany et al. (2021) explain how social links of migrants, including family-related factors and demography may influence migrant flows.

Often, decisions and choices on migration and destinations depend on available opportunities in particular locations, but also on skills and talents of potential migrants. This does not apply only on formally highly-educated migrants, but also migrants who engage in learning, training and skill acquisition opportunities (including language courses) which allow them to find jobs. Aksakal and Schmidt (2021) point out that countries such as Germany (or the UK) attract competitive and better-educated migrants.[3] Lower- and medium-educated migrants can increase their informal human capital, mainly through practical learning and gradual career development; also by occasionally changing their work location (Lulle et al., 2021).4 Previous migrations (including study periods abroad), in this way, may *upgrade* attractiveness of job-seekers for more competitive and dynamic markets.

Furthermore, decisions on migrations depend on subjective, personal *well-being* impressions (e.g. perceptions that include life satisfaction, happiness, experiences, etc.) and even their own personality (Aslany et al., 2021; Van Mol, 2016; Zdrilić and Sokolić, 2022). It is also widely presented in the literature that younger generations are more prone to migrate (Milasi, 2021). As Lulle et al. (2021) point out, a significant 56% of Europeans aged 15-24 were considering working in other EU Member States, while older generations had more modest intentions: 36% among those aged 25-39 and 23% among those aged 40-54. This might have substantial repercussions on countries hardly hit by economic crisis and recessions, with clear negative effects on youth unemployment and significant *brain drain* (Van Mol, 2016).

Within their research about the regional diffusion of digital skills in Europe, Caravella et al. (2022) conclude that bigger demand for advanced skills employed in local public organizations and companies would alleviate outward migrations and favour the digital transition of less competitive regions. Besides, acquiring new skills among the local population can bring to higher employability, higher incomes and innovation potentials (Sokolic, 2022).

Taking into consideration all the relevant theoretical insights, the following section presents the European quantitative context of digitalization, digital skills and migration.

3 Which is relevant for Croatian migrants, as Germany is usually their main country of destination.

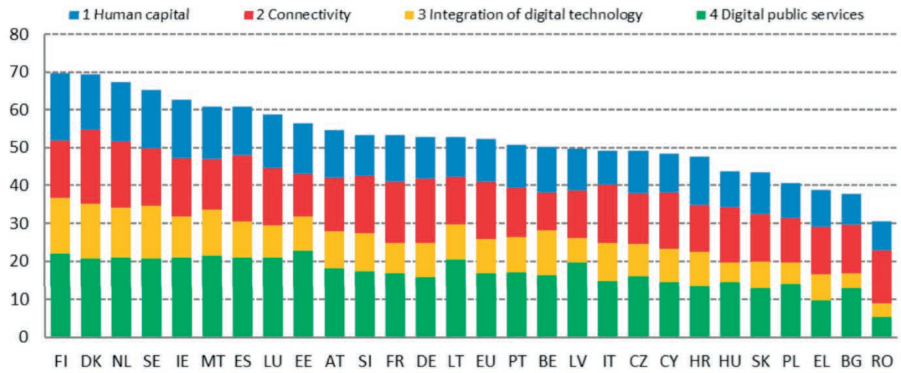
4 This means that they can start their migration path in Italy or Ireland and afterwards relocate to Germany or the United Kingdom.

3. Quantitative review of digital and migration data for the EU

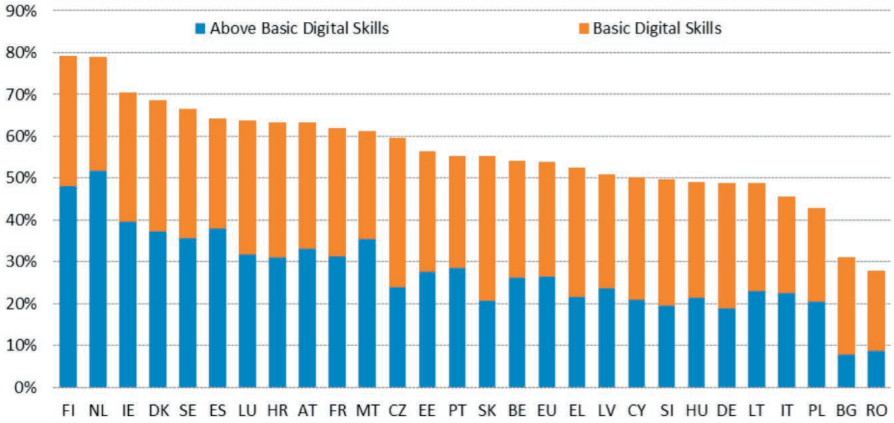
For this part of the paper, we present several statistical contributions in order to enlighten the picture of digitalization processes in Europe, and as a broader explanation of the context of analyzed data from the questionnaire about migration preferences among Croatian students. First of all, we present Figure 1, where the most recent *Digital Economy and Society Index (DESI) 2022* compares EU Member States according to their overall digitalization score (a) and the level of digital skills of its citizens (b).

Figure 1: Digital Economy and Society Index 2022

(a) DESI: Overall index and its main structure



(b) DESI: Level of digital skills of its citizens



Source: European Commission – DESI (2022)

Figure 1 shows that Nordic countries, the Netherlands and Ireland are in both cases the most advanced Member States in the digitalization context, while Romania and Bulgaria are clearly lagging behind. There are some differences in the overall index and the sub-index which shows the level of basic and above basic digital skills of the citizens. On the positive side, Croatia and Czechia clearly perform better in the second case, while Greece and Slovakia more modestly. On the negative side, Germany, Slovenia, Lithuania and Italy perform weaker in their human resources section of the index.

Table 1 presents the level of individuals' digital skills in 2021 among the general population and among specific groups, such as students, young people and non-nationals from other EU Member States (as a % of individuals). Basic overall digital skills of individuals (explained in the first part of section 4), on average, were reported by 54% of respondents in the European Union. Significantly higher assessed levels of skills were reported for students (77%) and young Europeans (71%), and especially those Europeans aged 16-29 with high formal education (89%). Lower estimated levels of digital skills were reported for immigrants from other EU Member States (52%) and the Unemployed Europeans (49%).

Table 1: Individuals' level of digital skills (from 2021 onwards) in the European Union – basic overall digital skills (% of individuals)

Population (type) → Member State:	*All Individuals*	Individuals, 16-29 years old	Individuals aged 16-24 with high formal education	Nationals of another EU-Member State	Non ICT professsionals	*Students*	Unemployed
EU27	*54*	71	89	52	62	*77*	49
Belgium	*54*	72	79	65	62	*75*	42
Bulgaria	*31*	49	82	*na*	40	*66*	15
Czechia	*60*	83	*na*	75	68	*88*	46
Denmark	*69*	82	*na*	74	73	*84*	71
Germany	*49*	58	83	35	55	*64*	36
Estonia	*56*	79	92	46	62	*84*	55
Ireland	*70*	77	*na*	88	78	*na*	66
Greece	*52*	87	94	55	66	*91*	53
Spain	*64*	84	93	65	73	*87*	62
France	*62*	79	93	50	69	*85*	60
Croatia	*63*	89	87	*na*	81	*89*	58
Italy	*46*	61	83	30	*na*	*67*	40
Cyprus	*50*	68	76	24	56	*83*	45
Latvia	*51*	79	87	*na*	57	*85*	46
Lithuania	*49*	77	80	*na*	57	*77*	37
Luxembourg	*64*	71	83	63	67	*72*	64
Hungary	*49*	67	81	64	56	*80*	37
Malta	*61*	92	94	86	72	*99*	54
Netherlands	*79*	87	99	78	84	*90*	70
Austria	*63*	79	91	75	71	*82*	65
Poland	*43*	67	72	*na*	51	*74*	32
Portugal	*55*	85	96	*na*	64	*90*	48
Romania	*28*	46	65	*na*	17	*60*	24
Slovenia	*50*	60	*na*	*na*	57	*71*	47
Slovakia	*55*	70	77	*na*	65	*75*	32
Finland	*79*	93	*na*	77	86	*97*	77
Sweden	*67*	80	83	67	71	*83*	66

Note (na): data not available.

Source: Eurostat (2022a)

Furthermore, data from Table 1 shows significant differences in the estimated levels of digital skills between Member States. It is not a surprise to find the highest percentages for countries such as Finland or the Netherlands (79%), followed by Ireland, Denmark and Sweden, and, on the other hand to see that the most modest levels of digital skills are reported in Romania (28%) and Bulgaria (31%) for the overall population. Nevertheless, quite modest levels have also been reported for Italy (46%) and Germany (49%) – two crucial Member States, while surprisingly high percentages are reported for Croatia (63%) – best New Member State and overall 8th in the EU, as well as for Czechia (60%) and Estonia (56%).

Among students, an impressive 99% of digitally skilled respondents were reported in Malta, 97% in Finland and 91% in Greece. Similar percentages to Greece were reported in the Netherlands, Portugal, Croatia, Czechia and Spain, while the lowest percentages can be found in Romania (60%), Germany (64%), Bulgaria (66%) and Italy (67%). Regarding young Europeans (aged 16-29), the top three countries are Finland, Malta and Croatia, followed by Greece and the Netherlands. On the other end, less than 50% of respondents have basic levels of digital skills in Romania and Bulgaria, while Germany and Italy are again among the worst performing. However, among the same age group of Europeans, if we single out those highly educated, the Netherlands leads with 99%, followed by Portugal (96%), Malta and Greece (94% both). Romania again lags behind the most (65%), together with Poland (72%) and Cyprus (76%), while Germany, Italy and Bulgaria in this case have similar percentages to the EU average.

Analyzing further, significant figures can be found for *Non-ICT professionals* and the unemployed. Again, top four Member States for the professionals not related to information and communication technologies with basic digital skills are Finland (86%), the Netherlands (84%), Croatia (81%) and Ireland (78%), while the last four countries on this list are: Romania (17%), Bulgaria (40%), Poland (51%) and Germany (55%). The figure for Italy was not available. Among Unemployed Europeans, on average, 49% of respondents declared that they had basic digital skills; ranging from only 15% in Bulgaria to 77% in Finland. Unemployed Europeans lacking basic digital skills are more often found in less advanced economies and mostly New Member States (with Croatia, Estonia, Malta being partially exceptions), while less satisfactory scores among Old Member States can be found (again) in Germany, Italy, Belgium and Greece5.

Finally, regarding the estimated levels of digital skills among *Nationals of another EU-Member State* which reside in particular EU countries, Ireland leads with 88%, followed by Malta (86%), the Netherlands (78%) and Finland (77%). Drastically opposite percentages were recorded in Cyprus (only 24%), Italy (30%) and Germany (35%), making them more *digitally vulnerable* Member States. The comparison in this case is incomplete, as the figures for 1/3 of Member States were not reported. However, reported figures in

5 Greece, although classified as an Old Member State, often shows traits more similar to New Member States.

this case can indicate the differences in levels of basic digital skills among immigrants from other EU Member States, as well as the differences of digital skills required on particular European labour markets.

Considering this overview of the estimated digital skills in particular Member States and the reported levels, it is important to understand the digitalization profiles of European nations which determine their digital ecosystems. Usually those who invest more, have better results, but some of the reported estimated levels show that even most advanced and innovative economies can lag behind in some aspects of digitalization. Theoretical and empirical studies suggest, however, that younger, more educated and richer individuals are more likely to take advantage of digital technologies. Countries with lower levels of digitalization experience also greater digital divides – gaps in the benefits of the digitalization processes among individuals and companies in the same nation (EBRD, 2021). This could turn out to be a growing problem, as digital skills are becoming more and more important for the competitiveness of economies and because production structures are shifting towards more digital-intensive sectors (Calvino et al., 2018; Donoso et al., 2020).

According to an aggregated index of digitalization developed by the EBRD (2021), which includes both preconditions for the use of digital technologies ('enablers') and the use of them by individuals and companies ('outcomes'), Estonia is the most successful new EU Member State (score: 92.2 / 100); above the average index for advanced economies. Close to the average (but still below) are: Slovenia (82.65), Lithuania (81.45) and Czechia (79.5). Croatia is lagging behind (score: 70.95), but still doing better than Greece (65.05), Romania (60.3), Bulgaria (59.45).

Švedkauskas and Sirikupt (2022) try to categorize New Member States according to their Digital Economy and Society Index (DESI) scores and the Global Innovation Index (GII) in order to determine which are *Digital Frontrunners* (Estonia, Malta, Slovenia), *Digital Accelerators* (Croatia, Czechia, Latvia, Lithuania, Slovakia) or *Digital Arrivers* (Bulgaria, Cyprus, Hungary, Poland, Romania). Digital Frontrunners show high shares of ICT graduates and employed ICT specialists, as well as individuals with above basic digital skills. These countries do not have significant emigration figures. Digital Accelerators, according to Švedkauskas and Sirikupt (2022) have more moderate ecosystems, but greatly manage to accelerate their digital transformation. Digital Arrivers performances are among the lowest in Europe, especially showing skills mismatches and a worrisome modest share of companies that provide ICT training to their employees.

A relevant aspect regarding digital skills and potential migration decisions can be observed in the example of individuals with ICT education and their employment status. On average, 92.6% of them do have a job, with Greece (80.5%), Spain (85.1%) and Italy (85.6%) being less effective regarding employment of these valuable human resources. On the other hand, in Czechia an astonishing 99.4% of ICT educated are employed (Eurostat, 2022c). We could argue that migration of ICT specialists seeking jobs would be more probable in the case of southern Europeans (including Croatians), compared to those from Czechia, Belgium or Germany.

Many economies in Central and Eastern Europe, the Mediterranean and Central Asia are experiencing a significant *brain drain* – the outward migration of people with higher levels of education and, in particular, better digital skills. Even though these regions are similar to advanced economies in terms of ICT graduates as a percentage of total graduates (both averaging around 4.5%), the number of ICT professionals and technicians working in these regions (as a share in total employment) is around half of the level seen in advanced economies (EBRD, 2021).

The data presented in this section, although not directly included in our empirical "model" (presented in sections 4 and 5), is essential to understand the context and helps to compare perceptions of basic digital skills in Europe. Moreover, it is relevant to understand the overall migration figures and trends. In 2019, some 3% of persons residing in the EU had a nationality of another Member State, while some 5% were non-EU nationals (Eurostat, 2020).6 Some 2.9 million EU citizens have emigrated outside their country of origin (2018), of which more than half (54%) were nationals going abroad, while the rest were either other EU-citizens or non-EU nationals. Some 36,000 Croatians emigrated from their country (plus some 3,000 non-Croatian citizens) in 2018. Besides the biggest Member States (France, Romania, Germany, Poland, Italy, Spain and the Netherlands), only Greece had more citizens leaving their home country (50,000). At the same time, some 4.5 million residents were immigrants: 48% of non-EU citizenship; 28% from another EU Member State; 23% nationals going back to their country (Eurostat, 2020). Most immigrants with EU-citizenship arrived to Germany (370,000), Spain (145,000), the Netherlands (79,400), France (78,700), Austria (64,300) and Belgium (63,900). Croatia received only 2,242 immigrants from other EU Member States in 2018, but approximately 15,000 non-EU citizens and 8,600 returnees (Eurostat, 2020).

The following sections present the methodological framework and selected data for the empirical analysis (4), and the elaboration of digital skills levels among different student groups, grouped according to their migration preferences (5).

4. Methodological and empirical framework

As our main analytical part of the research deals with basic digital skills among students, we start with the definition used by UNESCO (Law et al., 2018) to explain them. Basic overall digital skills exist among those people who know how to do at least one activity related to each of the following five areas (Law et al., 2018):

- information and data literacy skills (finding information online about goods or services or reading online newspapers)
- communication and collaboration skills (sending and receiving emails and using social media)

6 These figures do not include the United Kingdom, although in 2019 it was still part of the EU.

- digital content creation skills (using word processing or spreadsheet software and editing photos, video or audio files)
- safety skills (things like limiting access to profile or content on social media sites and changing internet browser settings)
- problem solving skills (selling online, internet banking and installing software or applications).[7]

Our empirical research is based on a student population questionnaire/ survey among young Croatians enrolled in economics and business studies (Faculty of Economics and Business of the University of Rijeka; Croatia), and aged 18-50 (95% being younger than 26; the sample includes also part-time students). The whole sample includes 714 students with valid responses; 455 undergraduate and 259 graduate students; 76.5% of which are female and 23.4% male. The data was collected during February 2022, while the responses were given on a five-point Likert scale: 1 indicating strong disagreement and 5 indicating strong agreement with each statement.

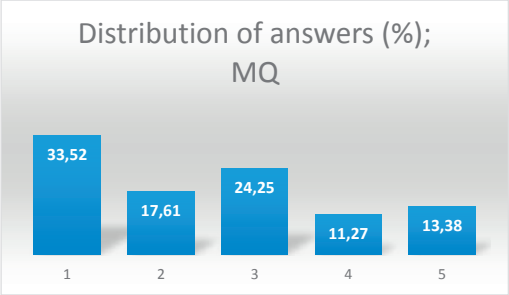
Although the questionnaire portrays 130 questions regarding their main features, like age, sex, origin, financial status, various skills and education, etc., most of them relate to migration preferences and perceptions related to various factors influencing education, skills, employment and mobility perspectives. However, we focus on a few questions directly connected to students' perceptions of their digital skills, including:

- *I know how to search for digital content and information and assess their quality [DQ1]*
- *I use digital technologies to communicate and collaborate in an online environment [DQ2]*
- *I am able to develop content of various formats using digital technologies [DQ3]*
- *I solve problems I encounter when using digital media and devices [DQ4].*

In this way, we analyse and relate students' perceptions regarding their digital skills with their migration preferences. The narrowed sample analyses the answers to these four questions according to three groups: (a) the whole sample (714 respondents); (b) highly motivated to migrate (95 respondents); (c) not motivated to migrate (238 respondents). These groups were determined according to the response to the question: *I have a strong desire to go abroad* [MQ] (in the context of future work and/or life). Figure 2 shows the percentage distribution of answers among surveyed students: The answer 1 being *strongly disagree*; while the answer 5 being *strongly agree*. It is obvious that most of the students don't want to leave Croatia, while a strong desire to do so can be associated with only 13.38% of them.

7 A more detailed explanation of the statistical indicator related to digital skills, and its calculation is explained by Eurostat (2022b).

Figure 2: Migration preferences among surveyed students from Rijeka* in 2022 [MI project at EFRI] in % of answers



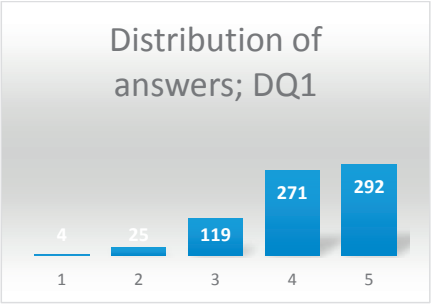
Notes (*): EFRI/Rijeka - Faculty of Economics and Business of the University of Rijeka; Croatia; the questionnaire was prepared and done within the ESF project "*MI – jučer, danas, sutra*" (UP.04.2.1.06.0018).

Source: Survey MI project at EFRI* (2022)

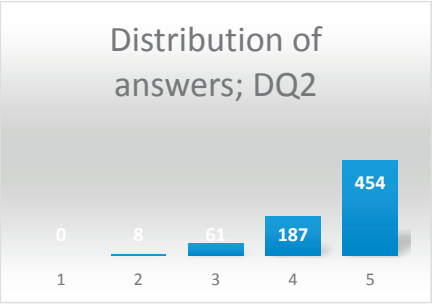
Figure 3 presents the distribution of answers regarding digital skills perceptions among the whole sample of surveyed students. Regarding their perception about being able to search for digital content and information and assess their quality (A), or the use of digital technologies to communicate and collaborate in an online environment (B), most answers fall in the range of *strongly agree* answers. The latter being much more dominant (63.9%), while for the first question the median falls in the interval closer to 4, so the distribution is less convincing regarding the complete sample about their confidence in their skills.

Figure 3: Digital skills perceptions among surveyed students from Rijeka* in 2022 [MI project at EFRI]

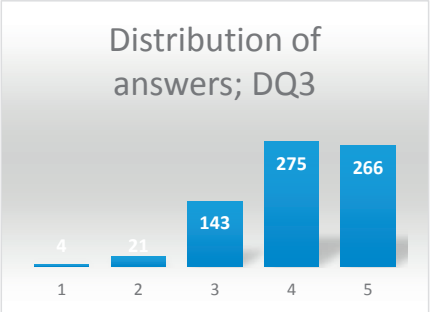
A: searching for digital content and information; assess their quality



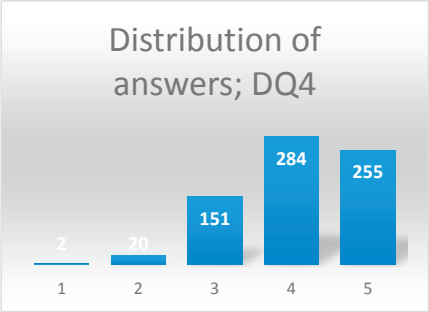
B: using digital technologies to communicate and collaborate in an online environment



C: ability to develop content of various formats using digital technologies



D: solving problems encountered when using digital media and devices



Notes (*): EFRI/Rijeka - Faculty of Economics and Business of the University of Rijeka; Croatia; the questionnaire was prepared and done within the ESF project "*MI – jučer, danas, sutra*" (UP.04.2.1.06.0018).

Source: Survey MI project at EFRI* (2022)

In the context of the third and fourth question regarding digital skills, most of the answers fall in the category leaning toward *I agree* (but perhaps not strongly). This regards the perception about the ability to develop content of various formats using digital technologies (C) and the ability to solve problems he/she encounters when using digital media and devices (D).

5. Results and discussion

As the main analysis of this research concerns the migration preferences of young Croatian students and their perceived levels of digital skills, we argue firstly that, comparing to other EU nations, Croatia actually ranks surely among the top ten Member States, and shows similar levels of basic digital skills to Spain, Sweden, Austria, Malta and Czechia. The 6th place among Member States regarding the student population confirms an advanced average level of digitalization among younger Croatian citizens and their digital skills, which is confirmed by the 3rd place in the EU when we take into account all individuals aged 16-29. Croatians regard themselves as digitally literate.

Now, these facts can refer to further elaboration of potential decisions whether to migrate, or not, while seeking jobs, especially if the local labour market shows signs of a mismatch. Nevertheless, Croatian students, are aware of the importance of digital skills for the labour market, as the survey resulted in an average score of 4.525 for the following question: *To what extent do you consider the following competencies important to employers: Digital competences?* According to the surveyed students, slightly more important (but very similar levels) are communication skills [average = 4.628], the ability to perform work independently [aver. = 4.597] and the willingness to take responsibility for their work performance [aver. = 4.568]. English language competences [4.4], Croatian language literacy [4.227], mathematical, logical and financial skills [4.03], as well as STEM-related skills [3.85] were less relevant, according to the students of economy and business studies.

We present in Table 2 descriptive statistics for the relevant questions used in the following empirical analysis. Additionally, a basic analysis showed that the four selected questions related to digital skills are not correlated with the migration preference question [MQ]. The correlation interval of values is between 0.064 to -0.053.

Table 2: Descriptive statistics

	N	Min.	Max.	Mean	St.Dev.
I know how to search for digital content and information and assess their quality [DQ1]	714	1	5	4.15	0.871
I use digital technologies to communicate and collaborate in an online environment [DQ2]	710	1	5	4.53	0.699
I am able to develop content of various formats using digital technologies [DQ3]	709	1	5	4.10	0.858
I solve problems I encounter when using digital media and devices [DQ4]	712	1	5	4.08	0.837
I have a strong desire to go abroad [MQ]	710	1	5	2.53	1.396

Source: authors' calculations.

In Table 3 we present a comparison of average scores for questionnaire answers for the four questions related to levels of digital skills, among three distinct groups of students according to their migration preference.

Table 3: Average scores for questionnaire answers regarding levels of digital skills of EFRI* students, according to their migration preference [Scores being from: 1 – *strongly disagree* to 5 – *strongly agree*]

	Whole sample (714)	**Highly motivated to migrate (95)**	**Not motivated to migrate (238)**
I know how to search for digital content and information and assess their quality [DQ1]	4.15	4.04	4.22
I use digital technologies to communicate and collaborate in an online environment [DQ2]	4.53	4.63	4.62
I am able to develop content of various formats using digital technologies [DQ3]	4.097	4.13	4.04
I solve problems I encounter when using digital media and devices [DQ4]	4.08	4.08	4.05
Average score for all 4 answers	4.21	4.22	4.23

Notes (*): EFRI/Rijeka - Faculty of Economics and Business of the University of Rijeka; Croatia; the questionnaire was prepared and done within the ESF project "*MI – jučer, danas, sutra*" (UP.04.2.1.06.0018).

Source: Survey MI project at EFRI* (2022)

It appears that surveyed students distributed to three migration preference groups have all similar perceptions regarding their digital skills (on average). This is especially true for DQ4. This brings to question our initial motivation for the research, as a limited group of highly educated Croatians show similar levels of digital skills. We assumed that those more motivated to migrate might show higher levels of basic digital skills. This, however, has to be taken into account with a dose of caution, because it is a self-assessed level of skills (and, the questionnaire had 130 questions, with no precise explanations).

Perhaps significantly, a small (but notable) discrepancy is present in the question DQ1 (*I know how to search for digital content and information and assess their quality*). Apparently, those who have higher levels of motivation to migrate have estimated their skill in a more moderate way compared to those who are sure they want to stay in Croatia (4.04 vs. 4.22).

Our assumption is more clearly confirmed in DQ3, which regards the perception of the ability to develop content of various formats using digital technologies, and only partially in DQ2, which regards the use of digital technologies for communication and collaboration in an online environment. Although the motivated for migrations have an average score above the

whole sample group (4.63 vs. 4.53), the average score of the third group – those which are not motivated to migrate – is also above the average (4.62).

Before the Conclusion, we shortly mention some other relevant questions included in the questionnaire, connected with migration aspects. Firstly, on a scale from 1 to 5 (5 being the highest level of concordance), students have a relatively good perception of their ability to live abroad – Q: *I could easily live abroad* [3.45]. A relatively high average score of 3.15 suggests that many students have a strong desire to go abroad (to work and/or study), although most of them do not plan to migrate in the next five years (13% strongly agree; 7.8% agrees to some extent) and only 6.86% are considering to interrupt studies in order to migrate. Furthermore, a significant share of students would be highly motivated to migrate if there were no available jobs in Croatia (32% strongly agree; 25% agree to some extent; 11% strongly disagree; 10% disagree to some extent). However, regarding the question whether to migrate while seeking a job within their profession or to rather find a job outside their profession, 15.3% strongly agree to find another job and stay in Croatia, while 17.4% agree to some extent.

These results should serve as a *beacon* for the discussion how Croatia, and perhaps other countries in Europe, should respond better to the challenges of the digitally skilled youth and their decisions whether to migrate (or not) while seeking for a better job, or better life. This is especially true, after the unprecedented COVID-19 pandemic and other recent challenges, such as the conflict in Eastern Europe and the significant trade and financial disturbances on the global scale.

Investment in digital technologies magnify productivity and promote efficiency, including for capital and labour resources associated with particular industries. Digital infrastructure and associated legislation has to encourage digitalisation and higher levels of digital skills (EBRD, 2021). Therefore, the European Union has initiated several strategies and activities related to the digital society, and the digital transition of Europe. For instance, in March 2021, the Digital Compass was presented for the period until 2030, with four cardinal points (European Commission; 2022a):

- Skills (20 million ICT specialists and at least 80% of Europeans with basic digital skills);
- Secure and sustainable digital infrastructures (better connectivity, European production of semiconductors, etc.);
- Digital transformation of businesses (including Cloud computing, Big data and Artificial Intelligence – AI, used by at least 75% of EU enterprises)
- Digitalisation of public services (which should be completely online).

Regarding skills, the European Skills Agenda for the 2021-2025 period prioritizes Sustainable Competitiveness, Social Fairness and Building Resilience, in order to help individuals and enterprises to develop more and better skills (European Commission; 2022b). This Agenda relates directly to the European Digital Strategy, and perceives investments from several financial instruments – mostly ESF+ and Erasmus, but also the Digital Europe

programme. The Digital Europe Programme should support projects in key capacity areas (supercomputing, AI, cybersecurity, advanced digital skills, wide use of digital technologies across the economy and society) with the overall budget of 7.5 billion euros (current prices) (European Commission; 2022c).

Perhaps the crucial EU initiative for digital skills is the Digital Education Action Plan 2021-2027, which aims to support the adaptation of the education and training systems in Europe to the requirements and needs of the digital age (EUR-lex, 2020). Its two priorities are: (a) Fostering the development of a high-performing digital education ecosystem; and (b) Enhancing digital skills and competences for the digital transformation. Both priorities should be supported by the European Digital Education Hub – with advisory services, exchange of practices and experiences, research and projects, policy development and cross-sectoral collaboration.8

6. Conclusion

This research was primarily motivated by the idea of explaining the importance of digital skills for today's European youth, as they became necessary and crucial for a competitive and modernized labour market. This is especially true when we take into consideration the dynamics and integrative processes on the European market, where millions of potential workers interact with leading companies, which invest huge efforts into productivity, innovation and quality – not only for profits, but also to remain active and relevant. At the same time, European companies rely ever more on the educated and mobile workforce because of new technologies and ever faster changes in the economy and the workplace. Europeans, especially younger generations are increasingly able to combine their knowledge, skills and enthusiasm in order to achieve personal development and create new opportunities; home and abroad. As the current scientific literature increasingly acknowledges the importance of digitalisation and digital skills, and at the same time recognizes the challenges of demographic changes and migrations, this research started with the *hypothesis* that a certain level of digital skills could encourage young migrants to make easier decisions regarding finding jobs abroad. Although the reviewed literature suggested that more educated and skilled (even richer) individuals could be more motivated to decide to migrate to other countries in order to find more and better jobs, our research did not produce concrete evidence of higher motivations to migrate among surveyed students of economy and business studies with higher levels of basic digital skills. However, it has to be emphasized that, although dealing with a relatively decent sample of 714 surveyed students, it is likely that it is not representative enough, as it includes a relatively homogeneous group of mostly young Croatians. This makes the most important limitation of the research. Nevertheless, further research could include students from other

8 Several other initiatives have been initiated both on the European and national level of the EU Member States, and most of them can be found on the Digital Skills and Jobs Platform [https://digital-skills-jobs.europa.eu/en/opportunities].

study areas (humanities, law, technical sciences and engineering, biomedical sciences, ICT, etc.), as well as other universities in Croatia, but also more students already studying abroad. Additionally, a comparative analysis could be done with students from other European countries. Another limitation of the sample could be explained by the character of basic digital skills assessed within the questionnaire – students were approximating their skills and ranking them on a scale from 1 - 5, primarily according to their own perceptions and self-evaluation. Furthermore, in order to test the hypothesis, we compared three selected groups of students according to their migration preferences, where we determined as a criteria one question which actually, again, assumes that students can objectively estimate their personal desire to go abroad while seeking jobs and a better life. Finally, this papers' scope and contributions transcend the empirical analysis explained here. The paper presents a relevant literature review, both of the digital skills and migration issues, and it compares Croatia with other similar European economies, giving also a clear view of the digital gaps in Europe, as well as the necessary strategies and other activities which EU Member States and the Union have to undertake in order to boost the digitalisation of the labour market.

It is not our intention to encourage migrations, as they might intensify the *brain drain* effect in Central and Eastern Europe (including Croatia). In combination with unfavourable demographic trends, and the delayed convergence process, this could impoverish even more the human capital in the *New Europe*. Merely, we want to point out how migrations could be affected by the differences in the digitalisation processes of particular countries, and that the EU and its Member States should do more to encourage adoption of digital skills in order to help the domestic labour market and the local economy. Most Europeans, including Croatians, assess themselves as having a high level of basic digital skills (some exceptions could be found in countries such as Romania, Bulgaria, Poland, Italy…). Likewise, surveyed students from Rijeka estimate their level of basic digital skills as very good, and a similar distribution can be found between students who plan and do not plan to migrate abroad. Off course, migrations are much more of a complex issue, and numerous research have not yet determined clearly all the motives and consequences of migrations, especially because the world is constantly changing, including the labour market and the individuals' perceptions and goals. We focused just on a small number of questions from one survey, carried out with a specific group of young people, but the problematic requires much broader insights.

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References

1. Aguilar, O., Girzadas, J. (2019) “Save-to-transform as a catalyst for embracing digital disruption”, USA: Deloitte Development LLC.
2. Aksakal, M., Schmidt, K. (2021) “The Role of Cultural Capital in Life Transitions among Young Intra-EU Movers in Germany”, Journal of Ethnic and Migration Studies, No 47 (8), pp. 1848–1865.
3. American Library Association Institutional Repository – ALAIR (2011) “What is Digital Literacy?” [Internet]. Available at: <https://alair.ala.org/handle/11213/16260> [Accessed: May 3, 2022].
4. Aslany, M., Carling, J., Mjelva, M.B., Sommerfelt, T. (2021) “Systematic review of determinants of migration aspirations”, QuantMig Project Deliverable D2.2., Southampton: University of Southampton
5. Calvino, F., Criscuolo, C., Marcolin, L., Squicciarini, M. (2018) “A taxonomy of digital intensive sectors”, OECD Science, Technology and Industry Working Paper, No. 2018/14.
6. Caravella, S., Cirillo, V., Crespi, F., Guarascio, D., Menghini, M. (2022) “The diffusion of digital skills across EU regions: Structural drivers and polarization dynamics”, GLO Discussion Paper, No. 1188, Essen (Germany): Global Labor Organization (GLO).
7. Cedefop (2018) “Insights into skill shortages and skill mismatch: Learning from CEDEFOP’s European skills and jobs survey”, Luxembourg: Publications Office, Cedefop reference series; No 106.
8. Data-Pop Alliance and Internews (2015) “Beyond Data Literacy: Reinventing Community Engagement and Empowerment in the Age of Data”, Data-Pop Alliance White Paper Series.
9. European Commission: The Digital Economy and Society Index (DESI) (2022) “Digital Economy and Society Index 2022 Thematic Chapters” [Internet]. Available at: <https://ec.europa.eu/newsroom/dae/redirection/document/88764> [Accessed: September 16, 2022].
10. Donoso, V., Pyżalski, J., Walter, N., Retzmann, N., Iwanicka, A., d’Haenens, L., Bartkowiak, K. (2020) “Report on Interviews with Experts on Digital Skills in Schools and on the Labour Market”, Leuven: KU Leuven, ySKILLS (“Youth Skills”; Horizon 2020 project).
11. EBRD (2021) “Transition Report 2021-22: System Upgrade: Delivering the Digital Dividend”, London: European Bank for Reconstruction and Development [Internet]. Available at: <https://www.ebrd.com/news/publications/transition-report/transition-report-202122.html> [Accessed: May, 2022].
12. Eshet-Alkalai, Y. (2004) “Digital Literacy: A Conceptual Framework for Survival Skills in the Digital Era”, Journal of Educational Multimedia and Hypermedia, No. 13(1), pp. 93-106.

13. EUR-Lex (2020) Communication from the Commission to the European Parliament, the Council, the EESC and the COR “Digital Education Action Plan 2021-2027: Resetting education and training for the digital age”; COM/2020/624 final [Internet]. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0624> [Accessed: May 15, 2022].

14. European Commission (2022a) “Europe’s Digital Decade: digital targets for 2030” [Internet]. Available at: <https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en> [Accessed: May 15, 2022].

15. European Commission (2022b) “European Skills Agenda” [Internet]. Available at: <https://ec.europa.eu/social/main.jsp?catId=1223&langId=en> [Accessed: May 15, 2022].

16. European Commission (2022c) “The Digital Europe Programme” [Internet]. Available at: <https://digital-strategy.ec.europa.eu/en/activities/digital-programme> [Accessed: May 15, 2022].

17. Eurostat (2022a) “Individuals’ level of digital skills (from 2021 onwards)” [Internet]. Available at: <https://ec.europa.eu/eurostat/databrowser/view/ISOC_SK_DSKL_I21__custom_3864627/default/table?lang=en> [Accessed: June, 2022].

18. Eurostat (2022b) “Individuals’ level of digital skills (from 2021 onwards) (isoc_sk_dskl_i21)” [Internet]. Available at: <https://ec.europa.eu/eurostat/cache/metadata/en/isoc_sk_dskl_i21_esmsip2.htm> [Accessed: June, 2022].

19. Eurostat (2020) “People on the move — statistics on mobility in Europe”, [Internet]. Available at: <https://ec.europa.eu/eurostat/cache/digpub/eumove/index.html?lang=en> [Accessed: September, 2022].

20. Eurostat (2022c) “Persons with ICT education by labour status” [Internet]. Available at: <https://ec.europa.eu/eurostat/databrowser/view/isoc_ski_itemp/default/bar?lang=en> [Accessed: May, 2022].

21. Helsper, E.J., Schneider, L.S., van Deursen, A.J.A.M., van Laar, E. (2020) “The youth Digital Skills Indicator: Report on the conceptualisation and development of the ySKILLS digital skills measure”, Leuven: KU Leuven, ySKILLS (“Youth Skills”; Horizon 2020 project).

22. Lankshear, C., Knobel, M. (2008) “Digital Literacies – Concepts, Policies and Practices”, New York (USA): Peter Lang Inc., International Academic Publishers.

23. Law, N., Woo, D., de la Torre, J., Wong, G. (2018) “A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2”, Information Paper No. 51 (June 2018), UIS/2018/ICT/IP/51, Montreal (Canada): UNESCO Institute for Statistics [Internet]. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000265403/PDF/265403eng.pdf.multi [Accessed: January, 2022].

24. Lulle, A., Janta, H., Emilsson, H. (2021) “Introduction to the Special Issue: European youth migration: human capital outcomes, skills and competences”, Journal of Ethnic and Migration Studies, 47:8, pp. 1725-1739.

25. Milasi, S. (2020) “What Drives Youth’s Intention to Migrate Abroad? Evidence from International Survey Data”, IZA Journal of Development and Migration, No 11:12.

26. Seňová, A., Šebeščáková, L. (2020) “Euro-Integration Tendencies in Implementation of ‘Industry 4.0’ in European Companies”, Split: Management – Journal of Contemporary Management Issues, Vol. 25, No. 2, pp. 251-261, doi: https://doi.org/10.30924/mjcmi.25.2.14.

27. Sokolic, D. (2022) “Implications of Technology Development on the Labour Market”, in LIMEN 2021 Conference Proceedings - Leadership, Innovation, Management and Economics: Integrated Politics of Research, Graz, Austria – December 16, 2021 (ed. Bevanda, V.), Belgrade (Serbia): Association of Economists and Managers of the Balkans, doi: https://doi.org/10.31410/LIMEN.2021.61.

28. Spires, H.A., Bartlett, M.E. (2012) “Digital Literacies and Learning: Designing a Path Forward”, Friday Institute White Paper Series, No 5 (June 2012), Raleigh (NC; USA): North Carolina State University College of Education.

29. Švedkauskas, Ž., Sirikupt, Ch. (2022) “Elevating Digital Talent Partnerships between the Southern Neighbourhood and EU13 Countries”, Euromesco Policy Brief, No 188, European Institute of the Mediterranean (IEMed) [Internet]. Available at: <https://www.euromesco.net/wp-content/uploads/2022/02/Policy-Brief-N%C2%BA118.pdf> [Accessed: June, 2022].

30. van Dijk, J.A.G.M., van Deursen, A.J.A.M. (2014) “Digital Skills: Unlocking the Information Society”, New York (USA): Palgrave Macmillan.

31. Van Hear, N., Bakewell, O., Long, K (2017) „Push-pull plus: Reconsidering the drivers of migration“, Journal of Ethnic and Migration Studies, No 44, pp. 1-18, doi: 10.1080/1369183X.2017.1384135.

32. Van Mol, C. (2016) „Migration aspirations of European youth in times of crisis“, Journal of Youth Studies 19(10), pp. 1303–1320.

33. Zdrilic, I., Sokolic, D. (2022) „Migration Intentions of Croatian Students“, 11th International Scientific Symposium Region, Entrepreneurship, Development (RED) (ed. Leko Šimić, M.), Osijek: Josip Faculty of Economics Juraj Strossmayer University of Osijek, pp. 885-899.

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