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CONTENTS

LATEST TRENDS IN ESP TEACHING

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Abstract: ESP has been around for plenty of time now to allow us to observe the evolution in both its scope and the teaching methodology employed, depending on the context where it is taught. The variety of purposes, learners and formats has certainly contributed to a diversification in approaches that teachers and trainers employ in order to achieve their most significant goal: fulfilling the learners' language needs, as they lie at the basis of teaching ESP. This paper will provide an overview of relevant literature in the field, in order to identify the latest trends and discuss how they apply to teaching ESP (specifically BE) at university level. Hopefully, it will paint a clear picture of what lies ahead for teaching professionals and how they can better adapt to the requirements of today's fast-paced, technologized world.
Keywords: latest trends; ESP; teaching methodology; BE; university students.
JEL Classification: F23, I21, I23.

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Introduction

English for Specific Purposes (ESP) took shape in the late 1960s, as a response to various factors, mostly connected with the unprecedented economic and technical expansion following the Second World War. This was coupled with a revolution in linguistics which, for the first time, had shifted its focus from describing the rules of grammar to discovering the ways in which it was "used in actual communication" (Widdowson, 1978 quoted in Hutchinson and Waters, 1987, p. 7). Historically, ESP has been seen as part of the larger categories of ELT and LSP, with which, of course, it shares a multitude of characteristics. Nevertheless, the literature in the field provides several definitions, in various attempts to emphasize its specificities. While most theorists agree that needs analysis sits at the basis of ESP (Hutchinson and Waters, 1987; Robinson, 1991), Dudley-Evans and St. John (1998) emphasise the fact that a big part of ESP teaching, especially that linked to a particular profession or discipline, uses a methodology that differs from the one used in General English teaching. Moreover, the authors stress two aspects of ESP methodology: "all ESP teaching should reflect the methodology of the disciplines and professions it

serves; and in more specific ESP teaching the nature of the interaction between the teacher and the learner may be very different from that in a general English class" (Dudley-Evans and St. John, 1998, p. 4). Twenty-five years later, this is still true, as teachers acknowledge more and more the importance of learner-led education, especially if they are job-experienced professionals (with equivalent qualifications in their field as the teacher/trainer) who have a very clear knowledge of the kind of language competence they need to perform their jobs.

In writing this paper, the aim is to go through the current trends in ESP teaching according to some of the latest literature in the field, while also making a few considerations on what that means for university students in the post-pandemic context.

Literature review

Back in 1994, Ellis and Johnson were listing the following five trends in teaching Business English as current at the time: language training v. skills training, the influence of management training, adapting teaching methodologies to the learners' specific needs, cross-cultural awareness and growing professionalism (Ellis and Johnson, 1994, pp. 215-220). The first point emphasizes the fact that ESP teachers are faced with the challenge of teaching both language and skills. This is a reality that they must incorporate into their lesson planning, with the main focus being, of course, on language training. In terms of the second trend, the influence of management training, the two authors noticed an increased awareness in teacher development, which they predicted would continue in the future. In the case of cross-cultural awareness, they do note its potential to enrich Business English classes, but they "remain sceptical about the value of these activities in the language classroom unless they relate directly to the objectives agreed in advance by the sponsoring organisation and unless the trainers have a lot of knowledge and experience in this field" (Ellis and Johnson, 1994, pp. 219-220). The final trend that they identify essentially refers to the concept of lifelong learning, since teaching ESP requires the teacher to find a particular niche to specialise in, while also staying up to date with the needs and requirements of their learners.

A decade ago, Elżbieta Jendrych (2013, p. 43) identified the following seven new developments in teaching English for professional communication at tertiary level: (1) content-and-language integrated learning, (2) use of didactic case studies, (3) corpus studies conducted for teaching purposes, (4) more effective coursebooks, (5) extensive use of online materials and e-courses, (6) teaching writing for specialized purposes and (7) teaching cross-cultural and social skills, as a reflexion of the increasing demand from both learners and employers, who feel that a high level of proficiency and accuracy in the English language is essential and a prerequisite of success in the world of business nowadays. We notice that the last trend, teaching cross-cultural and social skills, echoes the cross-cultural awareness the previous authors mentioned almost 20 years before, which is a testament to its importance.

Five years later, Dana Poklepovic (2018) discussed the impact of current trends on Business English and, alongside the evolution of technology (and its integration in education) and the globalisation of business, she talked about the new management and leadership model affecting millennials who, although well-educated and holding academic degrees, need to develop skills necessary for managing effectively in an increasingly challenging and (culturally) diverse workplace. Moreover, she stressed the fact that

Generation Z (people born between the mid 1990s and 2010) was also entering the workforce, setting the bar even higher for the ESP teacher as these learners are significantly more digitally and language competent than previous generations. However, as companies were reducing their training and development budgets in the name of cost maximisation, Poklepovic predicted an increase in the number of distance-teaching courses. As it happens, with the subsequent health crisis starting in early 2020, everyone's predictions regarding the integration of technology into both teaching and learning have been confirmed and even exceeded. In the words of Chia Suan Chong (2021), "we realise that the events of 2020/21 might have fast-forwarded some of the trends that were already developing in our industry, but none of them come as a surprise. If anything, this serves as confirmation as to where English language teaching and learning is going and will be going in the years to come."

Yang, Xu and Swales (2023) have recently conducted a bibliometric analysis of 705 articles published in the English for Specific Purposes Journal (ESPJ) across the forty years it has been in existence, in an attempt to illustrate the development of the journal (and of ESP, implicitly) in terms of the most frequently explored topics, the most highly cited articles and the references of ESPJ articles. Their research resulted in the identification of two major trends: "a significantly increased focus on the analyses of target language varieties" and "a shift from the coverage of a wide range of teaching issues in the 1980s to the primacy of writing and literacy since the 2000s" (Yang, Xu and Swales, 2023, p. 149). Even more interesting for us is the fact that, among the top ten significantly increased topics over four decades, business is the only discipline (Yang, Xu and Swales, 2023). Perhaps unsurprisingly, this can be linked to globalisation and the boom in international trade in the 1990s. Thus, English for Business Purposes (EBP) has gained popularity, both in the academia (where we can talk about English for Academic Business Purposes – EABP, for students majoring in business) and in the professional environment (for those who needed to use English at work, hence the branch named English for Occupational Purposes – EOP). Nevertheless, as Diane Belcher (2009) rightfully points out, what ultimately unites all the various branches of ESP is the commitment to help learners achieve their purpose and fulfil their language needs.

Dou, Chan and Win (2023) have similarly conducted a semi-systematic review of the relevant ESP literature from three major databases (Web of Science, Google Scholar and the Chinese National Knowledge Infrastructure), covering the key words "ESP development," "needs analysis," "future of ESP," "technology of ESP" and "interculture and ESP." Their aim was to follow the changes in ESP research historically, from 1962 to present day, and also identify the implications for the future based on the developments throughout the years. They conclude that needs analysis is still very much researched today, since learners' priorities have very much shifted through the years, mirroring the changes in society, and so is the use of information technology, which has been making a great impact on ESP. The growing access the technology stresses, in turn, the importance of teaching a foreign language in context, which highlights the need for intercultural competence. Thus, the authors emphasize the need for a revisit of needs analysis in the future while also recognising the importance of technological advances and intercultural communication.

In more practical terms, according to an ELT marketing and language-schools consultant, there are several digital and education trends that will impact ELT in 2023. The three main

digital trends are Virtual Reality (VR), Artificial Intelligence (AI), specifically ChatGPT, and the Metaverse (Rodriguez, 2023). The launch of ChatGPT has taken the education field by storm, prompting heated debates and calls for action from worried teachers across all education levels who fear that it will replace students' work entirely and lead to generalised plagiarism. The abrupt switch to online education during the COVID-19 pandemic has certainly opened the door for the extensive introduction of technology in the classroom, and returning to on-site activities has not automatically led to its elimination. As expected, we are now witnessing a process of hybridization in education, where the lessons from the pandemic have impacted, at least in part, both the teaching and learning processes. In terms of the education trends that will impact ELT in 2023, Rodriguez lists the following four: soft skills for employability, social emotional learning, inclusion and diversity and financial literacy (Rodriguez, 2023). Perhaps the most important one from the viewpoint of teaching ELT (and ESP specifically) is the first one, which essentially shows that there has been a shift from teaching English as a subject to viewing it as an essential tool that helps students communicate and work globally (Rodriguez, 2023). Thus, ESP becomes particularly relevant, especially at university level, as students specialise in their desired field of work.

Similarly, a leading ELT professional specialising in Business English points out that, in opposition to traditional language learning, teachers nowadays must acknowledge trends such as learning on-demand, personalised learning, microlearning, technology being mainstream rather than an add-on and there should also be an overall switch from assessing language learning proficiency to the effectiveness of communication that is actually achieved in the workplace through the use of English as a lingua franca (Frendo, 2023).

If we were to summarise the latest trends in ESP teaching according to the sources presented above, we would be able to identify two major directions. The first one is undoubtedly the integration of technology into the processes of teaching, learning, assessing and communicating, whether they occur exclusively or partially (to various degrees) through the virtual medium. At this point in time, we can neither ignore nor minimise the impact technology has had over our lives and the education process in the last two to three years. The second direction involves the further specialisation of the ESP teacher, to better suit the specific needs of the learner while, at the same time, focussing on the effectiveness of (intercultural) communication, rather than traditional language proficiency.

Considering these two main directions, the ESP teacher needs to find ways to implement any necessary changes to the curriculum and teaching methodology based on the assessment of the particular learning context. Below are some considerations regarding the implications of these trends on the teaching of ESP, specifically English for business, at university level, as we readjust following the challenges brought about by the recent global health crisis.

Practical considerations on the current trends in esp teaching at university level

The pandemic has certainly left an imprint on the recent approaches to ESP teaching. Three years after its debut, with the world having gone back to on-site activities, the integration of technology in learning and teaching on a large scale has not quite been implemented at our university, although the national legislation has been modified to allow for a higher percentage of online activities in the case of distance learning programmes (the initial

meeting and the final evaluation must take place on-site). Perhaps unsurprisingly given the pandemic context, after the forced transition to online activities, both students and teachers seem to have developed a distaste for technology-mediated interaction, but there is no denying that its role in education has certainly been strengthened. There are now more employees working remotely on a permanent basis and conferences being held exclusively online or organised as hybrid events, because the flexibility provided by the use of technology in such situations has been proven to work well for everyone involved.

In the Business English classroom, the return to on-site activities brought an improvement in communication (the new channels used during the pandemic have remained open) and the opportunity to learn from the experience of the past couple of years, while looking ahead at what comes next in the field of ESP teaching.

Implementing the process of needs analysis in relation with the specificity of English as a lingua franca in the post-pandemic world may lead to some interesting conclusions. The 2023-2024 academic year has marked a premiere in my academic career as lecturer at the Faculty of Economics and Business Administration in Iași. There are two international students (from outside of Europe) enrolled in the programmes that I teach English to: one is specialising in Management at undergraduate level and the other is studying Economics and international business at master's level. The Erasmus exchange programme at our university has, of course, been implemented for many years, with no shortage of international students spending a semester or two here, while attending regular or tutorial type courses. However, this is the first time I have had the pleasure of working with international students as part of regular full-time courses, and although the limited number does not justify any generalisations, it has allowed me to form an opinion on the current direction of ESP teaching at university level. If nothing else, the pandemic seems to have opened more channels for communication and encouraged movement towards obtaining an international education, while potentially working remotely at the same time (my master's student is currently working remotely for an American company outsourcing its operations to her native Central-American country). As previously shown, a lot of specialists in the field of ESP were predicting that the extensive use technology will take over as the leading trend (either for teaching, learning or overall providing easier access to education or even revolutionising the classroom as we know it through the use of AI and virtual reality). However, what has not been stated as clearly is what seems to be an increased interest in studying internationally (on-site, not remotely!), which may be the result of increased visibility of education institutions, together with a stronger desire to travel after a period of severe restrictions and the appeal of newly-available possibilities of combining remote activities (such as work) with studying abroad full-time.

In terms of analysing the students' needs with regard to preparing for or using English at work, the recent years have brought changes here as well. According to my students who are currently employed, the pandemic has increased usage of English as part of their daily activities as there was more interaction with other nationalities while also providing opportunities for finding work internationally (due to the prevalence of online activities). This has led, in turn, to the necessity of acquiring new skills, such as creating a video CV, managing videoconferences or negotiating with foreign partners, all in a foreign language and mediated by technology. Thus, the Business English teacher is now faced with preparing students for a world of business that is conducted both online and offline, with skills overlapping but also with new challenges arising every day. Using English as a lingua

franca guarantees its dynamism, but this puts a lot of pressure on the ESP trainer, who needs to be constantly up to date with the requirements of the business world (or any other field they specialise in), if they want to best prepare learners for the work they have to perform. Consequently, we might witness teachers further specialising in an area of ESP, as they try to balance language teaching with learning the specific skills required in that field, so that the content is relevant to the learner. Ellis and Johnson (1994) pointed out that language training should remain the main focus, but even the language content (mostly vocabulary, but not limited to it) used in a particular field may not have been covered during the teacher's initial training, which highlights the need to permanently be up to date with the developments in their area of ESP.

Conclusions

This overview of some of the current trends in ESP is certainly not exhaustive and it goes without saying that some trends have more staying power than others. Predictions can also be confirmed or disproved, but it is generally beneficial to be aware of trends so that one can learn from them and adapt to the current realities. English for Specific Purposes encompasses a variety of fields, so it is particularly important in this case to be aware of what is new both in the general sphere of language teaching and in the specific domain one is focussing on (i.e., business, finance, marketing, law, medicine etc.).

As we have seen, the two main directions ESP teaching is moving towards involve the use of technology and further specialisation, while keeping the learners' needs in mind and constantly adapting to the requirements of the job market. Conversely, one must not forget the fact that education and teaching must still rely on planning and predictability and, in this particular case, the focus should remain on language competence, so changes on a large scale do take time and effort. But, as is the case with teaching intercultural competence for instance, the first step is awareness, and knowledge of the current trends can only be beneficial to one's professional development.

Teaching ESP to university students can be seen as both a challenge and an opportunity in terms of implementing the new trends. The number of learners is usually very large, their language level is not uniform and most of them are pre-experienced. Technology can certainly help with communication, assessment and access to resources, but it can also act as a barrier to direct interaction and personalised learning. In terms of the second future direction identified above, further specialisation cannot occur until students themselves choose a career path that enables them to better define their learning needs. Thus, the teacher must be prepared to provide a general overview of the topics and areas ESP covers, so as to point out its specificity and then assist learners with their individual language competence requirements when the need arises. Moreover, as the number of international students continues to increase at our institution and elsewhere, the importance of intercultural competence as part of the ESP courses cannot be overlooked.

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FURTHER STUDIES ON THE PHENOMENON OF TAX OPTIMISATION VERSUS TAX EVASION - THE SCOURGE OF CONTEMPORARY SOCIETY

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Abstract: In this paper we aim to study the phenomen of tax evasion and tax optimization at the European Union level, in particular on value added tax, in order to outline the concept of the VAT revenue shortfall and to identify its determinants. Tax evasion is a complex and persistent problem faced by most countries around the world. This harmful practice affects the budgets of countries, reducing their revenues and jeopardising the sustainability of tax systems. Either tax evasion or tax optimisation both have the same strategic objective, namely to reduce through legal or illegal means the financial resources allocated to the state budget as taxes or duties. In order to ensure that we achieve the above-mentioned goal, we have set ourselves the objective of carrying out a study in EU member countries on the determinants of the VAT gap.
Keywords: accounting financial information, users of financial accounting information
JEL Codes: M41

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Theoretical background on research

A fundamental quality of a healthy organisation is good corporate governance. This is a set of principles, rules and practices that establish the direction and control of the organisation and the relationships between its various stakeholders (Tsakumis G.,2010). It plays a crucial role in defining how the organisation behaves both internally within itself and in relation to the market. In the modern era, researchers are increasingly focusing on understanding the roots of economic crises and developing proposals for recovery (Kiri

N.,2016). Policy makers seek a balance between the competitive strength of the national economy and the need to comply with international agreements and regulations, given the importance of economic growth (Bruno C., Marazano E.,2008).

Either tax evasion or tax optimization both have the same strategic objective, namely to reduce through legal or illegal means the financial resources destined to the state budget as taxes or duties (Kounadeas T.&al., 2022). Their effect is simple, i.e. it allows companies to save and reinvest those money, strengthening their market position and becoming much more competitive with their competitors (Annette A.,Johannesen.,Zucman G.,2019). One of the taxes that often falls under tax avoidance or tax optimization is the value added tax. One of the direct consequences of tax evasion and optimization carried out on value added tax is the formation of VAT gaps, which is a major concern for tax authorities and economists alike referring to the difference between the amount of VAT estimated to be collected by the tax authorities and that actually collected. Referring to the above, we can say that the motivation for this scientific approach was the amount of money lost by the European countries from the VAT gaps, i.e. from the deficit due to the non-collection of this tax. According to one of the most recent reports at EU level, in 2020 the VAT gap amounted to 93 billion euros, a rather large amount with which a series of social and economic projects could have been carried out, thus contributing to improving the quality of life, especially in countries with a much lower economic level compared to developed countries such as Luxembourg, Germany, France, the Netherlands, Belgium, etc. (European Commission Report, 2022).

In recent times both tax evasion and the VAT gap have become major issues of interest both in Romania and in the European Union as a whole. In the current economic context, the phenomenon of the widening of the VAT gap is a major problem for a fruitful economic and social development in a country. This as a first effect of tax evasion can manifest itself through inflation, unemployment and crisis, which can lead again to the realization of acts of evasion thus creating a vicious circle that can be stopped only by formulating clear, stable and advantageous policies for various categories of taxpayers (Aniței N.C., Lazăr R.E., 2016). When GDP is high and economic activity is robust there is usually a larger tax base for value added tax, leading to higher VAT revenues and a much smaller deficit. Conversely, in periods of economic downturn or recession GDP may fall, leading to reduced consumption, lower taxable transactions and possibly a much larger non-tax revenue deficit (Pastusiak R., Bolek M., Pluskota A.,2022). In general the overriding administrative objective of every state in any period is to maximise the tax revenue collected from taxes.

However, historically in any society there has been the phenomenon called tax evasion, which undoubtedly weakens the ability of the authorities to collect taxes from various taxpayers, thus creating a budget deficit that hinders the state in financing public expenditure, i.e. the provision of various goods and services to citizens (Kong F., Wang C., 2019). From the above, we can say that tax evasion as a concept is the evasion of taxes or duties by individuals or legal entities. In other words, it generally refers to illegal processes in which the obligation to pay taxes is concealed or ignored, i.e. the taxpayer pays less tax than he should pay according to the law, avoiding to communicate his real income and other important information to the tax authorities .

Research Method

The specialized literature defines the research methodology and the construction of the text of a paper as a "way" to be followed in the research activity to achieve the objectives, namely for information and training. To reach the goals of this research, I relied on a qualitative approach using a general-to-private approach. Regarding the human and social sciences, this research is based on the non-participant observation (Lesage and Wechtler, 2012), more precisely the inductive research method is applied, on the document analysis and on the comparison techniques. The research strategy addressed in the present research is dominated by certain methodological aspects namely:

- inductive (experimental, quasi-experimental, observational) and deductive;
- comparative and non-comparative;
- qualitative and quantitative (Dumitru Zaiț, Alain Spalanzani, 2006).

The research approach was mainly based on a qualitative analysis .The research is theoretical but also empirical. In order to benefit from timely results and conclusions in the research activity specific to the economic field, we aimed to analyze facts, economic events, figures and statistical data.

Bibliometric analysis of the concepts of tax avoidance versus tax optimization

For a better understanding of the relationship between the VAT gap and tax avoidance versus tax optimization, we have further conducted a bibliometric research on concepts to analyze these topics of international interest (Chernykh L., Mityakov S., 2017). The purpose of this analysis is to examine a number of scientific papers, publications and other relevant sources in order to identify trends, impact and evolution of scientific approaches in this field (Nurkholis N. &al. 2020). Thus, in order to carry out this research we used VOSviewer software and Web of Science platform, with the help of which we analyzed 3000 papers in the form of articles, books, book chapters and other relevant publications, the main areas being, Tax evasion, Tax optimization and corporate governance, Economic growth and performance etc. The papers studied were to include concepts of tax avoidance and optimisation, corporate governance, tax fraud and economic performance. Based on the VOSviewer application, we analysed the articles on the Web of Science from the perspective of the keywords mentioned above. Therefore in the graph below we have illustrated the 126 keywords, which reached the minimum threshold of 5 frequencies out of the 6422 reported by VOSviewer.

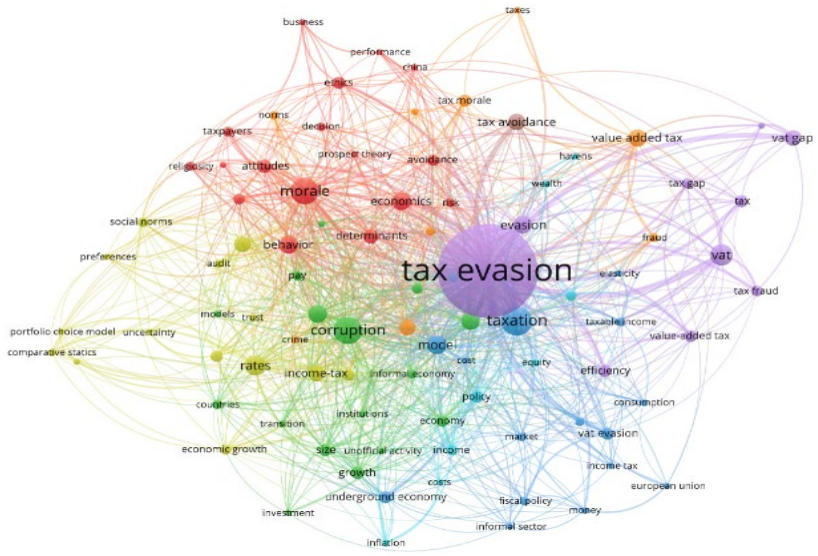


Chart no.1.
Bibliometric analysis of tax evasion & VAT gap concepts
Source: own processing in VOSviewer

We can see that there are five clusters or groups, each of which is highlighted by a distinct circle of a different colour depending on its relevance. Therefore, this network clearly illustrates that this area of research is of great importance and attracts considerable interest from the international scientific community and tax professionals. In this regard, by examining the bibliographic resources we concluded that: bibliometric analysis of tax evasion revealed a significant concern for this phenomenon both in the literature and in practice. This can also be seen in the graph above where the concept of tax evasion which is purple is interlinked with other concepts such as: corruption, business, vat-gap, vat evasion, value added-tax, taxation, economy etc. Thus, we can say that we have identified different theories, models and methods of estimating tax evasion, as well as case studies that analyze the causes, consequences and ways of combating tax evasion in the context of VAT, and this underlines the importance of effectively combating tax evasion in order to reduce the VAT gap and ensure efficient collection of this tax.

On the other hand, bibliometric analysis of the relationship between tax avoidance versus tax optimisation and the VAT gap has highlighted the existence of a complex connection between these concepts. This can also be identified in the graph above through the prism of purple, orange, red and green, illustrating the VAT gap as a result of evasion, optimisation, ethics and corruption. Thus, work has been identified that explores the interplay between these concepts sometimes highlighting the subtle boundaries between them and the challenges in identifying and evaluating tax practices. At the same time, examples of tax abuses that tend to fall into the grey area between tax avoidance and tax optimisation were also highlighted. This underlines the need for a balanced and consistent approach in tax legislation to prevent abusive practices and to reduce the VAT gap.

Overall, therefore, we can say that the bibliometric analysis carried out shows a strong connection between tax avoidance versus tax optimisation in relation to the value added tax gap, highlighting the need for continued debate and research in this area. Based on it,

guidance and insight can be provided in the development of effective tax policies and anti-avoidance measures to ensure efficient VAT collection and a fair tax system. However, in order to analyse these phenomena from an applied point of view and to get some clearer ideas, in the following we will present an econometric model of the factors influencing the gap at EU member country level, trying to highlight the dependency relationships, but also the factors that have amplified this evolution.

Econometric model on the factors influencing the VAT gap at EU level

Nowadays, tax management is one of the biggest challenges for a businessman. For a more efficient management of their assets and liabilities and in an attempt to achieve maximum profit, taxpayers resort to various tricks to evade or mitigate their tax obligations (Trif V., 2019). The shortfall from non-collection of value added tax, is a measure of overall VAT non-compliance (Tsakumis G.,2010). Value added tax is one of the basic sources of total revenue collected in all European countries. In 2020 alone, the contribution of VAT to total tax revenue ranged from 20% to 50% at Member State level as well as accounting for approximately 26% of total annual tax receipts for EU governments (Smietanka A., Tanski A.,2022). Most often this indicator is expressed in absolute terms according to the formula:

$$VAT\ Gap = VTTL - VAT\ revenue\ collected$$

or relative to a reference, which is always represented by the VTTL indicator:

$$VAT\ Gap(\%) = (VTTL - VAT\ revenue\ collected)/VTTL \times 100\%$$

As mentioned, the approach used for the estimates of basic income is carried out by calculating the VTTL indicator for a given time interval, while also aligning it with its relevant figures. Information from the national accounts (as a source of information on the tax base), various statistics as well as data from tax registers are used to estimate total VAT receipts. Compared to the production-based approach, which estimates VTTL payments for all sectors, the consumption-based approach analyses the final liability in a product breakdown and corrects the liability estimates for non-deductible VAT hidden at the intermediate stage.

The main objective in this econometric work is to relate the value added tax gap to the independent variables mentioned above through a mathematical regression and to determine the importance of each independent component in the evolution of this gap. In order to obtain valid explanations of the correlation between the dependent variable and the independent variable, we entered the data in SPSS 25 and checked the validity of several regression models, obtaining that the best model in this situation is the multiple linear regression, which has the form:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k + \varepsilon;$$

In the case of our model, the equation will have the form:

VAT gap=α+ β_1 Standard VAT rate+β_2 GDP+ β_3 Number of unemployed+ β_4 VTTL+β_5 Exchange rate+ε

We therefore aim to show that this model best describes our research hypothesis, and gives us a high degree of confidence in the econometric explanations taken in relation to the economic ones.
According to the statistical tests carried out during the modelling at the level of all EU member countries we can observe that between the variables GVA_Gap, number of legislative changes, number of unemployed, VAT rate, VTTL and GDP there is a strong link, therefore based on the results obtained, we can say that the variation of the independent variables explains 73.4% of the variation of the VAT gap. In other words, if the VAT Gap shows a certain evolution, it means that the number of legislative changes, the number of unemployed, the VAT rate, the VTTL and GDP will be able to explain 73.4% of this evolution.

Tabel no 1. Regression coefficients for EU-27 model

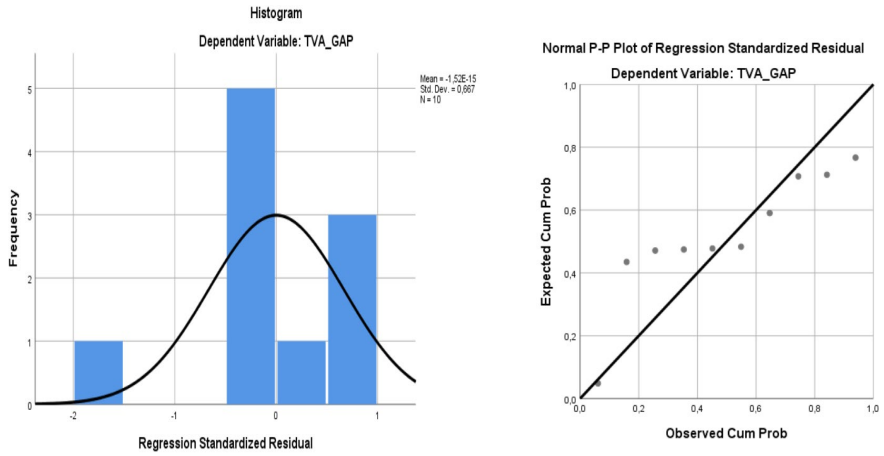
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3,732	6,325		,590	,561
VAT_quota	-22,726	28,980	-,096	-,784	,442
GDB	-,022	,008	-3,052	-2,718	,013
No unemploqed	1,507E-6	,000	,506	3,011	,007
VTTL	,344	,112	3,373	3,085	,006
Nr_sc_leg	1,484	,944	,183	1,571	,131
a. Dependent Variable: Gap_TVA					

Table Coefficients gives us data on the regression coefficients. Thus, according to the data the estimated equation of the multiple linear regression model has the form:

$$Gap\_VAT = 3.732 - 22.726*VAT\_quota - 0.022*GDP +1.507E-6*Nr\_somers+ 0.344*VTTL+ +1.484*Nr\_sc\_leg + \varepsilon$$

According to the Coefficients table and the equation estimated above, we observe that the variable that has the greatest influence on the VAT gap in all EU member countries is the VAT_rate. Although it would seem to us that the VAT rate applied at the level of the Member States should increase the VAT gap, by analyzing the above equation, we understand that in the case of this model the VAT rate applied at the level of the EU countries, on the contrary, contributes to the decrease of the VAT gap, and this can be explained by the fact that a possible increase of the standard VAT rate can cause an increase of the prices of goods and services, and because of this consumption decreases, demand decreases and therefore the revenues of the taxpayers decrease, which includes the value added tax.
Another variable that has a significant influence on the VAT gap is the number of changes in VAT legislation. This is most clear, as frequent changes in the VAT regulatory framework make it more difficult for taxpayers to adapt and therefore they may commit errors due to the instability of VAT legislation or they may intentionally resort to fraudulent acts because the previous legislation was much more convenient than the current one. A positive influence on the VAT undercollection gap is the variable (VTTL) total estimated VAT receipts, which could contribute to an increase in the gap due to the fact that the

higher this variable is and the lower the total actual VAT receipts collected, the higher the gap will be.
As regards the variable No_unemployed, it can be said that it has a positive but not very significant influence in all Member States, as it can in principle have an indirect impact on the deficit from non-collection of value added tax. Thus, this variable may lead to a reduction in consumption, or a decrease in the performance of some economic activities. However, the fact that the value of the coefficient next to this variable is very small means that compared to the total consumption of goods and services at EU level, consumption by the unemployed is so small that even if they in partnership with some suppliers were to resort to tax evasion, it would be insignificant.
Based on the research conducted, we can say that the most important indicator in determining the VAT gap is corruption, which can contribute to increasing this indicator by supporting and protecting tax evaders in exchange for financial incentives. This protection often invokes the provision of strictly confidential information on the conduct of tax controls, the deliberate blocking of investigations or the payment of very low taxes and penalties compared to the frauds committed. Thus, we can clearly outline the idea that the exercise of corruption can weaken the tax control and supervision system by means of illegal influences exerted on tax officials and authorities. This can lead to a certain relaxation in the application of tax rules and a reduction in the detection and sanctioning of tax evaders, causing the VAT-Gap to increase.
Next, in order to validate the above mentioned hypothesis we will illustrate in the following graph the histogram and the P-P Plot which should say that our variables do not exert such a large influence on the VAT-Gap.



Chat no 2. Histogram and Normal P-P Plot of the situation in Romania
Source: Own processing in SPSS

According to the above graph we can see that the histogram follows a totally fluctuating distribution with a number of deviations, and if we refer to the probability plot of the residual we can say that it is not similar at all to the line graph, which tells us that this model requires one more variable, namely the corruption index that could make the error terms normally distributed. Thus according to the analysis of this graph we can validate

the hypothesis formulated above and we can confirm the influence, interdependence and correlation between the dependent variable with the independent ones but most importantly the enormous contribution of corruption exercised among public authorities which amplifies the effect of the independent variables and ranks Romania 1st in the EU on the VAT gap.

Conclusions and proposals

In this paper we aimed to study the concepts of tax evasion and tax optimization and their influence on value added tax, in order to outline the phenomenon known as the VAT gap.Among the most common ways of evading the payment of taxes imposed were: underestimation of wealth and property owned, use of alternative means of payment and bribery of tax collectors, and these activities have only forced public authorities to formulate more balanced and intelligent tax policies over time.

According to the research carried out, the main indicators determining the evolution of the gap in the EU-27 Member States are the standard VAT rate, the number of legislative changes and the number of unemployed. However, we have identified a difference between economically developed countries and those with an average economy, namely that in the case of less developed countries, the increase in the VAT rate contributes to reducing the gap due to the increase in prices, the decrease in demand due to the lack of financial resources and the decrease in taxable income in terms of VAT, whereas in developed countries the opposite is true, the increase in the VAT rate contributes to the widening of the gap, and this can be explained by the fact that companies operating in those countries, since VAT is increased, have an incentive to evade versus optimise tax in order to reduce the tax base, which leads to lower compliance and a much higher deficit.

We can say that a high level of corruption affects the growth of the gap by supporting and protecting tax evaders by providing strictly confidential information on the conduct of tax audits, intentionally blocking investigations or paying very low taxes and penalties compared to the frauds committed. On the basis of this analysis we can say that as long as corruption exists in public administration, the socio-economic objectives of a state will be very difficult to achieve. The authorities therefore have a duty to formulate measures to combat both corruption and tax evasion in order to ensure financial stability and prosperity in all areas of state activity.

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A LINKAGE BETWEEN PRODUCER AND CONSUMER PRICES IN EUROPEAN COUNTRIES

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Abstract: This paper examines a linkage between consumer and producer prices within European countries. The research sample in this paper includes 23 European countries and monthly data between February 2000 and March 2023 for the harmonized index of consumer prices (HICP) and producer prices index (PPI). Using a wavelet coherence approach country country-specific linkage was provided for each of the considered countries. Empirical findings suggested diverse relationships. However, the most frequently observed linkage is the one with producer prices as leading and consumer prices as lagging variables and a positive correlation between the two. Furthermore, the relation is more prominent at higher scales or lower frequencies. Conclusively, monetary policy needs to monitor producer prices while targeting inflation rates.
Keywords: producer prices; consumer prices; wavelet coherence; European countries.
JEL Classification: C54; E52; E64.

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Introduction

The mechanism of price transmission is one of the focal issues in macroeconomics. Understanding a linkage between consumer and producer prices bears important implications for monetary policy while framing measures towards inflation stability. Following Živkov et al. (2023) and references herein, existing research suggests diverse and conflicting conclusions regarding the linkage between consumer and producer prices. Therefore, there is a need for further analysis of the topic. This paper aims to contribute and provide empirical results from a sample of European countries.

Besides this introductory section, a reminder of the paper is organized as follows: section 2 summarizes literature development related to the issue under consideration. Section 3

illustrates the employed methodology and research data, Section 4 provides the results of empirical evaluation, and the final section provides an overview of the main findings from the research.

Brief overview of the related literature

Alemu (2012) used vector error correction model (VECM) and found causality from producer to consumer prices in in South Africa. Hakimipoor et al. (2016) found no interlingake between consumer and producer prices in Itran. Based on quarterly data from Australia between 1969q3 and 2010q Tiwari (2012) found Granger-causality from consumers' price to producers' price at intermediate frequencies suggesting medium-run cycles. Granger-causality from producers' price to consumers' price was not detected at any frequency level. Consequently, consumers' price identified as is a leading indicator for producers' price. Based on monthly data sample between January 2010 and August 2016, Anggraeni and Irawan, (2018)found unidirectional causality from producer to consumer prices in Indonesia. Topuz et a. (2018) used vector autoregression (VAR) approach and found bidirectional Granger causality between producer and consumer prices in Turkey and United Kingdom as well.Based on the monthly data sample between August 1995 and December 2007, Akcay (2011) found unidirectional causality from producer price to consumer price in the case of France and Finland, bidirectional causality in the case of Germany in the case of Sweden and Netherlands and no significant causality was found. Su et al. (2016) considered the case of Slovakia on a monthly data sample between 1998:01 and 2016:01 and pointed out that consumer prices play a focal role in the dynamics of consumer prices in the case of Slovakia. Khan et al. (2018) analysed a linkage between consumer and producer prices in Central and Eastern European countries. The finding suggested that producer prices affected consumer prices in terms of of Granger causality in Lithuania, Latvia, Slovakia Romania, and Slovenia while consumer prices has a significant effect on the producer prices only in case of Hungary. Ulke and Ergun (2014) analysed monthly data between January 2003 and December 2013 for Turkey and found a linkage between consumer to producer prices. Ozpolat (2020) studied a linkage between consumer and producer prices on a sample of annual panel data for Bulgaria, Croatia, Romania, Czech Republic, Poland, Slovenia, Slovak Republic and Latvia between 1992 and 2017. The empirical findings suggested the existence of long-run bidirectional causality between consumer and producer prices. Khan et al. (2018) employed wavelet coherence analysis and expenditure-switching mode on a sample of monthly observations between 1999 and 2016 and considered a linkage between consumer and producer prices in the Check Republic. The empirical findings suggested a time-dependent linkage between consumer and producer prices over the time and frequency domain. The results further suggested a non-negligible role of exchange rate in the relationship between consumer and producer prices. Živkov et al. (2023) used wavelet coherence analysis on a data sample between January 1998 and March 2022 and examined the relationship for Poland, Czech Republic, Slovakia, Lithuania, Hungary, Estonia, Latvia and Slovenia. The empirical results suggested a time-varying and scale-varying nature of the relationship. Tiwari et al. (2013) used a wavelet coherence approach and based on monthly data between 1991m1 and 2011m11 analysed a linkage between consumer and producer prices in Romania. The findings provided strong evidence to support the presence of cyclical effects or variables in phase while counter-cyclical effects were not found. Tiwari et al. (2014) used wavelet

coherence approaches and provided results for Mexico. Based on data samples between January 1981 and March 2009, empirical findings suggested a bidirectional linkage between consumer and producer prices. In the short run (up to 7 months), consumer prices were leading while for longer periods producer prices were the leading variable. Contemporary literature is ambiguous regarding a linkage between producer and consumer prices. Consequently, there is a need to bring further arguments and contribute to the debate.

Research methods

The recent empirical research in economics and finance has acknowledged the benefits of the wavelet-based methodology adopted in this study (Bošnjak, 2021, Rathinasamy et al., 2017; Rua, 2012; Vacha and Barunik, 2012; Xu, 2019). Wavelet coherence is a mathematical tool used in signal processing and time series analysis. Enables us to measure and visualize the degree of similarity or correlation between two time series in both the time and frequency domains. In this research paper, Morlet wavelet is utilized as described in the equation (1):

$$\psi^M(t) = \frac{1}{\pi^{\frac{1}{4}}} e^{i\omega_0 t} e^{\frac{-t^2}{2}} \quad (1)$$

where t denotes time, and ω_0 serves as the central frequency parameter, typically set to six as is common in similar economic research (Vacha and Barunik, 2012). The Morlet wavelet's intricate characteristics provide a valuable advantage by enabling the consideration of time-dependent amplitude and phase across various frequencies. Equation (2) illustrates the continuous wavelet transform:

$$W_x(\tau, s) = \frac{1}{\sqrt{s}} \int_{-\infty}^{\infty} x(t) \overline{\psi\left(\frac{t-\tau}{s}\right)} dt \quad (2)$$

where $x(t)$ represents the observed time series, while s denotes the scale, and τ represents the location determining the wavelet's position. Following the wavelet transform equation (2), the observed time series $x(t)$ is decomposed using wavelets. Subsequently, the study delves into assessing the magnitude and significance of the local correlation between consumer and producer prices, both considered as time series data. To analyse the size and significance of this local correlation, the paper introduces the concepts of cross-wavelet transform and cross-wavelet power. The cross wavelet transform for two time series $x(t)$ and $y(t)$ is defined in equation (3):

$$W_{xy}(\tau, s) = W_x(\tau, s)\overline{W_y(\tau, s)} \quad (3)$$

In this context, $W_x(\tau, s)$ stands for the continuous wavelet transform of the observed time series $x(t)$ and $\overline{W_y(\tau, s)}$ indicates the complex conjugate continuous wavelet transform of the observed time series $y(t)$. The cross-wavelet power is denoted as $\left|W_{xy}(\tau, s)\right|$. Finally, equation (4) introduces the squared wavelet coherence coefficient:

$$R^2(\tau, s) = \frac{\left|S\left(s^{-1} W_{xy}(\tau, s)\right)\right|^2}{S(s^{-1}|W_x(\tau, s)|^2) S\left(s^{-1}\left|W_y(\tau, s)\right|^2\right)} \quad (4)$$

where S denotes a smoothing operator. Similar to the Pearson squared correlation coefficient, the squared wavelet coherence coefficient falls within the range of zero to one. Additionally, the analysis of wavelet coherence offers insights into the phase differences

between the examined time series. The equation for wavelet coherence phase difference is presented as (5):

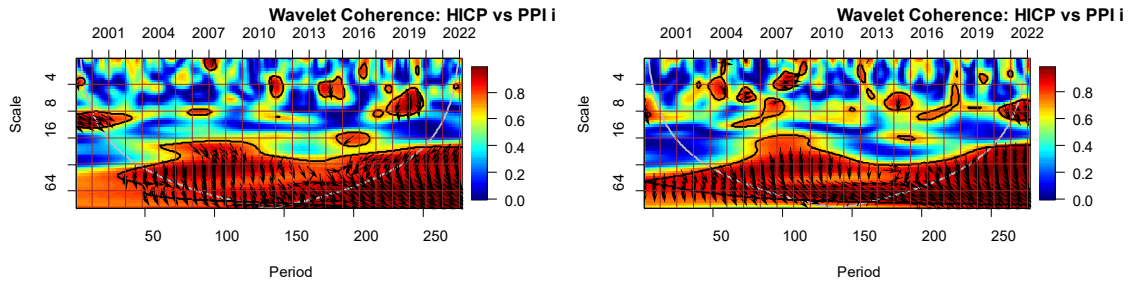
$$\varphi(\tau, s) = tan^{-1}\left(\frac{\Im\left(W_{xy}(\tau,s)\right)}{\Re\left(W_{xy}(\tau,s)\right)}\right) \quad (5)$$

where $\Re$ signifies the real part, and $\Im$ signify the imaginary part of the cross wavelet transform mentioned in equation (3). The phase difference is visually depicted using arrows. A zero-phase difference suggests that the analysed time series are positively correlated and move in sync. Arrows pointing to the right signify a positive correlation, while arrows pointing to the left represent a negative correlation. Upward-pointing arrows indicate that the first time series leads the second by a right angle, while downward-pointing arrows indicate that the second time series leads the first by a right angle. Consequently, the arrows can convey various combinations of relationships."

Empirical findings

Following procedure described in section entitled methods, Figure 1 illustrates interlinkage between consumer and producer prices in Austria.

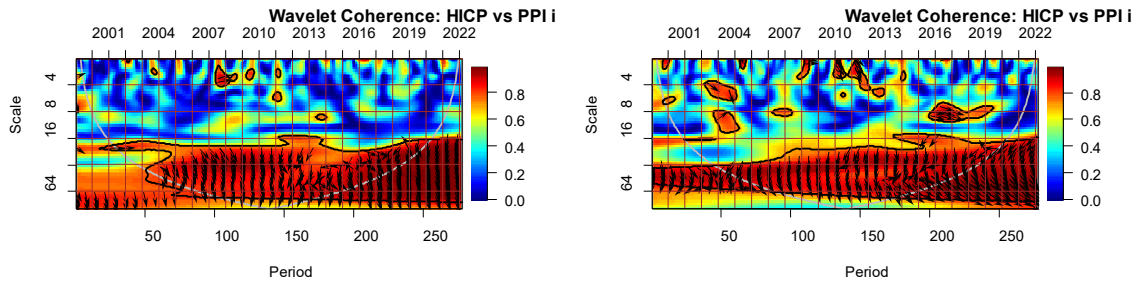
Figure 1-2 a linkage between consumer and producer prices in Austria/ Belgium



As illustrated in figure 1, the arrows pointed right and down suggesting that the producer prices index time series leads the harmonized index of consumer prices while correlations were positive. Furthermore, the linkage was identified at higher scales or lower frequencies. Figure 2 illustrates a linkage between consumer and producer prices in case of Belgium. Following Figure 2, a linkage between consumer and producer prices was found during the entire observation period. A linkage was present at lower frequencies with producer prices as leading variable.

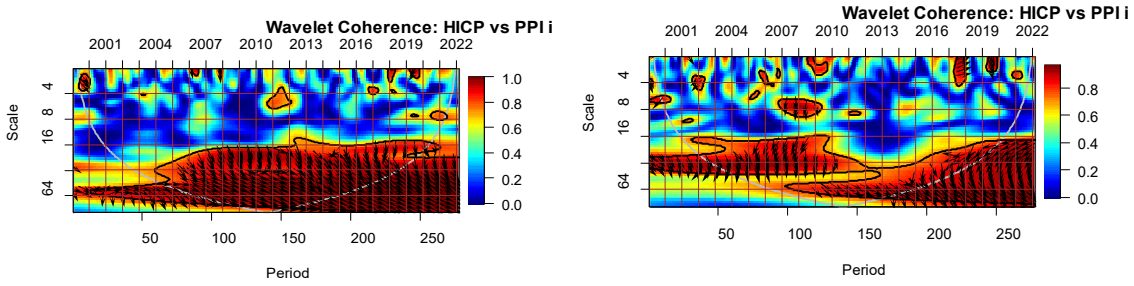
Figure 3 presents a linkage between consumer and producer prices in case of Bulgaria.

Figure 2-4 a linkage between consumer and producer prices in Bulgaria/ Croatia



In case of Bulgaria, as illustrated in Figure 3, producer prices were liding during the observation period. However, the correlation was not allways positive. Figure 4 illustrates ther linkage in case of Croatia. Similarly to the case in Bulgaria, in case of Croatia producer prices were leading variable and correlation was not positive during the observation period as one can see in Figure 4. The case of Cyprus is provided in Figure 5. As illustrated in Figure5, pruducer prices were leading variable and correlation were positive. Futhermore, the linkage was less prominent at the beginning of the observation period. Figure 6 illustrates the case of Denmark. Figure 6 illustrates a significant correlation between producer and consumer prices during the entire observation period. However, a linkage was established at lower frequencies after 2008.

Figure 3-6 a linkage between consumer and producer prices in Cyprus/ Denmark



The case of Finland is provided in Figure 7. Figure 7 illustrates a linkage between producer and consumer prices in case of Finland. Producer prices were leading variable during the entire obyervation period but correlation were not allways a positive at all frequencies. Figure 9 depicts a linkage in case of France. Figure 8 suggested a positive linkage between producer and consumer prices with producer prices as leading variable but correlation was detected at different frequancies in different time priods.

Figure 4-8 a linkage between consumer and producer prices in Finland/ France

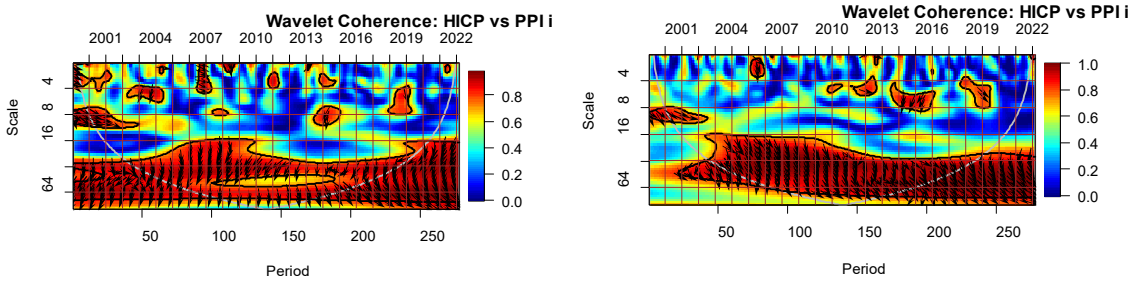
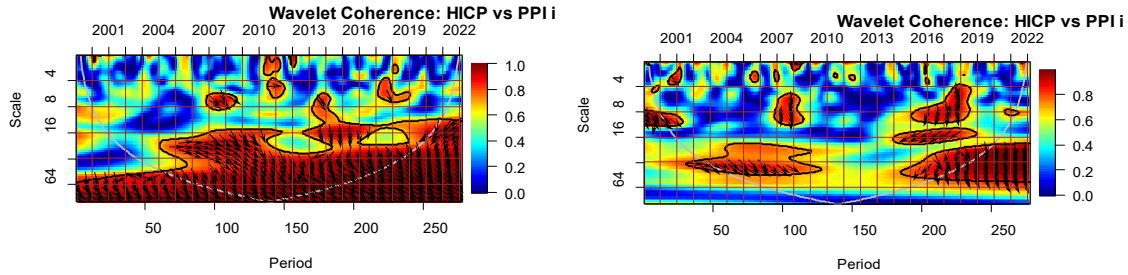


Figure 9 shows the linkage in case of Germany. Figure 9 brings the case in Germany. In case of Germany the linkage was positive and leading variable was the one representing consumer prices at lower frequencies.Slightly different relationship was observed with higher frequencies. Figure 10 provides the case in Greece.

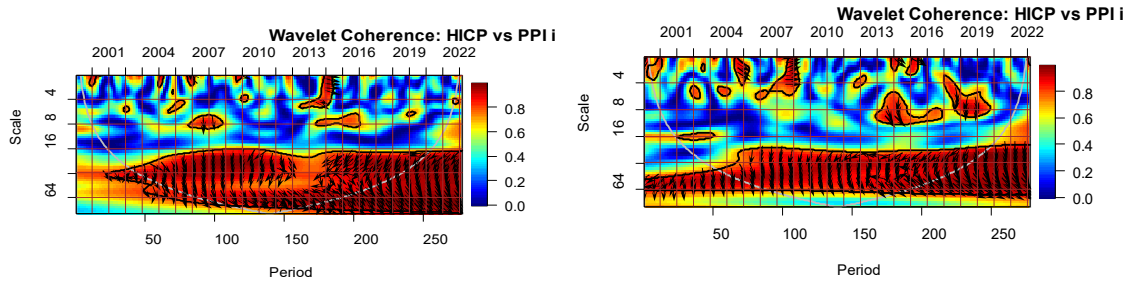
Figure 5-10 a linkage between consumer and producer prices in Germany/ Greece



As illustrated in Figure 10, the linkage in Greece is less prominent comparing to other considered countries. In some periods there was no linkage between producer and consumer prices in Greece.

Figure 11 illustrates the case in Italy. The linkage between producer and consumer prices in Italy was detected after 2002. As it is often the case the linkage is more prominent at higher scales or lower frequencies. The linkage in case of Lithuania was provided in Figure12.

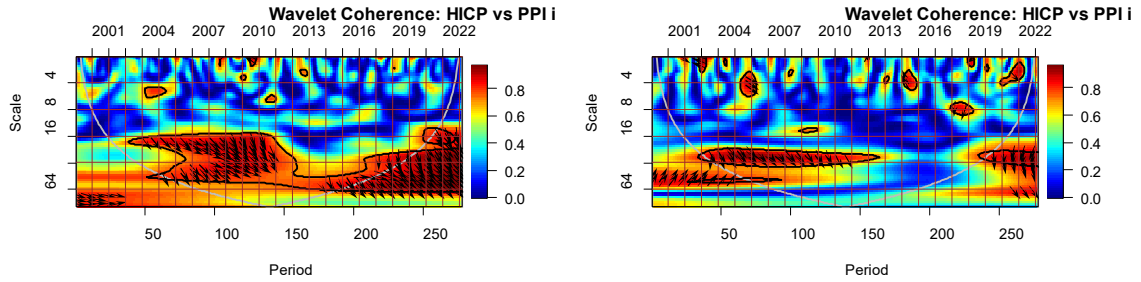
Figure 6-12 a linkage between consumer and producer prices in Italy/ Lithuania



The link between producer and consumer prices in Lithuania illustrates producer prices as leading variable and positive correlation at lowe frequencies. While at higher frequencies the linkage was not allways postive suggesting ambiguos and time dependent relationship between producer and consumer prices.

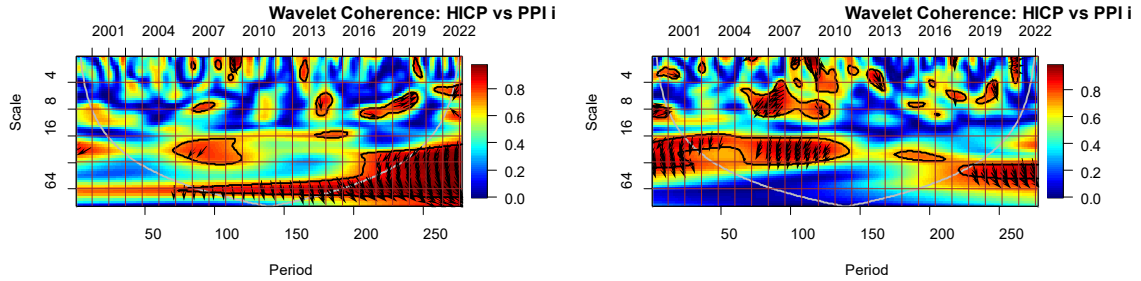
Figure 13 illustrates the linkage in case of Luxembourg.

Figure 7-14 a linkage between consumer and producer prices in Luxembourg Malta



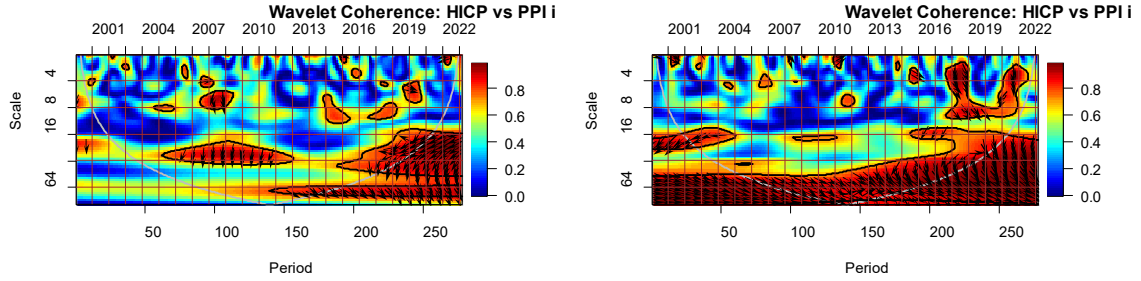
Following Figure 13, in case of Luxembourg the linkage was potitive and producer prices were leading variable but the linkage was not detected during the whole observation period. Figure 14 depicts the case in Malta. As illustrated in figure 14, there was no linkage between consumer and producer prices from 2012 up to 2020. In the rests of the observation period the linkage was positive. However, at the beginning of the observatio period and at lower frequencies the leading variable was the one presenting consumer prices.
The case of Netherlands was illustrated in Figure 15.

Figure 8-16 a linkage between consumer and producer prices in Netherlands/ Norway



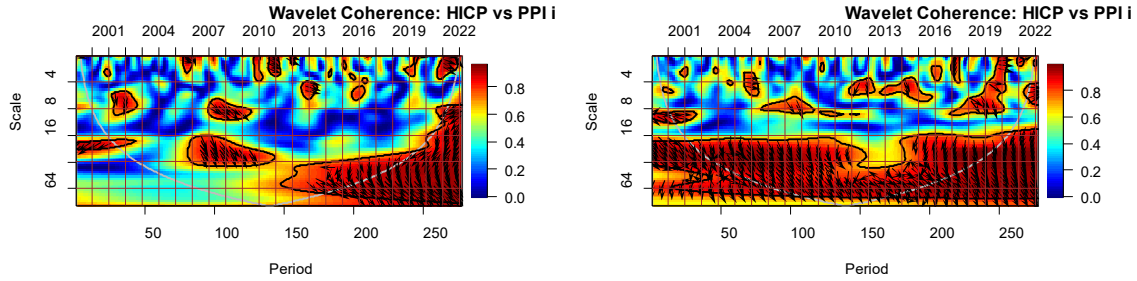
Based on findings in Figure 15, the linkage in Netherlands was bacame more prominent by the time. Producer prices was found as the leding variable and correlation was positive. Figure 16 illustrates the case of Norway. Figure 9 a linkage between consumer and producer prices in Norway. Following Figure 16, the correlation between produvcer and consumer prices in Norway was positive when detected. The variable representing producer prices was the leading variable. However, the linkage was not present during the entire observation period.
The case of Portugal was illustrated in Figure 17.

Figure 10-18 a linkage between consumer and producer prices in Portugal- Turkiye



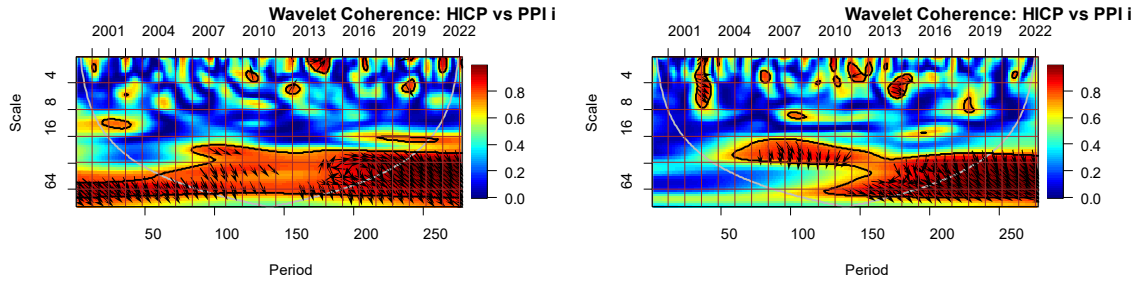
Following Figure 17, there were different linkages between producer and consumer prices in Portugal. However, whenever the linkage was detected producer prices appeared as leading variable. Figure 18 provides the case in Turkiye. Unlike the findings from Ulke and Ergun (2014) empirical results in Figure 18 suggested producer prices as a leading variable and positive correlation between producer and consumer prices.
Figure 19 illustrates the case of Sweden.

Figure 11-20 a linkage between consumer and producer prices in Sweden/ Spain

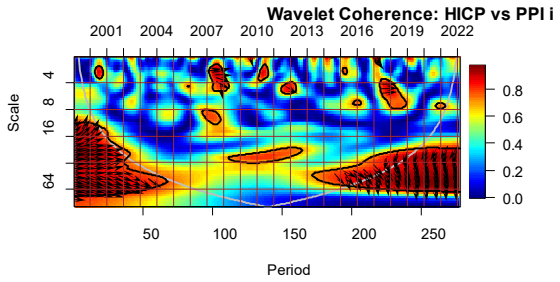


Following presented in Figure 19, the linkage in Sweden was not present during the whole oservation period. Variable presenting producer prices was the leading one whenever the lingake was found. Figure 20 illustrates the case of Spain. Following findings in Figure 20, the linkage in Spain was prominent. The variable representing producer prices was the leading one and correlation was mostly positive.
Figure 21 provides the linkage in case of Slovenia.

Figure 12-22 a linkage between consumer and producer prices in Slovenia/Slovakia



As well as in case of Spain, Figure 21 illustrates a prominent linkage between producer and consumer prices in Slovenia. The variable representing producer prices was the leading one and correlation was mostly positive. Figure 22 provides the case from Slovakia. As illustrated in Figure 22, the findings for Slovakia are in line with points from Su et al. (2016). The linkage is less prominent comparing the case from Slovenia and Sopain, for example.
Figure 23 brings the case from Romania.
Figure 13 a linkage between consumer and producer prices in Romania



As illustrated in Figure 23, the linkage in the case of Romania was prominent at the beginning as well as at the end of the observation period. Producer prices were leading during both identified periods. However, consumer and producer prices in Romania were more in phase during the beginning of the observation period. McKnight (2011) suggested that central banks in open economies should be oriented towards targeting consumer prices rather than producer prices. Findings from this paper suggested producer prices to govern consumer prices. Therefore, for the considered sample countries targeting producer prices might be more effective.

Conclusions

Several conclusions can be pointed out based on the research provided in this paper. Firstly, existing literature suggests various linkages between producer and consumer prices from various parts of the globe. Empirical approaches employed to establish the link include cointegration and Granger causality on samples of panel data or on a sample of a single country. Recent empirical literature recognized the wavelet coherence approach as a well-suited approach to establish a linkage between producer and consumer prices in the time domain as well as in the frequency domain. Following wavelet coherence analysis, various linkages were established in European countries. The most prominent nature of the linkage is the one with producer prices as the leading and consumer prices as the lagging variable. The correlation was mostly positive and established at higher scales or lower frequencies. Empirical findings suggested producer prices as a focal variable while controlling price stability. As is always the case, there are some limitations of the research. This paper observes consumer and producer prices while not taking into account potential effects from other variables. Consequently, further research might be directed towards including other variables like exchange rates into the linkage between producer and consumer prices.

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THE INTERDISCIPLINARITY OF SENTIMENT ANALYSIS AND ITS USE IN TEACHING

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Abstract: Sentiment analysis is no longer considered an emerging field in the context of today's language analysis tools. Widely used in the business area, it is a very useful tool in analyzing reviews and feedback provided by customers for different types of products and services. Beyond its wide use in marketing and tourism, for instance, sentiment analysis has proven its interdisciplinary character, going far beyond its original purpose. One innovative and creative way is its use in education. There are already quite a few studies in this direction, highlighting the importance and usefulness of sentiment analysis in teaching. This article adds to this research, focusing on its use use in an English as a second language class, in the setting of an Economics faculty, with first-year Bachelor students. The general context of this teaching approach, its details, results, and limitations will be described in detail.
Keywords: sentiment analysis, teaching, English as a second language

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Introduction

'Sentiment analysis, also called opinion mining, is the field of study that analyzes people's opinions, sentiments, appraisals, attitudes, and emotions toward entities and their attributes expressed in written text. The entities can be products, services, organizations, individuals, events, issues, or topics' (Liu, 2015). The term 'opinion mining' appeared first when researchers attempted to classify a larger corpus of reviews retrieved from important sites available online like Amazon and C/net; the classifier used was gradually refined by mining at sentence level and large number of sentences were 'parsed and thresholded by the mining tool employed' (Dave, Lawrence and Pennock, 2003). The results of these authors, published more than 20 years ago were yet unclear and uncertain at the time and more work in the field was obviously recommended. However, the two tests engaged in this particular ground-breaking research offered fairly good results for the classification of online reviews, as long as the 'appropriate features and metrics' were used (Dave, Lawrence and Pennock, 2003). On the other hand, the sentiment analysis as a term was coined by Nasukawa and Yi, in the same year of 2003. Their research highlighted the extraction of opinions using reviews and texts from various websites, as well. However, it did not focus on the sentiment from a large text such as a full document, but it was narrowed to references to the particular object reviewed. The use of natural language processing (NLP) as a tool

proved quite precise, as it offered consistent results of over 86% accuracy in all tests performed.

The main use of sentiment analysis is on analyzing information using a special algorithm in order to discern if that information expresses a positive, neutral or negative sentiment – hence the name of the tool itself. With the widespread of internet shopping, a larger and larger volume of reviews and opinions on various products, online shops, services etc. are available today. According to Bing, the creation and development of sentiment analysis concur with the one of the social media: 'sentiment analysis is now right at the center of the social media research' (Bing, 2015). It is therefore widely used in marketing, tourism and sales, but the research on sentiment analysis has impacted the society in general, too, because people's opinions influence everything. Furthermore, the overwhelmingly rich resource of opinions, reviews and feedback available online, companies and researchers can gather insights into the perspective of all categories 'of people or communities towards any service or any product'. This wealth of feedback and reviews are precious to various companies worldwide, as this 'active feedback actually may help the development of services and products by incorporating the opinions expressed by users and clients. (Mehto & Indras, 2016)

There are various types of sentiment analysis and different software tools using it. This paper focuses mainly on the model called Lexicon based approach. A 'lexicon sentiment model' approaches sentiment analysis using a dictionary (lexicon) of words and their associated sentiment scores. More precisely, this refers to a database of words and their positive, neutral or negative connotation. In order to analyze a text from the sentiment point of view, this approach looks into each word of the text and its lexicon score, aggregating them to determine the general sentiment of the text.

According to a pre-set threshold, the overall sentiment score of the text may prove to be positive, negative, or neutral, depending on the number of words with that score found in the text. This lexicon-based sentiment model is easy to use, but they are limited in analyzing irony or other types of nuances. Human intervention is therefore needed or at least the use of more accurate machine learning techniques, in order to deal with more complex texts. To offer a very basic and simple example of how this approach work, we may have a lexicon/dictionary with the following words and scores: Happy: +1; Sad: -1; Good: +1; Bad: -1; Neutral: 0.

If we were to analyze the sentiment of a sentence like: 'This particular product is good, but its second feature is bad', we would break the sentence into separate words and search their scores in the predefined lexicon: "This product": Neutral (not in the lexicon); "is": Neutral "good": +1; "but": Neutral; "its second": Neutral; "feature": Neutral; "is": Neutral; "bad": -1

Summing up the sentiment scores of this simple sentence we end up with:

1(Good)+(−1) (Bad)=01(Good)+(−1)(Sad)=0

The overall sentiment score in this case is therefore 0; in other words, the score is neutral and the sentiment analysis of the sentence classifies the sentence as neutral.

This is a first, basic step in lexicon based analyses. In complex lexicon sentiment analysis, which uses machine learning techniques, sentiment scores are weighted, the topic and order of words are also looked into and the result is more nuanced and accurate. For example, a word like 'OK' could be assigned in such a lexicon a score of 1, 'good' a score of 2, and 'awesome' a score of 3; on the negative side, 'terrible' could be -2 and 'bad' -1. The actual

score values would always depend on the lexicon and the assigned values. The sentiment score of a sentence is calculated as a sum of individual word scores, just like in the simple example above.
Some popular and widely used lexicons for sentiment analysis are the AFINN Lexicon, with almost 4000 listed words and their scores, SentiWordNet - an opinion lexicon, its origin database being the WordNet database, or VADER (Valence Aware Dictionary and Sentiment Reasoner) which is mainly designed for analyzing social media texts.

Literature review

An interesting approach to sentiment analysist uses fuzzy logic, as explained by authors like Subasic and Huettner. They developed a lexicon associating words with affect categories, as described above, and specified the intensity of the given word and its relation to the category it belonged to, also called centrality (Subasic and Huettner, 2001). A possible example would be the word 'dislike' from the category of 'sentiments', displaying a certain level of intensity and centrality. Words are then grouped in sets and these sets help analyze the sentiment of a document (Subasic and Huettner, 2001). A separate method would be to make use of a manually-constructed lexicon to analyze the text in order to discern if its general sentiment is positive, neutral or negative.
In their research on fuzzy logic, Subasic and Huettner propose an innovative approach that combines natural language processing and fuzzy logic techniques for analyzing affect content in a text. Their objectives include rapid analysis and visualization of affect content to aid decision-making. The key resource is the already mentioned fuzzy-affect lexicon, from which the fuzzy thesaurus and affect category groups are derived. The text is tagged with affect categories, and centralities/intensities are combined using fuzzy logic to generate affect sets, representing the document's general sentiment. Analysis on social media or news content or movie reviews show a correspondence between affect sets and human judgments. This approach allows for a certain ambiguity, leveraging fuzzy logic's ability to handle word vagueness in natural language. The authors highlight the importance of affect-related information in various electronic documents, emphasizing its role in decision-making and human communication. They introduce a fuzzy semantic typing approach that employs an affect lexicon, addresses ambiguity, and integrates with general-purpose text management systems. Fuzzy logic is chosen for its qualitative emphasis and effectiveness in managing ambiguity and imprecision. The system generates a fuzzy thesaurus and affect category groups for enhanced functionality, as well (Subasic and Huettner, 2001).
A different type of sentiment analysis model uses the so-called Aspect Catalogue, which is able to analyze a text considering its 'intended meaning' and classify it as positive, negative or neutral. The authors analyzed a word, for instance, on a a two dimensional grid which can discern this intended meaning and, according to the context, can 'detect underlying sentiments such as sarcasm satire praise or slander' (Mehto and Indras, 2016). This is an important factor in sentiment analysis because the software often fails in this respect, this lack of refinement being one of its major shortcomings, according to researchers.
Generally speaking, one of the most common areas of application of sentiment analysis is analyzing customers' reviews of products and services from the feedback section of websites or from social media. The reviews and comments from customers help future

clients decide what to purchase, if the case, and at the same time foster customer engagement. They also enhance brand visibility and very importantly, they help the company improve their products and services. In fact, both positive and negative reviews contribute to the overall reputation and performance of a business, as there is no bad publicity, it is generally considered. A specific application of such a type of analysis is the so-called 'flame detection, where highly heated or antagonist language can be identified' (Mehto and Indras, 2016). Flame detection in sentiment analysis contributes to creating a more positive and respectful online environment by identifying and managing content that could incite negativity. It requires a nuanced understanding of language and context, often involving a combination of linguistic analysis, machine learning, and user moderation mechanisms. In this way, offensive comments can be filtered and moderated, as needed.

Furthermore, customer opinions play a crucial role in guiding business decisions. Monitoring the public's perspectives is obviously a valuable tool for discovering potential customers and understanding their preferences. This insight aids in fostering positive public relations and can also be instrumental in predicting future business trends. Also, companies can adjust their services and products to correspond to the demands of the market. Perhaps this is one of the most useful uses of sentiment analysis in the case of companies.

All methods described have their merits and their drawbacks. Since this paper focuses mainly on the lexicon based method, it is worth mentioning that its advantages lie in its generality, as the words hold consistent meaning regardless of the topic. As previously mentioned, the lexicon-based approach involves using dictionaries with words annotated by their semantic orientation, polarity and centrality. However, a drawback is that the polarity of a word may change with the context. For instance, consider the sentences: 'This university offers a high standard of education' and 'The criminality is high in that area'. In both sentences, the word "high" retains its meaning, but in the first case, "high level" conveys a positive sentiment, whereas in the second case, "high level of criminality" conveys a negative sentiment. Obviously, this shows once more that the complexity of natural language cannot be analyzed accurately by machines, at least not yet. Human intervention is needed in this case, in order to observe the context and decide if the sense is indeed positive or perhaps neutral or negative. For instance, domains like tourism or websites selling electronic equipment can be quite straightforward, but this is not always the case with blogs, vlogs or social media in general, where feedback and opinions can be nuanced and subtler.

Lexicons can be created manually or automatically. In the following teaching approach, the tool called SentiWordNet, available on the internet as a free resource for opinion mining, was used in class. As most such tools, it can analyze text and categorize it as positive, negative or neutral.

Methodology

In the following we will detail a teaching approach, in other words, a practical lesson plan that attempted to cover the key components of a lexicon-based sentiment analysis model. This lesson plan was designed for an intermediate level of students at the Faculty of Economics, studying English as part of their curricula. The lesson was intended as an exercise in sentiment analysis, and its main purpose was not to teach opinion mining, in any way, but rather to explore a new area using English as a second language. The class

itself was a class of English for special purposes, and in one of the seminars, the theme of sentiment analysis was suggested to students, and accepted by them, as well, as a hands-on experiment. The main idea of the class was to only speak English, to work in pairs and groups and to use language in a practical way, by employing a free tool of natural language processing and observe the outcome. No technical background was required, just the possibility of using this type of analysis on an electronic device, be it a phone or a tablet. The entire activity focused on understanding lexicon-based sentiment analysis without any need of programming skills. In fact, the whole point of the lesson was to explain and inforce the concept of sentiment analysis, more precisely that of lexicon-based sentiment analysis in a unpretentious, non-technical manner. The length of the lesson being of maximum two hours, time was also an issue, so things were kept simple and straightforward. The lesson outline proceeded as follows:

- Introduction (15 minutes): Explain briefly some basics of sentiment analysis as a toll and of lexicon-based sentiment analysis using simple language and a short YouTube presentation film.
- Text Highlighting (15 minutes): Provide printed copies of short texts or product reviews (reviewing clearly aspects like performance, design, usability). Ask students to read through the text and use colored pens to highlight words or phrases that convey positive, negative, or neutral sentiments. Encourage them to refer to a simple sentiment lexicon provided by the instructor.
- Identify aspects (10 minutes): Discuss the aspects of the text (e.g., product features like performance, design, usability). Have students underline or circle words related to specific aspects using a different color.
- Group Discussion (15 minutes): Divide the class into pairs or small groups and ask them to share their highlighted texts and identified aspects. Facilitate a discussion on how different aspects contribute to the overall sentiment of the text.
- Break (10 minutes): A break was offered at this time, as the class itself was meant to last for 100 minutes, with a 10 minutes break in the middle: 50 minutes of lesson, 10 minutes break and another 50 minutes teaching time. After the break, students continued working on the topic of the lesson, following with the next stage, the fifth one.
- Create Aspect-Specific Sentiment Summary (10 minutes): On the whiteboard, flip chart, laptop, create a table with aspects and sentiment scores (positive, negative, neutral). In open class, discuss and decide on the sentiment scores for each aspect based on the highlighted words.
- Presentation (10 minutes): Ask each group to present their aspect-specific sentiment summary to the class. Encourage students to explain how they identified sentiments and aspects in their respective texts and if they consider these relevant.
- Reflection (10 minutes): Conclude the activity with a brief reflection. Ask students to share what they learned about sentiments and aspects in text. Discuss, if applicable real-world applications of understanding sentiments in different aspects.
- Assessment (5 minutes): Assess student participation in text highlighting, sentiment identification, and group discussions through verbal feedback and appraisal. Ponder on student understanding through class participation, discussion contributions, and completion of the hands-on activity
- Evaluate the accuracy of sentiment summaries presented by each group.

- Discussion and Reflection (12 minutes): Facilitate a class discussion on the challenges and potential applications of lexicon-based sentiment analysis with aspect-based analysis.
- Encourage students to reflect on how this approach might be useful in real-world scenarios.
- Optional final assignment (3 minutes):
- Assign, according to needs, an optional task that requires students to research and write a short report on a specific application of lexicon-based sentiment analysis in a chosen industry or domain. This can be used in future lessons with the same topic.
- As a final note, this hands-on activity focused on a more visual and collaborative approach to understanding sentiments and its use. It tried to remove the technical barrier and strongly encouraged active participation through group discussions and presentations.

Results

The proposed lesson plan was designed to achieve several learning results related to lexicon-based sentiment analysis, some of them being perhaps ambitious, such as understanding some fundamentals about Sentiment Analysis and recognizing its purpose and significance in understanding text data. Furthermore, an important objective of the class was to help students understand the role, purpose and even use of sentiment analysis, recognizing how words are associated with sentiment scores. Students were supposed to understand some key concepts of sentiment analysis, understanding that sentiments can vary for different aspects within the same piece of text. The real-world case study was meant to highlight the students' ability to understand and practically apply concepts in class, by analyzing sentiments within a pre-selected text, employing critical thinking skills to assign sentiment scores. Most importantly, given the fact that the main purpose of this lesson was to practice English as a second language, the focus was not on sentiment analysis itself as a goal, but rather a means of achieving the goal of conversation in the target language, pair work, group work, short presentation and class collaboration in general. This is in fact part of a larger teaching approach, known as CLIL, which stands for Content and Language Integrated Learning. Through CLIL, students learn about topics new to them, such as sentiment analysis and how to use it, and also a second language which is basically the means of instruction during the CLIL lessons. This approach has been extensively promoted by the European Union as a means to achieve multilingualism and many European countries have integrated it into their curricula at all levels of education. This particular exercise of a lesson was devised as an experiment in this regard. Regarding the outcomes of the class, it is worth noting that students participated actively in group discussions, sharing insights and collaboratively deciding on sentiment scores for the text. They also presented their findings to the class, which can help a lot enhancing their communication and presentation skills. Reflecting on the real-world applications of lexicon-based sentiment analysis and connecting theoretical concepts to a practical scenario has proven helpful, according to the feedback received from students afterwards. These learning outcomes covered a range of cognitive, practical, collaborative, reflective, and application-oriented skills, promoting at the same time the understanding of the concepts presented in class. The proposed lesson plan incorporated interactive and collaborative elements, which positively influenced student engagement, from class

observation. From the ulterior discussions with students, they found the subject of sentiment analysis intriguing, especially if they can relate it to real-world scenarios like product reviews or social media comments, which was the case here. They appreciated the application-oriented approach, particularly the case study that connects theoretical concepts to practical scenarios. The hands-on activities, such as text highlighting, aspect identification, and group discussions, promoted engagement. Students appreciated the opportunity to actively participate in a practical activity and actually see the results of their work in class. Group discussions and presentations encourage collaboration. Students mentioned the fact that they enjoyed working together, sharing ideas, and collectively determining sentiment scores for different aspects. This enhanced the understanding of the relevance of sentiment analysis. Encouraging reflection on real-world applications and prompting critical thinking during group discussions can normally foster a deeper understanding of the subject matter.

Limitations

The activity was adjusted for lower-level students, as well, so as to make the concepts more accessible, in the hope that students who might have been intimidated by technical aspects could feel more comfortable and engaged during the lesson. And last but not least, the combination of interactive activities, group discussions, and a reflective component can contribute to creating a positive and inclusive learning environment. Important authors in education mention that 'the lens of reflection' in teaching, as outlined by John Dewey as early as 1933, is getting more and more prominence, up to the point when American universities 'teach reflection as a cornerstone' in their educational programs (Stanley, 1998). It is therefore useful to include reflection in one's teaching and classes as often as possible, helping students to objectify themselves. It is worth mentioning that individual student reactions may vary in such a class, and it may be beneficial to ask for feedback even during the class or at least immediately after the lesson, in order to understand how well the objectives were met and to make adjustments for possible future sessions. Overall, a well-structured and interactive lesson plan can contribute to positive student engagement and learning experience and it was hoped this class played this exact role. Among the challenges the students face, apart from the ones mentioned above, students may also have encountered other difficulties, as well. The main issue in a foreign language class, is definitely that students with limited technical proficiency might feel overwhelmed, especially during hands-on activities involving CLIL activities. This may lead to class avoidance, which is problematic, because students simply tune-out of the lesson altogether. In order to manage this problem, the teacher should provide an alternative non-technical hands-on activity that focuses on visual and collaborative aspects, ensuring everyone can actively participate. Furthermore, students may struggle if they have little or no prior knowledge of sentiment analysis or lexicons and this should always be taken into consideration, perhaps by preparing a brief explanation in the beginning of the class, thus ensuring that foundational concepts are well-explained. Also, the students should be encouraged to ask questions and ask for clarifications, if the case. Students may also encounter difficulties when working in pairs and in groups, as this may not be their usual way of learning, and this may be overcome by showing them the benefits of collaboration in class. And last but not least, students may struggle with their group presentations, as they are shy or feel in the spotlight when discussing in front of the whole class. However,

when they have worked in groups, it may become easier because this task can be assigned voluntarily and more assertive or communicative students can assume this activity with success. By anticipating these potential difficulties and incorporating adjustments into the lesson plan, educators can create a more supportive learning environment, allowing students to overcome challenges and engage effectively with the material and the lesson itself.

Conclusions

In today's highly competitive business world, customer experience has become a critical factor in the success of any organization. Understanding how customers feel about your products, services and brand is invaluable in making informed decisions that can lead to improvements. This is where sentiment analysis or opinion mining comes into play. Sentiment analysis is not just a passive tool for understanding customer sentiment. It can provide valuable insights that enable companies to improve customer service and enhance the overall customer experience. By analyzing the sentiment behind customer reviews and feedback, businesses can better understand the clients' preferences. Sentiment analysis can help recommend products or services that match individual customer preferences, increasing the likelihood of people purchasing more of the services and products available. Analyzing these aspects is important in education, and including them in a class of any type, adjusting the activities and tasks according to the level and interest of students may prove insightful and aligned with the tendencies of today. Using sentiment analysis in class, not as a programming endeavor but as a means to, for instance, to engage in a foreign language, can be of interest to students at Bachelor's level in a faculty of Economics. Considering this, the article has described a practical exercise, meant as an experiment, of employing a natural language processing tool like sentiment analysis in a lesson of English as a second language. The stages of the lesson, its results, and feedback were described in detail, along with the limitations and possible problematic aspects of such a class. Some possible solutions to these problems were also provided. However, the lesson overall proved to be quite dynamic and interesting for students, and their feedback was positive on the whole. The main thing to be mentioned is that such a lesson should be repeated, using sentiment analysis in other creative way, or even included in a larger teaching project of using Content-based lessons in teaching a foreign language.

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LOCAL PUBLIC ADMINISTRATION'S PERFORMANCE ÎN ROMANIA

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Abstract: The objective of the paper is to apply the theoretical principles of performance evaluation in local public administration to the practical work of Ilfov County Council. To achieve this objective, the theoretical aspects necessary for the case study are presented. The concepts of efficiency, effectiveness and economy in the public sector, the factors influencing these concepts, and their control and evaluation are analysed in the paper. Performance management is presented at both general and specific levels. Indicators are used to measure the performance of a public service. Performance indicators are useful tools for decision-makers and officials involved in public policy-making in central government, as they give them a detailed (and close-up) picture of the existing situation and allow them to adapt their initiatives to the realities of the moment and set feasible and measurable targets. The stages of the decision-making process are presented, as well as the analysis of the performance of the local public administration activity within the Ilfov County Council from the point of view of the theoretical aspects presented above. To this end, the Council's strategic objectives, the decisions taken to achieve the objectives and the way in which they are achieved in both quantitative and qualitative terms are presented. The paper is based on a study of public administration legislation and on articles and treatises. The type of research is APPLIED, and in terms of objectives it is a DESCRIPTIVE RESEARCH. Considering that I will use efficiency, time and qualitative and quantitative indicators, the research will be PLURIDISCIPLINARY but equally QUANTITY TYPE RESEARCH. As the data analyzed will reflect the evolution of the indicators in view, we will have a DIACRONIC RESEARCH located at the international level, being at the same time a DOCUMENTARY research. In view of the considerations set out above, the theme chosen for the research is very topical.
Keywords: public administration; indicators; performance; decisions.
JEL Classification: Y.

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The performance of the local public administration

Efficiency, effectiveness, economicity in the public sector

Efficiency means "maximizing the results of an activity in relation to the resources used" (Legea nr.94/1992, 2009, art.2, lit.g). The notion of economic efficiency is dealt with in two-way and two-way practice studies:

a. Performance as a particularly good result of some activities;
b. maximum effect of some activities in relation to allocated or consumed resources.

In order to be able to analyze the activity in the public sector in terms of efficiency, efficiency must be understood and considered as a result of the influence of several factors such as economic factors, political factors, cultural factors, legal factors and, in particular, the human factor. Public managers need to take into account that if efforts can be strictly dimensioned, effects, especially social ones, are difficult to determine and can't be fully predicted, the activity of public administration being carried out in a social context subjected multiple influences.

Since efficiency can be quantifiable (economic effects) and non-quantifiable (social effects), public managers must consider both forms and the fact that they can have both present and perspective dimensions. The human factor is the key element of public sector

performance and performance and is the main coordinate of the size and especially the quality of public sector activity. Among the direct non-quantifiable elements but having multiple consequences on performance in the public sector, an important place occupies the efficiency of civil servants' work. In the public sector in Romania the human factor is one of the most neglected resources, the consequences of this situation leading to major negative effects. Efficiency "is the ratio between the result obtained and the means employed, in economic terms the ratio between output (what comes out) and input (what comes in)" (Matei, 2006, p. 194). Efficiency consists in getting the most possible results with the resource level or with a lower one.

Efficiency in public sector organizations exists when they deliver and deliver the appropriate public services in terms of quantity and quality, ensuring the correct management of all resources according to established levels. A public institution is effective when it manages to accomplish its mission and goals with planned or lower costs. The efficiency of the activity of the public administration authority is reflected in (Costea, 2000, p. 57):

- the quality of the administrative act;
- competencies, ability to work and exercise of duties;
- the capacity of local authorities to solve public policy issues in a timely manner.

Issues related to staffing in the public administration have direct influence on the level of efficiency of a public institution and its ability to fulfill its socio-economic mission for which it was created and operating. The efficiency of public management in general and of a public institution appears as a direct result of the professionalism with which the public managers manage to harmonize in the processes of management and execution the general coordinates of the thinking of the political representatives of the administration transmitted to be applied in the public sector and the mission social activity of the public institution operating in a certain social field, whose specificity is given by the content of the needs determined locally and which the institutions serve.

Efficiency means "the degree of achievement of the objectives scheduled for each activity and the relationship between the projected effect and the actual result of the activity concerned" (Legea nr.94/1992, 2009, art.2, lit.f). Efficiency "refers to the ratio between the result obtained and the objective to be achieved" (Matei, 2006, p. 192). Efficiency consists in achieving the objectives defined by public managers. This concept implies, on the one hand, the prior definition of an objective and, on the other hand, the measurement of the obtained result. It consists in the fact that the performance of the public administration is directed to the proposed goals, solving the public problems by a legal way and it also consists in achieving at the highest level the objectives defined by the public managers, which can be measured by the impact that the achievement of the objectives it has its customers.

Efficiency directly influences efficiency and is a human attribute that has its source in the personality, knowledge, reason of public officials, and in their relationships. Androniceanu defines effectiveness as "the whole process of achieving an expected, planned, desired outcome. Efficiency is the quality of producing the expected effect " (Androniceanu, 2008, p. 329). Without efficient and effective staff, it is not possible to organize rationally and efficiently the public sector, efficiency and effectiveness being essential and indispensable features of the civil servant's work. Without these

characteristics, the work of each individual public servant would have negative influences on the overall activity of the institution and would jeopardize the public interest.
Raising public managers' attention on human performance will positively influence the efficiency of the use of material and financial resources and the overall efficiency of public institutions and authorities. The value of public sector institutions and authorities lies not only in the material or financial means at its disposal, but also in its human potential. Economy is "minimizing the cost of resources allocated to achieve the expected results of an activity, while maintaining the appropriate quality of these results" (Legea nr.94/1992, 2009, art.2, lit.h).
Estimation of economy is done by using well-defined criteria, such as:
- the existence of adequate and comprehensive regulations on the organization and functioning of the activities in the audited areas;
- allocating sufficient funds and at the optimum time for organizing and functioning in good condition of public services;
- the existence of a price limit set in a given domestic policy;
- comparing a price charged in a previous transaction;
- Comparison with the average value of the "cost" indicator achieved by similarly performing entities.

The Court of Auditors carries out an "independent assessment of the economy, efficiency and effectiveness with which a public entity, program, project, process or activity uses public resources allocated to meet the objectives set." (HG. 1/2009, 2009, art.181, alin. 2). Performance audit is an independent assessment of how an entity, program, activity or operation functions efficiently and effectively, while respecting the economy. Audit of performance does not necessarily require concurrent analysis of "3E" - economy, efficiency, effectiveness.

Control and evaluation of public sector efficiency

Controlling and evaluating public sector efficiency are complex issues, sometimes generated by the impossibility of quantification of outputs or the precise and clear non-formulation of objectives. In this context, G. Hofstede makes an analysis of the types of control based on the four defining elements of an activity, which he formulates as four questions (Nicolescu et al., 2003, p. 253):

- Are the objectives pursued in the course of the activity unambiguously known?
- Are the results of the activity measurable?
- Effects of decisions can be known (by the hierarchically superior level of control)?
- Is the activity repetitive?

Based on these four benchmarks, six forms of control of the management of an economic activity, which can be used in the public sector activity (Table 1), are recommended.

Table no.1 Forms of control of economic activity management

The situation	Answer to question				Types of recommended control
	a	b	c	d	
1	YES	YES	YES	YES	Routine check
2	YES	YES	YES	NO	Control by experts
3	YES	YES	NO	YES	Control based on "test and error"
4	YES	YES	NO	NO	Control "intuitive"

5	YES	NO	NO	NO	“Subjective” control
6	NU	NO	NO	NO	“Political” control

(Nicolescu et al., 2003, p. 253)

"Routine control" is the type of management control currently performed in a typical organization: the objectives pursued are specifically formulated by the hierarchically superior level; the results, the level of touch of which indicates the degree of achievement of objectives, are perfectly quantifiable; decisions made by managers produce easily observable effects, and work involves an undefined repetitive process (eg, the set of goods and services being made is relatively stable). The control performed by an expert applies if the activity of the public undertaking is not repetitive. Control based on "test and error" is recommended in situations where it is not possible to see precisely what quantitative results are due to the manager's decisions and which are generated by changes in the environment in which the public enterprise acts.

If the activity is not repetitive, the difficulty of conducting effective control increases, and the only solution is to entrust it to a person who is not necessarily an expert in the field, but rather to have a sufficient public consideration to entrust his task of evaluator ("intuitive" control). "Subjective" control refers to a situation that presents the well-known issue of a priori inexistence of univocally defined and quantifiable results that allow the measurement of the activity being carried out. If the answer to all four questions is negative, the only possible form of control is "political" control.

Performance management

Performance can be defined by both results and behavior. The explanatory dictionary of the Romanian language defines "performance" as a result, as being particularly good. Developments over the past 20 years in public management have broadened focus on performance and measurable results. There is today in modern management of the administration a complex set of tools, methods and techniques where performance orientation is not just a slogan but the main framework on which decisions are based are implemented and then measured results and distance from the expected. The word "performance" is the bearer of an ideology of progress, effort, always to do better, and means to continually improve the parameters of the service provided both in terms of effectiveness and efficiency, but also taking into account the needs and expectations of citizens. The idea of performance means achieving a high standard of service, reforming or improving the methods and procedures used, such as involving beneficiaries, staff and higher hierarchical levels.

Performance includes all of the elementary logical steps of the action, from intent to actual outcome. This should not only be tracked and measured, but should be managed with four variables: cost, quality, time and organization. Performance management involves getting the best results from the organization, teams and individuals through knowledge and performance management. It is a systematic approach based on continuous processes of planning, evaluation and measurement of results, in line with its strategic objectives. The basic premise is that the achievement of the desired results leads to the achievement of the objectives of the organization and to ensuring its performance (Matei, 2012, pp. 5-8). Performance management must be understood as a continuous process, reflecting normal management practices, and not as special techniques imposed on managers. Its conceptual

framework includes terms such as "performance management", "performance", "performing organization".
Since management is the set of methods and processes for defining objectives, training and control in the service of the quality of external benefits and the ways of internal functioning, the management is interested in the public organization. In the opinion of specialists, there is a strong managerial move that seeks to transform more or less the public sector through the following four major mutations (Matei, 2006, p. 181):
- from a central administration on its own operation to an open administration;
- from a procedural administration and submitting to a responsible administration;
- from a vertical administration, where everything is commanded by the hierarchical pyramid, to a transversal administration, existing in the network;
- from the administration to the administration with results.

Management has a two-dimensional aspect, on the one hand, of the "macromanagement" that corresponds to the management of the organization, and on the other hand, the "micromanagement" that makes the system of relations between the manager and the employee.

Table no.2 The levels of analysis and action

	Define objectives	Organization	Allocation of resources	Training	Control
"Macro" = Organization Leadership	Strategy The organization's project	Assignment of missions coordination	Budgeting Allocation according to priorities	Internal communication Update work methods	Evaluation of results Driving activities
"Micro" = Manager / Employee Relationship	Individual objectives	Defining the function Delegation	Conditions and means of work	Individual conversations Motivation(+) and (-)	Appreciation Results Assistance Sanction

(Matei, 2006, p.182)

Performance can be assessed by reference to national standards applicable to all service providers or local standards used by the local government alone.

General Managerial Performance

General methodological and managerial performance

A first performance refers to the degree of organization management's awareness. This is expressed quantitatively by the number of systems, management methods and techniques used at a given moment for the exercise of management processes and their functions and qualitatively - in the manner of their methodical operationalization. This performance depends on the degree of participation and involvement of managerial tools in the management processes, which is given by the number and weight of managerial systems, methods and techniques that managers use to perform each function. To these will be added the competence of the managers, which is given mainly by the managerial knowledge possessed by the managers of the three organizational echelons of the organization.

General decisional performance

The degree of decision-making of the organization's problems is a performance that can be determined as a ratio between the number of decisions adopted at the organization level

and the number of problems it faced within a certain timeframe. Another performance is the degree of decision-making, which is determined by the actions initiated in the field led to the implementation of decisions. This performance indicator is determined on the whole of the management and on the organizational echelons.

Overall information - management performance

This performance represents the degree of satisfaction of the informational needs of the top, middle and inferior managers, determined as a ratio between the amount of information provided and the amount needed for each manager. At the same time, the satisfaction of the information needs of the contractors, determined by the same algorithm, is also considered.

Overall organizational performance

It can be delineated as the degree of procedural assurance of the objectives assumed for a certain period, which highlights the extent to which the delimitation and dimensioning of the work processes satisfy the claims imposed by the five categories of fundamental objectives, derivates I, derivates II, specific, individual. In the same context, the degree of structural and organizational coverage of the work processes involved in achieving the objectives is considered (Verboncu, 2005, p. 18). In order to achieve the objectives, work processes, found in different forms of aggregation, are required in the procedural components (functions, tasks, tasks, tasks), and a properly structured structural-organizational framework is necessary for their proper development. Any procedural component must have a structurally-organizational support that is properly delimited for it to be exercised. Failure to comply with these correspondences inevitably leads to the failure to achieve the objectives.

Specific Managerial Performance

a. Methodological and managerial performance. The most important performance is the quality of managerial tools. This is highlighted by:

- the opportunity to call and use a particular management tool (management system, method or technique);
- the integrity of the requested system, method or management technique, for the proper use of all its components, and any truncated approach being sooner or later disappointed by the failure;
- observance of the specific methodology of operationalization of the chosen managerial tool;
- the synchronization between the requirements and requirements of the chosen management system, method or technique for promotion and use, on the one hand, and the competence of managers and executors directly involved in their operation;
- the synchronization between the managerial tools employed and the management functions in which they directly participate in the exercise.

The second methodological and managerial performance is the quality of the design, operation and maintenance methodologies of its management and its components. This is reflected by:

- respecting the specific phases and phases of managerial design / redesign as the fundamental premise of the success of such a complex, strategic approach and a pronounced innovation;

- taking into account the specifics of the applicative environment (the process or structural organization or components at which it is operationalizing);
- the correspondence between the content of the methodology, the requirements and requirements imposed by its application and the competence of those operating it; it is very important for the methodology, regardless of complexity, to be understood by managers and executors, so that application proceeds quietly towards performance;
- the opportunity of the design / redesign methodology, highlighted by the application period; it is very important to operationalize the methodology in an optimal timeframe, when the change, modernization or improvement of a domain is necessary.

b. Decision performances. The most important performance is the quality of managerial decisions. This can be highlighted by:

- scientific substantiation - assured, on the one hand, by the existence and capitalization of relevant information on the problems to be solved and, on the other hand, especially in the case of strategic decisions, the use of appropriate managerial tools for substantiating and adopting decisions, depending on the decisional situation in which the problem to be solved falls;
- empowering the decision - given by the actual involvement of the person or persons having the necessary authority (decision-making power or right to decide in a particular area);
- it is assumed that the decision-makers have the knowledge, skills and aptitudes needed to harness the official authority assigned to the post, ie they have the personal authority required to solve the problems they are facing;
- the appropriateness of the decision - namely, the adoption and enforcement of the decision within a timeframe considered optimal; any overshoot makes the decision adopted unnecessary. Thus, it is preferable for a less substantiated decision to be adopted in the optimum period than a superior decision taken outside it;
- integration into all microeconomic decisions implies, firstly, the outlining of objectives, belonging to the organizational system's fundamental system (fundamental, derivative or specific). Secondly, a horizontal correlation is needed in the sense of harmonizing decisions made by managers on the same hierarchical level regarding complex decision-making issues that require the presence of multiple compartments;
- the proper formulation of the decision, ie the retrieval of the following parameters in the text (responsible for it is the decision-maker): (expressed explicitly), the decisional objectives, the modalities of implementation, the necessary resources, the date of adoption, the date of application, the place of enforcement and the decision-maker.

Also, the quality of the decision-making mechanisms (decision-making acts and processes):

- the opportunity to substantiate, adopt and enforce decision-based decisions or decisions. The premise of such a qualitative parameter is the typological framing of the adopted decisions. Only the current decisions are the consequence of the decisional acts, in their adoption being necessary, the experience, the flair, the talent, the intuition of the manager (the decision-maker);
- the observation of the methodology specific to the strategic tactical decision-making processes, that is, the recapture of some representative stages, without which the quality of the "finished product", ie the decisions taken and its efficiency, suffers;

- the quality of the parameters of the acts and the decisional processes, ensured by: the competence of the decision-makers, individual and group; with reference to their knowledge, skills and aptitudes (personal authority); realism of decisional goals; the accuracy of decisional criteria; substantiating decisional variants; realism of consequences / decisional results;

- the synchronization between the hierarchical position of managers (decision-makers) and the types of decisions adopted, known as the extremely high variety of decisions taken and the equally diverse decision-making of managers;

- the correspondence between the decisional requirements of each management function and the decisions taken (the decisional intensity of management functions).

- correspondence of the functions of the organization - decisions adopted (decisional intensity on functions). Given that the exercise of managerial functions affects process components (work processes found in different aggregation formulas, from tasks to attributions, activities and functions), it is very important to give them a distributed attention in relation to their importance in the organization's economy and contributing to the achievement of the various types of objectives.

- correspondence official authority - personal authority (competence granted - competence in fact);

- correspondence between the typology of decisions and the content of trends in management and its major components.

c. Information performance. The quality of information is a fundamental requirement that is ensured through:

- realism, respectively, the use of information that faithfully reflects the situation of the organization and its contextual environment;

- multilateralism, ensured by the approach of phenomena and processes, prism of some aspects of economic, technical, social, etc. and their retrieval into the information;

- dynamism, in the sense of highlighting the processes of work in their evolution;

- opportunity - recording, transmission and processing of information in a timely manner, thus ensuring effective decision making and operational processes;

- adaptability - the quality of the information circuits and flows is evaluated according to the length, content and costs of the information transmission. The quality of information procedures can be highlighted by: the quality of information handling tools and the quality of informational situations (documents).

d. Organizational Performance. These performances relate in particular to procedural organization and structural organization. The process organization can be evaluated by the accuracy of the delimitation and dimensioning of the procedural components (tasks, tasks, tasks, functions). Structural organization can be assessed by: accuracy of delimitation and dimensioning of structural components.

Practically, the work processes, delimited in tasks, attributions, activities and functions, can’t be exercised, and the fundamental objectives, derivates I, derivatives II, specific and individual, can’t be achieved unless the structural and organizational components are delimited and sized accordingly: positions, functions, compartments, hierarchical levels, hierarchical weights, or organizational relationships. Significant are posts and compartments (no matter what their name), where work processes take shape.

Correlation to hierarchical levels - hierarchical weights, implies shaping even more balanced dimensions of leadership rules for managers located on the same hierarchical

level. The flattening of the organizational structure, which requires a reasonable number of hierarchical levels to allow a fluency of information (shorter information circuits and information flows) and, on this basis, a rapid information of managers and executors involved in substantiating and adopting decisions and actions. The quality of organizational relationships is dependent on the constructive and functional characteristics of the organization and the type of organizational structure adopted. It would be desirable for the structure of organizational relations to be oriented towards functional and functional relations of cooperation, much closer to participatory management.
The degree of functional specialization of positions and compartments is a criterion of organizational performance, which implies a certain procedural endowment of these two structural components. An exaggerated specialty at the level of postures may generate their routine occupants in everything they do and, in time, even inefficiency. The quality of the organizational documents is another important quality parameter in the appreciation of the organizational system. It assumes that the organization and operation rules, organization chart, job descriptions and job descriptions faithfully, procedurally and structurally reflect the organization, departments, functions and positions of management and execution. Mobility-stability correspondence is an asset of any type of organizational structure, insofar as it allows the operation of changes whenever needed, without, however, substantially disrupting the normal operation of the organization (Verboncu, 2005, pp. 16-19).

Performance and quality of public services

Broadly speaking, public services are defined as "assemblies of persons and things created to meet a public need by a public body subject to its authority and control" (Alexandru, 1999, p. 293). Over time, citizens' claims to the quality of public services have increased. They refuse to be treated as mere consumers and prefer to be seen as customers in the context of supply and demand also in the public services sector. This position changes the very meaning of the concept of public service, for which every citizen has an obligation to contribute in the form of taxes and duties, which is transformed into services for the public. As in any private or public enterprise, in order to ensure the success of its missions, the traditional concept of public service must be changed, with emphasis on quality and diversification.
The management of public services, unlike the production of goods, is more complicated due to the specificity of their realization, namely (Nicolescu et al., 2003, pp. 202-203):

- public services are intangible, have immaterial expression;
- public services are not storable, so there is simultaneity between the moment of production and consumption;
- public services are interactive, requiring the active presence of the consumer at the time of their production;
- public services have a low capitalization rate.

Performance management of service quality highlights two fundamental issues:

- How do we measure and evaluate the real level of performance?
- How do we make the performance measure a weight and how do we ensure the performance?

Both are issues that relate not only to service standards, but rather to performance management. However, there are a number of difficulties in measuring performance.

The overall objective of performance management is to continuously improve quality, efficiency, and effectiveness by focusing on the results and consequences of public services in relation to internal processes. Quality in public administration is both an engagement and a challenge. Quality requires efficient services, as well as a personalized relationship with the public and greater satisfaction with the requirements of the public. Quality is measured by the absence of mistakes, omissions, defects, complaints and misunderstandings when appealing to the entrepreneurial spirit and creativity of civil servants, placing citizens and consumers of public services at the heart of the administration's activities.

Making transactions with public institutions should be simple and agreeable, and not pretentious and disagreeable. Pleasant character covers several qualitative aspects of a service, such as the politeness with which the client is treated or the degree of comfort and cleanliness in public offices or public transport. Simplicity is a fundamental aspect and a series of initiatives on service quality have as their primary objective the administrative simplicity. Thus, the forms should be easy to read and understand, and working with a public institution should not be likened to an obstacle course. Performance information should be used constructively to increase performance and not to establish guilty for poor performance.

Reporting performance indicators and metrics involves questions such as: What should you relate to and with whom? Who should be reporting? and What form should the report embrace? The following classification of different types of performance information can be made (Matei, 2006, pp. 197-200):

- customer information - these are information that allows the customer to evaluate the content - quantity and quality - of the service and possibly to choose;
- management information - these are relevant information only for the organization's internal management that provides a basis for correcting production processes, content, etc.;
- information from control bodies - these are the information that enables the decision maker to evaluate the results and impact of a service in order to be able to make possible changes to the strategy or programs.

For performance to count, a mechanism of performance or service agreements may be applied, possibly with financial penalties if the performance of an organization does not reach the required level. In such cases, the system of remuneration of managers and functionaries can be applied according to performance. Public recognition through public praise or awarding prizes and certificates can motivate staff (work done in EU countries).

Some countries pay attention to performance through agreements between institutions and ministries, others practice a bottom-up approach to implementing service quality initiatives and pay less attention to how to prepare and motivate first-line officials to improve service quality. Service quality initiatives may require improved physical working conditions, but also the physical appearance and presence of civil servants, greater flexibility of the work program, important factors in motivating staff.

Another aspect of the performance management system is the right to complaints and redress. This system may increasingly involve appeals against administrative decisions or the establishment of equal rights, rather than complaints about the quality of a service.

In conclusion, in any organization efficiency is a priority and obtaining economic and financial performance is the result of general and specific managerial performance.

Management and exercise should not be regarded as an end in itself but as a factor in enhancing the efficiency and effectiveness of an organization. An efficient management provided by professional managers is absolutely necessary to achieve great performance.

Measuring the performance of a public service

Performance measurement means the permanent process of monitoring, evaluating, and reporting on how programs or activities are carried out at all stages of their deployment.

Performance appraisal in service organizations is a prerequisite for any effort to improve the management of local public services. This allows for strengthening the control of local public authorities on the management of public services, assuming the responsibility of managers and executors for the quality of decisions and how to implement them, fostering the transparency of public interest activities and collaboration with the beneficiaries of the public services offered.

Performance appraisal in public services is based on the following:

- correctly identifying the needs of the beneficiaries / users;
- determining the objectives and programs related to the identified needs;
- achieving a quality of services close to the needs of citizens;
- ensuring the best productivity and the lowest price of services.

The stages of design and management of a performance evaluation and monitoring system are (Matei, 2012, pp. 7-8):

1. Guaranteeing management commitment;
2. Delegating the responsibilities (leaders or staff) of managing / coordinating the efforts of the development department of the Performance Indicators;
3. Selection of departments / activities / functions for which performance indicators will be developed;
4. Identifying goals and objectives;
5. Conceiving indicators that reflect relevant activities to achieve goals:

focusing more on the quality of services and outcomes than on contributions and workload;
the inclusion of a small number or too many indicators;
request the contribution / endorsement of those with execution and management functions;
identifying beneficiaries and focusing on service delivery;
examining regular surveys of citizens, service recipients;
inclusion of effectiveness and efficiency indicators.

6. Determining the desired frequency of reporting on activities;
7. Delegation of responsibility for data collection and reporting;
8. Delegating centralized responsibility for receiving and monitoring data and for sharing views;
9. Regular audit of activity data;
10. Incorporating an appropriate benchmark in activity analysis;
11. Linking the performance appraisal system with important decision-making processes (eg. goal setting, policy making, resource allocation, employee improvement and remuneration, program appraisal);
12. Continuous improvement of performance indicators;
13. Incorporate selected indicators into population information reports.

Public service performance is measured using various indicators, grounding feedback and determining decisions about improving organization performance or designing new parameters.

Monitoring and evaluation are two essential steps in measuring and analyzing the results obtained from the expected results. Within these processes, the transition from the traditional control-based approach to the approach based on data and information-gathering is measured to measure performance. Monitoring and evaluation are correlated and interdependent processes. Monitoring is "the periodic collection and analysis of information in order to substantiate the decision-making process by those empowered, ensuring transparency in decision-making and providing a basis for future evaluation actions" (Moraru et al., 2009, p. 21). It is necessary to use the relevant information gathered from the monitoring activity in the elaboration of the evaluations. The accuracy of the data obtained from the monitoring process requires a systematic and careful collection of the data. In order to analyze the performance of the public service in relation to the goals set, there must be a set of indicators.

The indicators are:

- Quantitative - expressed in numerical or percentage terms;
- Qualitative - can measure perception, can help describe behaviors.

Establishing clear, concrete and measurable objectives and results / results helps to establish easy-to-measure performance indicators. When setting indicators, account must be taken of the clarity and univocity of the links between the indicators and the purpose, objectives, and results. Also, when establishing the indicator system, the specificity of the selected indicators must be considered (they must match the purpose for which they were developed). The information may be of different relevance for different users, so we can have the following typology of performance information, namely:

- „customer information (these are information that allows the customer to evaluate the content - quantity and quality - of the service and possibly to choose),
- management information (they are relevant only to the internal management of the public organization, which provides a basis for the correction of production processes) and
- Information from control bodies (information that allows the decision maker to evaluate the results and impact of a service in order to make possible changes to the strategy or programs).

Performance information should have a precise target and be easy to evaluate, accurate, concise and formulated in clear and direct language. In order to be used in monitoring and evaluation processes, indicators should be relevant, useful, sustainable and verifiable. The relevance of the indicators is their ability to measure the programmed results as fully as possible; the utility is to be provided at regular intervals and to be used by public authorities; sustainability consists in the possibility of using long-term and minimum cost indicators and the verifiability is related to the possibility of controlling the quality and consistency of input and output data in the process of calculating the indicators.

Key characteristics of the indicators can be summarized as such (Matei, 2012, pp. 9-11):

1. Measurability - indicators must be expressed in a form that can be measured. Even though the indicators are qualitative, they have to be elaborated in a measurable form;
2. Validity / Availability - they must be accessible either to the purposes they measure or to the time available to achieve certain goals;

3. Realism - indicators need to be set in a realistic way, closely related to the way the goals are formulated. There is no need to set complex, vague goals, expressed in a metaphorical form, because they can become unmeasurable;
4. Planning in time, just like each goal or outcome, each indicator must have a timing, duration, period;
5. Clarity - the indicators must be clearly defined, their interpretation be simple, with the possibility of showing trends of evolution (ascending, decreasing, constant);
6. Reliability / Precision - Measuring the indicators, the data used, must be reliable.
Indicators must also meet the following conditions / requirements:
a) be appropriate / match policy / strategy;
b) to be clear from the analytical point of view;
c) the data needed for the measurement to be accessible / simple / comprehensible / verifiable.
The main types of indicators are:
Basic indicators are used to compare the results / effects of similar public policies. These are easy-to-measure and monitored indicators over longer periods of time. Basic indicators reflect the established priorities and provide information on the direct and indirect consequences of a particular public policy. In Romania there are two main types of basic indicators:
a) Administrative indicators show government action in an administrative and managerial way, as well as planning capacity, utilizing the resources available to achieve the objectives.
b) Performance indicators are formulated to assess the real impact of public policy at an economic, political, social, and environmental level. Specific indicators may be used according to the sector in which public policy is formulated. In order to measure the achievement of the results of the public policy implementation or the strategic plan of the institution, it is necessary to establish the performance indicators. Performance indicators measure the relationship between objectives and outcomes in a performance and impact / impact monitoring and evaluation system, while administrative indicators measure the resources and activities of the public authority. Performance indicators are useful both when assessing policy outcomes and when assessing their impact - the long-term effects of policy and how the objectives originally proposed were achieved. Performance indicators may be general or specific.
Generic performance indicators are those indicators that need to be taken into account whenever public policy is monitored and evaluated. The main overall performance indicators are:
1) Indicators on resources and activities (input indicators) - encompass all the resources allocated to each level of public policy. The role of this type of indicators is to provide information on available resources (human, material, financial). Monitoring of resource indicators is necessary to have a picture of the quantity of resources in each phase of the policy;
2) Result indicators (output indicators) - are indicators related to the activities undertaken and measure their direct results. Output indicators are measured in monetary or physical units;
3) Result indicators are related to the direct effects of public policies. Provides information about changes in the behavior, ability or performance of their direct beneficiaries. These

indicators may be of a physical nature (reduction of travel times, number of road accidents) or may be economic / financial (lower transport costs).
4) Impact indicators refer to the consequences of public policy beyond the effects on direct beneficiaries. There are two types of impact concept definition. The specific impact that occurs after a period of time but which is directly related to the actions taken and the overall impact that is a long-term effect affecting a significant part of the population.
Specific performance indicators are indicators whose application differs from one policy to another and from one sector to another. The main types of performance-specific indicators are: macroeconomic indicators and analytical indicators.
Analytical indicators are those indicators that measure the relationship between resource allocations, proposed outcomes and resource allocations, and the results obtained. This type of indicators are used to determine how best to obtain the least resource outcomes - analytical indicators are used to determine the effectiveness of government action.
The main categories of analytical indicators are: Economic Indicators, Efficiency Indicators - Cost and Productivity Efficiency Indicators, Efficiency Indicators and Quality Indicators:
- Economic indicators measure the correct and efficient use of allocated resources. This type of indicator is used only to measure the quantity of resources allocated for a policy. However, in some cases, improving economic indicators may entail lowering the quality of goods and services produced by not always reducing the quantity of resources allocated leading to efficiency.
- Efficiency indicators measure the relationships between the results obtained and the resources allocated to them. Efficiency indicators take into account both the costs and the productivity needed to obtain the result.
- Efficacy indicators measure the extent to which the public institution has succeeded, through the results of its policies, to attain its established objectives, responding to the main challenges posed by society and the needs of citizens. Efficiency indicators allow analysis of the relationship between the results of public policies, policy goals and citizens' needs.
- Quality indicators measure service quality, being a type of assessment / appreciation that describes the services provided to citizens and institutions in terms of customer speed, availability, rate, continuity, quantity and satisfaction. This type of indicator measures the quality of products and services compared to established quality standards. This means that service standards must be established and approved in advance in order to make appropriate measurements.
By minimum quality standard (HG nr.961/2009, 2009) we understand that is the lowest quality standard that applies to a service provided to citizens and meets the requirements of the law. The values of the minimum quality standards and the related objectives shall be specified for each category of direct beneficiaries.
The quality standard is a service statement and will normally act as a reference in the organization and operation of services. It can also be used to check whether the service has been provided as requested, but standards must be made in a way that can be customized.
Performance indicators may be set to measure the performance of the service provider as well as to verify that the services provided comply with the standards described.
Cost indicators can be set to monitor the cost-effectiveness of the service as well as the cost / efficiency ratio of the service compared to the result indicators. Result indicators measure the impact of the service on the beneficiary.

The process of determining performance indicators is a complex one, precisely because public services are somewhere on the border between competitive logic and social logic, which requires a balance.

Performance Indicies

Performance indicator – Quality and efficiency of public services

Measuring performance in public institutions and services through the systematic use of performance indicators is a step towards public administration reform that brings with it an additional rigor and transparency of the work of these structures, which is so necessary for the public sector in general. One of the common features of the Southeast European states after the fall of communism is the lack of practice of planning and setting development and investment priorities (Sevic, 2003, p. 8). Not only Romania has this feature, but also other countries where planning was a very common term, but mostly applied by central public authorities.

Performance means continuous improvement of the parameters of the service provided, both in terms of effectiveness and efficiency, but also the needs and expectations of citizens. For this purpose, the idea of performance involves achieving a high standard of service (not just getting the lowest cost), reforming or improving the methods and procedures used, but also actively and creatively involving the beneficiaries, staff and higher hierarchical levels (Cf. Office of the Deputy Prime Minister, 2005).

Performance can be assessed by reference to standards established at national level and applicable to all service providers or local standards used by the local government alone. Those in the first category must be limited to areas or aspects considered strategic at a given time (eg waste recycling); the others may be established in any area of significant importance to the local community concerned. This separation reflects the fact that often the needs of local communities are different and therefore the actions taken must be adequate. However, before designing a performance measurement system, it is absolutely necessary to define the priorities for each local community. The document that represents their source is the local development strategy that can address the entire activity of local government or specific areas. The policy objectives set out in the strategy are derived either from national targets for areas under local responsibility or from the needs of the respective community. They should be (SMART): specific; measurable; suitable; realistic; delimited in time.

The performance measurement system is part of the local development strategy and quantifies the degree of achievement of its objectives. The system uses indicators, measurable factors that show to what extent the objectives have been achieved. The development of the strategy and the indicator system are the first steps in the implementation of a performance measurement system, according to the following steps (Sevic, 2003, p. 69):

- defining the strategic plan;
- choice of indicators;
- choice of collection methods;
- performance management plan review.

Stages of design and implementation of a performance measurement system in the public sector:

- As far as the nature of the indicators is concerned, the literature identifies two categories: those defining the different concepts of performance, and those through which it is determined what is measured in concrete terms.
- If in the first case there is a rather general typology of the classification of performance indicators, in the second case it practically practically follows what is being pursued when a system of performance indicators is being built.
- Proficiency indicators are categorized by two key concepts, namely, those who can effectively measure those performances (those that are quantifiable), and those who have the capacity to develop the application of concepts to the scope (where we want to use them on a general or special basis).

Categories of performance indicators:

- effectiveness - the level to which a particular product or outcome meets the requirements;
- efficiency - the level to which a particular process produces the result according to the requirements with minimum effort;
- economics - the level of minimization of the cost of the resources allocated to achieve the expected results - while maintaining the appropriate quality of the results;
- quality - the level at which a particular product or result meets the expectations of the beneficiaries;
- deliver on time - if a unit of product or the result has been done correctly and on time;
- productivity - value added to process related to labor or capital value;
- cost benefit - the ratio between the costs incurred and the benefits obtained, if there is a profit, an advantage;
- utility – the ratio between the cost and the utilty.

Types of performance indicators:

Input - the amount of resources used to produce a particular product, resulting - eg. the number of specialized personnel working within the social assistance service, the average cost of one km of mountain county road;

Process - the amount of work required to produce a certain result - eg. number of households served, number of beneficiaries of public service;

Output - the amount of services or products made over a certain period of time - eg. km of county road modernized (result);

Outcome – events or changes in conditions, behaviors or attitudes that indicate progress towards the mission or objectives of the program - The number of persons with an economic and social impact, the modernization of the county road, the percentage of respondents who classify the quality of the public service (Sevic, 2003, p. 38).

A balanced system of performance indicators should include as many indicators as possible, with the focus on measuring the impact of the public service provided. They indicate the effect on the beneficiaries of public services and are usually measured by their degree of satisfaction. As a general assessment of the frequency of use of different types of indicators by local public authorities in Romania, it can be said that input indicators are predominantly used, indicating the quantity of resource used, in this category most often the financial indicators are used. These indicators are not relevant to measuring the

performance of local government. Without underestimating the importance of the financial data that must be included in any public policy impact assessment analysis, it should be stressed that the use of result and impact indicators also means bringing the beneficiaries of the services at the same time, of the concrete effects that the amount of resources (input) on the members of the local community (output and / or outcome) produced.

Measuring the impact of public services may, however, be a difficult effort, as variables that have produced a certain effect can not always be accurately identified. For example, more programs, sectoral policies and interventions of both the central public administration (the ministries responsible for traffic and transport) and local ones (local public authorities that manage roads or streets can contribute to the increase of the traffic flow in a municipality) and public transport in common). At the same time, the effect of the measures is recorded over time, over several budget years, which makes it even more difficult. An ideal system of measuring performance in the public sector should reflect as fully as possible how local authorities manage to exercise their responsibilities.

Thus, the performance indicators should represent each area of activity of the local government, have the so-called "objective" assessments (generally the indicators referring to the financial and staff resources), but also the "subjective" ones which aim at assessing the satisfaction of the beneficiaries of public services), collected both by quantitative and qualitative methods. We consider it very important to know the opinion of the citizens about the quality of the public services that they benefit from; the surveys can indicate the deficiencies in the activity of the providers, the needs or particularities of certain areas within the territorial-administrative unit, as well as the degree of satisfaction with the activity of the local authorities. In practice, performance indicators, as the case may be, and those included in the research of the Institute for Public Policies are limited, from the elaboration stage, to the precarious level of internal management of statistical data from the public administration in Romania.

Existing reality cannot be changed overnight, but the application of a policy that combines incentives with penalties, data collection can become, in some years, a permanent and systematic practice so that performance measurement is possible. Measuring the performance of public institutions or providing public services is one of the most commonly cited objectives of any government reform program or strategy.

The usefulness of such an approach appears to be unambiguous, but practice is so difficult that most of the time the goal remains at the desideratum. However, decision-makers, policy-makers, civil society and even citizens have resumed the subject with obstinacy, seemingly more mobilized by each failure, to show that this commendable approach to quantifying the results and eventually the impact of resources used to produce good public is possible. Performance indicators can become particularly useful tools for mayors interested in systematically monitoring and evaluating the work of subordinate structures and communicating progress to community members. Performance indicators can become particularly useful tools for local community members to determine whether local elected representatives meet their expectations or promises. Performance indicators can become particularly useful tools for any local elected, civil servant or citizen who wants to compare the state of affairs and the evolution of their own administration with those of other localities. They can also become useful tools for locally opposed politicians in the field of ongoing evaluation and monitoring of the mayor's work, and to publicize the failure of the mayor if necessary.

Performance indicators are useful tools for decision-makers and officials involved in public policy-making in the central public administration, as it provides them with a detailed (and close) view of the existing situation and enables them to adapt their initiatives to the realities of the moment and to set up feasible and quantifiable targets. Despite all these arguments, measuring performance in its simplest form, systematically collecting statistical data, seems to be still unknown even for some local governments at county level municipalities. Often, the justifications provided by local government representatives for the general lack of information were that, once the management of a service was delegated, their responsibilities were reduced to a minimum, operators assuming the obligation to deliver it at the parameters specified in the contract. The responsibility of developing development strategies and programs, monitoring the performance and control of operators' activity remains with the local public administration authority irrespective of how the service is managed (Lambru and Mărgineanu, 2004, pp. 10-50).

Case study. Performance measurement in local public administration. Performance of county and local counselors' work

Decisions of the county council of ILFOV – activity's performance

The County Council is an authority of the public administration, established at the level of the county, with the role of coordinating the activity of the municipal, town and municipal councils, in order to realize the public services of county interest. It operates on the basis of the principles of local autonomy and the decentralization of public services. Structure of the County Council - it consists of the county councilors, elected by universal, equal, direct, secret and free vote expressed in the conditions stipulated by the law (the number of the members of each county council is established by order of the prefect, according to the number of the inhabitants of the county - NIS on January 1 / July 1 - the previous election) (Legea nr. 215/2001, 2001, cap. VI). The activity of the County Council of ILFOV is based on Law no. 215 of 2001. Thus, the 30 elected councilors were validated and took the oath, of whom 2 vice-presidents and one president were elected. 7 Specialized Commissions of the Council were structured as follows:

- Budget, Finance, Bank, Prognosis and Economic Studies Committee;
- Commission for organization and urban development, public works, architecture and administration of the public and private domain of the county;
- Public Service, Social, Trade, Privatization and European Integration Commission;
- Education, Health, Family, Social Protection, Child Protection, Sports, Recreation and Tourism;
- Local, legal public administration commission, defense of public order, observance of citizens' rights and freedoms;
- Culture Committee, Preservation of Historical Monuments, Cults and Minorities;
- Committee on Agriculture and Environmental Protection.

The meeting of the County Council shall take place at ordinary quarterly sessions and in extraordinary sessions whenever necessary at the request of the President of the Council, at least 1/3 of the members of the council or at the prefect's initiative. The adoption of the Council decisions and the provisions issued by the President are made according to the provisions defined by the Law no. 215/2001, through the exercise of its duties performs

the operative management of the public administration at the county level. We can say that the mission of the specialized apparatus of the County Council is:

- the precise and effective satisfaction of the requirements and expectations of the public;
- Improving the external appreciation of public services offered;
- performing transparent processes and activities and keeping them under control;
- functioning in accordance with current legislation;
- improving the transparency of decision-making;
- effective bureaucracy, geared to the demands of the public;
- increasing the efficiency and quality of administrative work;
- discouraging the possibilities of corrupting the system and employees;
- ensuring the integrity, impartiality and effectiveness of public authorities and institutions.

The assumed objectives of the County Council of ILFOV (Consiliul Judetean Ilfov, 2020, p. 6):

- Increasing the role and functions of cities and municipalities in the development of the regions - it is a priority for the development of the county and is registered in the National Strategy for Regional Development (Investments that support economic growth, environmental protection, improvement of urban infrastructure and social cohesion). For the implementation of the projects for the increase of the role and functions of the cities and municipalities at the county level, 4 decisions of the council for their approval are required.
- Increasing energy efficiency in the public sector - 20% reduction in CO2 emissions, in line with the Europe 2020 Strategy.
- Increasing the accessibility of regions by improving regional mobility and providing essential services for sustainable and inclusive economic development.
- Regenerating deprived areas and fostering social inclusion of marginalized communities by creating the necessary premises to ensure these communities with essential services and decent living conditions.
- Increasing regional economies by developing specific innovation and research infrastructure and boosting the competitiveness of SMEs.

The strategic objectives of the Ilfov County Council (Consiliul Judetean Ilfov, 2020, pp. 7-12):

- Strengthening Ilfov's competitiveness in the context of the neighborhood with Bucharest;
- Increasing the quality of life for the residents of Ilfov County;
- Ensure a high degree of mobility and accessibility for residents and the business environment in Ilfov County;
- Increasing institutional capacity to improve the quality and timeliness of the administrative process.

The competence of the County Council in achieving the objectives proposed by the decisions is visible in the table below. Among the decisions adopted by the County Council, those that were in line with the proposed projects include: financing, setting up, structure, allocation of resources for the established objectives.

Tabel no. 3 Performance of the County Council of ILFOV

Crt. Nbr.	Decision of the County Council	Number of decisions	Project achieved	Year	Projects established through the development strategy	Year
1.	County council decision	15	5	2016	78	2016
2.	County council decision	28	27	2017		2017
3.	County council decision	23	23	2018		2018

(Consiliul Judetean Ilfov, 2020, pp. 7-12, official website)

Activity performance can be defined at the institutional, group, or individual / individual level depending on each situation we refer to, the measurement is different depending on the methods and techniques that can be applied. As far as the County Council is concerned, its performance can be related to the number of decisions it has taken over a period of time if the results obtained following the adoption of these decisions have led to the achievement of the proposed projects and established at the beginning of that year. Even if certain Council decisions are the result of a procedure deriving from the legal framework, the Council for the adoption of the budget, etc.

A special role is played by the legislative initiative that the counselors have shown during one year, which were given by the council after the legislative initiative, considering that it is the "driving force" of the administration at the county level. The performance of county councilors can be highlighted at the level of all counselors, at the level of political advisory groups or at individual level. As for the individual performance of local counselors, we can perform a performance interpretation based on the following criteria:

- attending Council meetings;
- the number of decisions adopted (as the counselor voted);
- legislative initiative (even if the law requires a certain procedure);
- the objectives of the County Council - if by the exercise of the vote in the council it agreed the established objectives;
- time – 1 year;

The council's decisions on projects are not as large compared to the total number of decisions taken in one year. In 2015 out of 15 given decisions, only a quarter of the projects were completed, which shows us the performance of the counselors was not that good. The following year things are different. Of nearly 30 decisions, around 90% of the projects have been finalized. In my opinion, it is a real success. The progress of the county council in terms of performance is visible. And in 2017 things were as good as they were. In fact, fewer decisions, but the success rate was 100%. Since the strategy was implemented by 2020, the local council has three years to meet all the general objectives set out in the strategy. There are almost half of the implementation, and at the pace of 2016 and 2017, I believe that by the end of 2020, almost 80% of the objectives will be met, which is a real success given the bureaucracy in the Romanian public administration.

Decisions of the Local council of Chitila – Activity's performance

The activity of the Local Council is regulated by Law 215/2001, republished, on local public administration, with subsequent amendments and completions. Thus, the 17 elected councilors were validated and took the oath, among them the deputy mayor of the locality, who also retained the status of local councilor. Within the Local Council were established 3 Specialized Commissions of the Council, as follows (HCL nr. 76/24.06.2019):

- Commission for economic and social development programs, budget-finance, city and public administration of the city, agriculture, urban management, environmental protection, services and commerce;
- Commission for Education, Health, Culture, Social Protection, Sporting and Recreational Activities;
- Commission for local public administration, legal, defense of public order and peace of citizens' rights.

The meeting of the Local Council takes place during the ordinary monthly meetings and in extraordinary sessions whenever necessary at the request of the mayor of the locality or at the prefect's initiative. The adoption of Council decisions and the provisions issued by the mayor shall be in accordance with the provisions laid down in Law 215/2001, republished, on local public administration, with subsequent amendments and completions, and through the exercise of its duties, perform the operative management of the local public administration. In order to fulfill the attributions provided by the legislation in force, the mayor of the city is served by a specialized apparatus. Depending on the specificity of the tasks, the mayor organizes his specialized apparatus in organizational structures, respectively, services, offices and compartments.

These organizational structures of the mayor ensure the fulfillment of the attributions of the local public administration authorities established by law and other normative acts, as well as by their own decisions. The mayor's specialty apparatus is organized according to The Local Council Decision, which also approves the organization chart and the state of affairs. The local council adopted by decision a plan of measures and actions to be taken in order to achieve the objectives of the development strategy of the locality. In these circumstances, we can say that we have a measure of the performance of the local public administration management insofar as the objectives included in the development of the locality have been materialized in measures and actions that are well-timed, the sources of financing identified and prove their sustainability. The adoption of strategic tactical decisions (the most important in the organization's economy) requires a specific methodological approach, namely a complex decision-making process, structured in several stages.

Tabel no. 4 The stept of the decision process

Crt.	Stage	Content
I	Defining the decisional problem	It defines as comprehensive as possible the strategic - tactical nature of the organization, whose decision - making has a considerable influence on the field
II	Establishment of decisional objectives and criteria	The objectives and the decisional criteria are clearly specified; we take into consideration the categorical system of objectives, the correlations with the other domains of the organization, the influences of the environmental variables
III	Specifying decisional variants	It defines the main ways of achieving the decisional objectives, respectively the decisional variants.

IV	Choosing the optimal option (deciding)	Choose the variant that meets the requirements of several decisional criteria and ensures the achievement of the foreseen objectives; the decision-making tool intervenes, depending on the complexity of the problem, the degree of substantiation of the decision depends on the quality of the decision-making methods and techniques used.
V	Applying the decision	Actions are being taken to operationalize the decision, which involves appropriate steps in the field.
VI	Evaluation of the decision	Comparing the results obtained from the application of the decision with the expected objectives to determine the effectiveness of the decision, implicitly of the causes of positive or negative deviations.

Decision-making can be found in decisions and mechanisms to substantiate, adopt and apply them. The management decision is the product of simpler or more complex decision-making processes, conditioned by several elements: the individual or group decision maker, the existence of the decisional objective or objectives, the existence of the plurality of decisional variants, the plurality of decisional consequences, the existence of the environment. Following the adoption of the plan of measures and actions, decisions of the local council were adopted aiming at the achievement of the stated goals in the development strategy. The performance of local management can be determined from this point of view by analyzing the proposed objectives and the achieved objectives: the number of decisions of the local council that were adopted for the accomplishment of the planned actions, but also the objectives achieved.

The mayor of the locality, as a city manager, can analyze it from the point of view of achieving the proposed objectives; thus, the mayor coordinates the specialized apparatus in order to meet the objectives of improving the infrastructure, ensuring a favorable socio-economic climate, providing the educational and health infrastructure, as well as increasing the living standards of the city's inhabitants. The following table shows the stage of implementation of the actions included in the Plan of Measures and Actions approved with the "Sustainable Development Strategy of Chitila City, Ilfov County 2014-2020" together with the observations detailing the realization / not realization:

Tabel no. 5 Implemented projects

Nb	Actions	Finished	Observations
1	Rehabilitation and modernization of school units	Yes	The schools in the locality have benefited from the financing provided by the Ministry of Education for rehabilitation: the electrical and sanitary facilities were upgraded, the wood carpentry with PVC joinery with thermopan windows was replaced, they were thermally rehabilitated;
2	Building a kindergarten	Yes	In 2016, the so-called ECO kindergarten, a modern kindergarten, where children benefit from all the conditions, the kindergarten built with European non-reimbursable funds;
3	Rehabilitation and modernization of Chitila Cultural House	Yes	The building of the cultural house was modernized with funds from the local budget: the electrical installation, the sound system was replaced, the carpentry was replaced, the building was rehabilitated, the fencing was restored
4	Organization of exhibitions and communications, editing of informative materials	Yes	There are quarterly communication sessions attended by representatives of the local administration, the general school, members of the community but also invited: Ilfov County Directorate

	in order to promote the local and national cultural heritage.		
5	Arrangement and endowment of space for emergency service	Yes	In the building in which Chitila City Hall is located a space for the emergency service was arranged; a person who has as his / her attributions the coordination of the voluntary service for emergency situations has been contracted with a labor contract; by decision of the Local Council the composition and attributions of the voluntary emergency service were established; the issue of equipment is not resolved: specific equipment is purchased for service members and the annual procurement plan foresaw the purchase of a backhoe loader and a motorized pump
6	Building a Hospital.	No	The feasibility study has been carried out, the location is identified, but the source of financing is not established
7	Ensuring the conditions for carrying out an appropriate activity of the sanitary units	Yes	With funds from the local budget, a building with the destination of "Dispensar" was built in which the family physicians working in the area of the village operate; also in the same building was leased a space for carrying out activities of a pharmacy;
8	Organization of qualification courses in various construction jobs, so that all those working in the field know the technological novelties, the national and community legislation in the field	Yes	The City Hall has organized free training courses, as well as identifying the target group members, training courses, SOP HRD courses.
9	Maintaining the viability of the road network through repair, maintenance and periodic maintenance, capital repairs and upgrades	Yes	Starting with 2007, the plan for maintenance of the local road network was approved by decision of the Local Council; as well as maintenance works are also done annually on the out-of-town roads that serve farmers to reach the agricultural land;
10	Extension of the water supply system of the Youth Quarter II and III.	No	The feasibility study for the extension of the water supply system has been carried out, being in the stage of obtaining agreements and approvals from the competent authorities
11	Establishment of the sewerage system of the youth districts II and III.	No	The feasibility study for the establishment of the sewerage system was carried out, being in the process of obtaining the agreements and approvals from the competent authorities
12	Establishment of natural gas supply system for youth districts II and III.	No	The feasibility study was carried out and submitted to the Ministry of Economy for the start of the concession procedure
13	Modernizing and expanding the public lighting network through European funds. LED break light to reduce CO2 emissions.	No	The feasibility study and the light-tech audit were carried out. The project must be deposited on the Mysmis platform by August 30th in order to obtain funding

14	Arranging selective waste collection points in Chitila.	Yes	The collection points were arranged; the collection of household waste will start soon
15	Arrangement of the Chitila sports hall with the platform and tennis courts	Yes	Chitila Sports Club in the Chitila Sports Club with tribune, tennis courts, modern heating systems, locker rooms, etc. was rehabilitated.
16	The Chitila dendrological park	Yes	In the city center was set up a park with a total area of 4000 sqm, with funding from PNDL(National Program of Local Development).
17	Construction of a new headquarters	No	In order to replace the current headquarters with a new one, the new school must be built to use the old school and to modernize it.

(City Hall Chitila, 2014, pp. 20-50)

Conclusions and proposals

The industrial revolution since the beginning of the last century has led to the development of production capacities, the replacement of certain man-made operations with specialized machinery and equipment, the management role has increased greatly, it is becoming more and more important for the level of industrial production (normalization of labor, normalization of executed operations, necessary costs, production flow, etc.). Each production structure has contributed to the structuring and implementation of various management models (methods and techniques specific to the object of activity), management has gradually come to be present in all social spheres as well as in all known structures and organizations regardless of object of activity. Nowadays globalization is a reality, this process has had a great influence on the structure of the management of the organizations, the competition and the concentration of the managers' capabilities for profit has led the management to a series of transformations, its evolution is very complex (in some situations even very technical, depending on the specificity of the activity).

Management has greatly expanded its forecasting component in order for an investment to be secure, for a given area or sector, a series of forecasts and estimates of that situation.

Managerial performance in public administration is highly conditioned by the influence of the political factor, management is the one that has pushed the political decision maker to be more realistic than the performance needs in the administration. In order to unify the concepts applied in public management at the national level, we could take a first step by creating a network for the transmission of information between all local government structures in our country (between all city halls and local / county councils / CGMB), to be connected with the central specialized authorities (service that can be implemented by specialized structures of the state). This would bring many advantages, of which I will list a few, namely: better communication; accessing information in real time and timely;

correlation of databases; checking the performance of local governments; quick and accurate intervention to solve problems; assessment of limit situations; increase transparency.

As a prognosis for public management - I can say that in 5 years at the latest it will overtake management innovation in the private area, development and management initiation started from the private area, and the administration area will lead it to the most powerful development he has ever known. As a first step in public administration development, it can be the new SICAP auction platform (Elecronic System of Procurements). This platform

is simpler to use and is based on reducing waiting times in terms of accessing the platform and initiating a direct purchase, auctions, etc. As a public servant in the field of public procurement it is very important that the managers of all the departments of a public institution communicate permanently with the procurement department this being an active compartment and always subject to the risks.

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MINISTRY OF EDUCATION POLICIES WINNING COVID-19 BATTLE AND LOSING TECHNOLOGY INTEGRATION WAR

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Abstract: The digital era was set to change education, with Israel's Ministry of Education making significant investments in technology integration. Despite these efforts, success has been limited. The COVID-19 pandemic rapidly sped up tech adoption in education but decreased after the pandemic, mirroring similar occurrences worldwide. This article is a case analysis of the past five decades, examining how government and global policies influenced technology integration in education. It uncovers various issues, including ministerial changes disrupting programs, resource shortages, and conflicting stakeholder agendas. Possible solutions include creating a national education council independent of ministry changes and giving more authority to local authorities, allowing them to customize solutions for schools and take responsibility for outcomes.
Keywords: Technology; Ministry-of-Education, Education-Policy, Education-Reform, Public-Administration.

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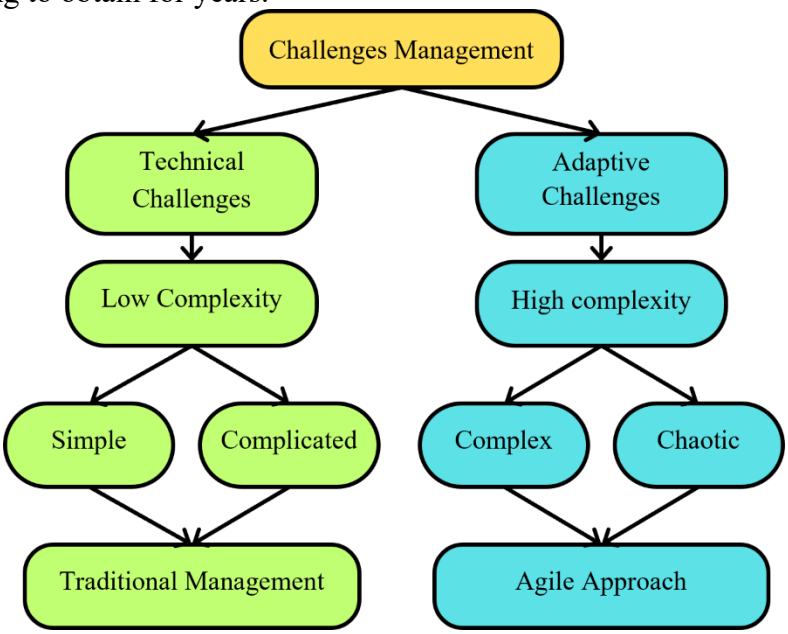
Introduction

The digital era was expected to revolutionize education and enhance learning systems. Policy played a vital role in driving technology integration in education due to the rapid pace of technological change and teaching methods. Governments and organizations invested heavily in policies and research to incorporate technology into teaching, infrastructure, devices and software. Despite significant efforts, technology integration had limited success (Eickelmann, 2018; OECD, 2020a). However, COVID-19 pandemic unexpectedly accelerated technology integration into education systems in early 2020. With schools closed due to lockdowns, distance learning from home became the only option. Teachers quickly realized technology was the bridge to their students and began implementing technology in new and innovative ways. Training programs and instructions accompanied this shift; teachers even initiated professional groups on social media for collaboration (OECD, 2020c). Davis's (1989) Technology Acceptance Model (TAM) can explain technology adoption quickly by teachers, as technology meets the TAM model's two parameters: usefulness and ease of use.

After two years, schools reopened, and teachers and students were delighted to return to the classrooms. However, Ministry of Education (MOE) and teachers in Israel believed technology was no longer necessary for face-to-face learning. Furthermore, recently equipped schools, MOE neglected technology policy, led to momentum loss, which has been challenging to obtain for years.



In the traditional management approach, higher-level management typically makes top-

Figure 14. Callenges management according to complexity level
Source: Processed by the authors

down decisions communicated to lower-level employees. This approach frequently utilizes change strategies such as the Theory of Change to identify threats, develop a strategic plan, and guide the education system through restructuring process, aiming to achieve a new equilibrium. These strategies prove effective for addressing Technical Challenges when the Complexity of the problem is Simple, where the relationship between action and result is well-understood, or Complicated, where this relationship can be determined in advance. However, the rapidly evolving landscape of technology presents Adaptive Challenges, which lack predefined solutions and demand agile approaches. Adaptive Challenges emerge when the Complexity of problems is Complex, meaning the relationship between action and result can only be understood in hindsight, or Chaotic, where no discernible connection exists between action and result as can be seen in Figure 1 (Heifetz & Linsky, 2017; Snowden & Boone, 2007).

This article conducted a comprehensive case analysis of Israeli Ministry of Education policies spanning the last 50 years. It seeks to explore the impact of specific policies on technology integration in the education system, addressing the question: How have these policies shaped the technological landscape within education?

The information presented is based on four sources:

- The Israeli MOE policies from the state comptroller report and reports commissioned by the Israeli government would tell the story of technology integration in the education system (Figure 2).
- Examining global policies documented by Organization for Economic Co-operation and Development (OECD) and United Nations Educational, Scientific and Cultural Organization (UNESCO) policies and policy analyses of their impact on local policymakers (Figure 2).
- The voices and insights of teachers serve as a crucial foundation for grounding the implications of policies within the education system. As one of the authors is a techno-pedagogy instructor, actively engages and listens to teachers describe their daily experiences with technology. Anonymous names were assigned to teachers, ensuring confidentiality of teachers' identities.
- The technology advancements context would shed light on MOE actions that have led to its failures.

Background Analysis

Technology Integration Policies in the 1970s

In the 1970s, technology moved from big analog mainframes to smaller digital computers, thanks to advancements in electronic components. These early computers were used in education for students to practice using tutorial programs and assessments. In 1969, ARPANET transmitted messages between two computers over a network and in 1971, the first Email was sent (Cox, 2018). UNESCO 1969 global challenges of technology integration into education. Technology's high and unpredictable complexity challenged education systems worldwide. Traditional teaching methods' persistent preference in schools underscored need for policy changes to facilitate transformation. Moreover, necessitated customizing software to meet local needs, required adjustments for language and curriculum to be useful (UNESCO Institute for Educational Planing, 1969).

Between 1968 and 1970, the MOE's Chief Executive Officer (CEO) sought a proposal to incorporate technology into the education system. Still, given technological limitations, the idea was considered impractical in those days. Subsequently, in 1971, the government established the Center for Educational Technology (CET), focused on software development in the local language, customization to the curriculum, and introduced PDUC system: Practice and Diagnosis Using a Computer (Elgali & Kalman, 2011). The CET center's approach aligned with the recommendations of the UNESCO IIEP from 1969.

Technology Integration Policies in the 1980s

In 1981, IBM made a significant breakthrough, unveiled the IBM PC, quickly established it as the standard for Personal Computers (PC) and paved the way for smaller, more affordable IBM-compatible PCs. This led to the creation of interactive tools like drill and practice software, significantly improved education and gained wide adoption among schools and educators (O'Regan, 2021; Cox, 2018). The 1984 introduction of Apple Mackintosh marked a milestone in bringing Graphical User Interface (GUI) to the forefront, replacing traditional text-based interactions with visual elements and improving computer accessibility. Microsoft Windows' launch in 1985 further popularized this advancement (O'Regan, 2021).

In the 1980s, worldwide technology-integrated policies were classified as computer science and technology-enhanced teaching. First, teaching computer science in vocational schools was led by top-down management. Second, using technology to enhance teaching methods represented a form of self-organization within the education system, led by teachers. This innovative approach brought about a transformative shift in teachers' roles and contributed to modernizing the education system. Notably, UNESCO acknowledged that due to the high cost of technology, governments initially piloted its implementation in a selected few schools to assess its effectiveness. Over time, focus shifted from simply allocated resources to a more strategic emphasis on teacher training (UNESCO, 1990).
UNESCO's 1985 policy for strengthening science and technology education. Governments should implement top-down policies to strengthen science and technology education, providing teaching resources to empower technology users, establishing a national network, and offering teacher training to facilitate technology integration into instruction (UNESCO, 1985).
In 1982, MOE introduced the National Education System Computer Action Plan nationwide program to implement technology in education. This comprehensive plan included teacher training, infrastructure development, provision of computer equipment, and research guidance. The goal was to prepare students for the labor market and integrate computer sciences into the education system (Elgali & Kalman, 2011; Israel's National Authority for Measurement and Evaluation in Education, 2015). In 1984, the National Program for Computer-Aided Teaching Systems Development was proposed to prepare the country for computer-assisted teaching and compete in the global technology race (Elgali & Kalman, 2011). In 1986, MOE aligned with UNESCO's policy, introduced a five-year comprehensive plan entitled Technology in Education System: Policy Guidelines and Action Proposals to incorporate computers as teaching aids and standalone subjects into education. The committee members acknowledged technology's value as digital tools for teaching aids and study subjects but cautioned against overestimating its capabilities. (Elgali & Kalman, 2011). The adoption of top-down policies in the 1980s was likely influenced by the complex nature of technological advancements, the need for efficient resource allocation, global competitiveness, alignment with international standards, and the aspiration to bring a transformative change in the education system (Bannister, 2017).

Technology Integration Policies in the 1990s

Digital technology advancement accelerated in the 1990s with Internet's widespread availability. Mosaic, the first graphical web browser, was launched. Netscape Navigator further popularized web browsing with a user-friendly interface. Mobile phones have revolutionized communication, connecting people anywhere and anytime. The first short message service (SMS) was sent in Finland. The introduction of the first laptops marked another milestone in technology evolution. The Microsoft Windows 95 operating system, with features like the Start Menu and Internet Explorer web browser, contributed significantly to the growth of web browsing among Windows users. Learning Management Systems (LMS) were established, and Wi-Fi technology was officially standardized with the first wireless networking standard, IEEE 802.11 (Cox, 2018; O'Regan, 2021).
In the 1990s, UNESCO took a comprehensive and inclusive approach to challenges and opportunities of technology in education. Their policy, discussed at the second congress in 1996, went beyond technical considerations, addressed national plans, technology,

teachers, students, and the social, economic, and cultural aspects of technology-enhanced education. This holistic perspective marked a shift from the specific challenges of computerization in the 1970s and network development in the 1980s. UNESCO's multifaceted examination aimed to understand the broader implications of technology integration, recognized the diverse stakeholders involved and emphasized the need for a nuanced understanding of education technology's social, economic, and cultural dimensions. (UNESCO Institute for Information Technologies in Education, 1997).

In 1999, OECD identified pressing policies to integrate technology into schools' challenges. First, reevaluating funding to balance evolving technology costs with traditional education needs. Second, adapting education policies to technology changes, emphasizing quality assurance and resource responsibilities. Third, comprehensive regulations were required for taxation, copyright, and privacy. Lastly, balancing quality and accessibility in Internet-based learning, especially in lower-grade education. Additionally, developing educational technology expertise was crucial to address these challenges (OECD, 1999). In 1994, MOE program Tomorrow 98 invested in science and technology education with a five-year lottery and local authorities partnership. The focus was on increasing technology budget and integrating computers into teaching. Phase II was approved in 1998 but faced challenges in teacher training, curriculum integration, and infrastructure improvements (Eisenberg & Selivansky Eden, 2019; Vorgan, 2010).

Technology Integration Policies in the 2000s

Technology burst in the 2000s, with founding of Google in 1998 and improved online search (O'Regan, 2021). MIT OpenCourseWare launched and pioneered the open educational resources (OER) movement (King & Lee, 2023). Various technological innovations, such as Skype, transformed communication by offering voice and video calls over the Internet (Kohne et al., 2022). Facebook was launched, transforming online social interactions (O'Regan, 2021), while YouTube changed how video content is shared and consumed (Strangelove, 2010). Khan Academy offers self-learning, free educational videos and exercises (Plasencia & Navas, 2014). The iPhone's introduction in 2007 sparked the smartphone revolution, bringing internet access and digital services to a broader audience. Smartphones, including Android devices, transformed communication and daily tasks through mobile computing and connectivity (O'Regan, 2021). WhatsApp was launched, providing a user-friendly platform for instant messaging. Instagram also shaped social media's visual aspect (Kohne et al., 2022).

OECD policy of 2001 emphasized strengthening public positive attitudes and agreement. Policy recognized balancing accountability with educational quality and flexibility challenge. Explored innovative resource allocation strategies and emphasized the critical role of teachers. Further, encouraged a deeper understanding of integrating insights for more equitable and effective learning environments (OECD, 2001).

Additional OECD policy addressed reducing students' digital divide. Reducing disparities in technology access and usage, commonly referred to as the digital divide, was the primary objective of the policy. Focused on expanding internet access and digital education programs. Identified needs for better fundamentals and digital literacy skills for students. Emphasized the necessity for substantial changes in teaching methods (OECD, 2001).

In 2003, OECD published scenarios for the School of Tomorrow. The OECD concluded many countries struggle with the need for constant budgeting technology updating. Thus,

the first scenario suggested school computer centers, minimizing infrastructure and equipment budgeting and limiting technology use. Although national programs invested in schools' initial acquisitions, their maintenance was not included (OECD, 2003).
UNESCO 2008 policy encouragement of national technology policies. Encouraged governments to initiate national technology policies, provide clear goals and vision for using technology in education, and encourage efforts to advance educational purposes. It should emphasize technology's efficient use for online content, student tracking, personalized instruction, and accountability while promoting engaging and active learning (Kozma, 2008). In 2000, a committee report evaluated Tomorrow-98 program, emphasizing three key elements: investment in infrastructure, equipment, and pedagogical assimilation. Educational goals, leading initiatives like distance learning and school websites. In September 2003, Phase III of the program, focusing on the innovative use of technology in education, was launched. The program emphasized organizational aspects, including training and committee oversight, rather than introducing new ideas (Vorgan, 2010).

Technology Integration Policies in the 2010s

Technology has evolved significantly in recent years. Cloud computing services like Google Drive revolutionized data storage and collaboration, while MOOCs gained traction through platforms like Coursera and edX (Stracke & Trisolini, 2021). Microsoft introduced Skype for Business to enhance enterprise communication and collaboration. The introduction of Google Glass and Oculus Rift blurred the line between the natural world and the digital world, showcasing the potential of Augmented Reality (AR) and revitalizing interest in Virtual Reality (VR) (Greengard, 2019).
In 2010, coinciding with Israel's accession to OECD (n.d.) MOE launched the National Technology Program for 21st-Century Education. This strategic initiative aimed to modernize teaching by integrating learning sciences and technology. Its primary objectives were to narrow the digital gap with OECD counterparts, adhere to global technology standards, and foster connectivity between schools and the broader external environment. Approaching technology as a technical challenge with either simple or complicated complexity, MOE formulated a comprehensive theory of change to guide the transformation. A well-defined vision of the desired outcomes drove the top-down change management approach. However, the initial budget request of 1.5 billion USD saw only 52 million USD, equivalent to 4%, receiving approval for the inaugural year. The program commenced with pilot schools in peripheral settlements in the north and south.
The established technology standards encompass essential infrastructure, a dedicated computer class, and a teacher station in each classroom, thereby improving the student-to-computer ratio. Key program emphases included skill development, fostering active student engagement, and redefining the teacher's role as a learning mediator. Success hinged on strong leadership, a coherent technology strategy, sustained funding, universal technology access, and practical evaluation. In its initial year, the program enrolled 200 out of 4300 schools, experiencing substantial growth to 650 schools within the subsequent year (Israel's National Authority for Measurement and Evaluation in Education, 2015).
While receiving positive feedback, the program faced complexities, highlighting the importance of robust technological infrastructure. After three years, teachers noted motivation boosts but reported increased workloads and burnout, underscoring the need for

better support. Unfortunately, the program could not continue beyond the first two planned years due to budget constraints, preventing achieving its goals (Israel's National Authority for Measurement and Evaluation in Education, 2015; Lindenstrauss, 2010).
In 2014, the Minister of Education launched Meaningful Learning reform to modernize education and equip students with the skills required in the 21st century. The reform focused on fostering critical thinking, creativity, self-learning, teamwork, and the use of technology among students to promote cognitive, emotional, and social growth. However, due to inadequate funding and an emphasis on teaching processes rather than devices, National Technology Program for 21st-Century Education was eventually suspended (Shapira, 2018). Five years later, the reform had little to no impact on students' 21st-century skills (Englman, 2021). The top-down approach of the reform angered teachers who felt that the program's name implied that their previous teaching practices were not meaningful.
In 2017, responding to OECD's PISA 2018 computerized test call, a globally recognized assessment for 15-year-olds in reading, math, and science, MOE aimed to enhance school readiness. Despite incorporating new schools in 2018, only 23% of secondary schools (7th-9th grades) had updated their technological infrastructure (Englman, 2021).

Technology Integration Policies in the 2020s

In 2020, the onset of COVID-19 pandemic plunged the world into an unprecedented and chaotic situation, inducing widespread fear and panic as the novel virus rapidly spread, leaving people grappling with the unknown, the surge in illnesses, and the absence of a cure, marking a global event of unparalleled proportions.
In March 2020, the Israeli government initiated a comprehensive lockdown in response to the escalating COVID-19 pandemic as part of global efforts to constrain the virus spread. As part of this lockdown, all educational institutions were temporarily closed, reflecting the growing concern over the rising number of cases (Englman, 2020). Consequently, the period between March 2020 and February 2021 was characterized by extended periods of partial school closure. During this time, most school days did not witness the physical presence of all students. An overwhelming 94% of students in grades 5th-12th learning activities occurred through various distance or integrated methods. Middle school students experienced the highest proportion at 43% (Englman, 2021). This closure of educational institutions affects about 1.5 billion students worldwide, including about 2.3 million in Israel (UNESCO, 2020).
Initially, MOE struggled to manage education system effectively. Adding to the difficulty, MOE was under the guidance of the Ministry of Health, whose directives changed frequently, making it challenging to adjust to the needs of the education system. Two weeks before schools' closure, an emergency learning exercise was conducted by MOE, but the results were never made public. Previous exercise results were also unsatisfactory. Additionally, during the exercises, teachers often did not hold synchronous lessons. These factors may have contributed to MOE's lack of faith in teachers' abilities to teach online.
Facing the challenge, MOE initiated National Television Broadcasting System, suggested indirectly replacing teachers. Thus, the Treasure Ministry suggested unpaid teacher leave. However, after a brief pause and teachers' union pressure, agreements were reached to resume distance learning (Waisblau, 2020). Despite investing significantly in expanding

the broadcasts, a few students watched it, and their number declined daily due to content adequacy, pedagogical quality, and teacher scheduling conflicts (Englman, 2020).

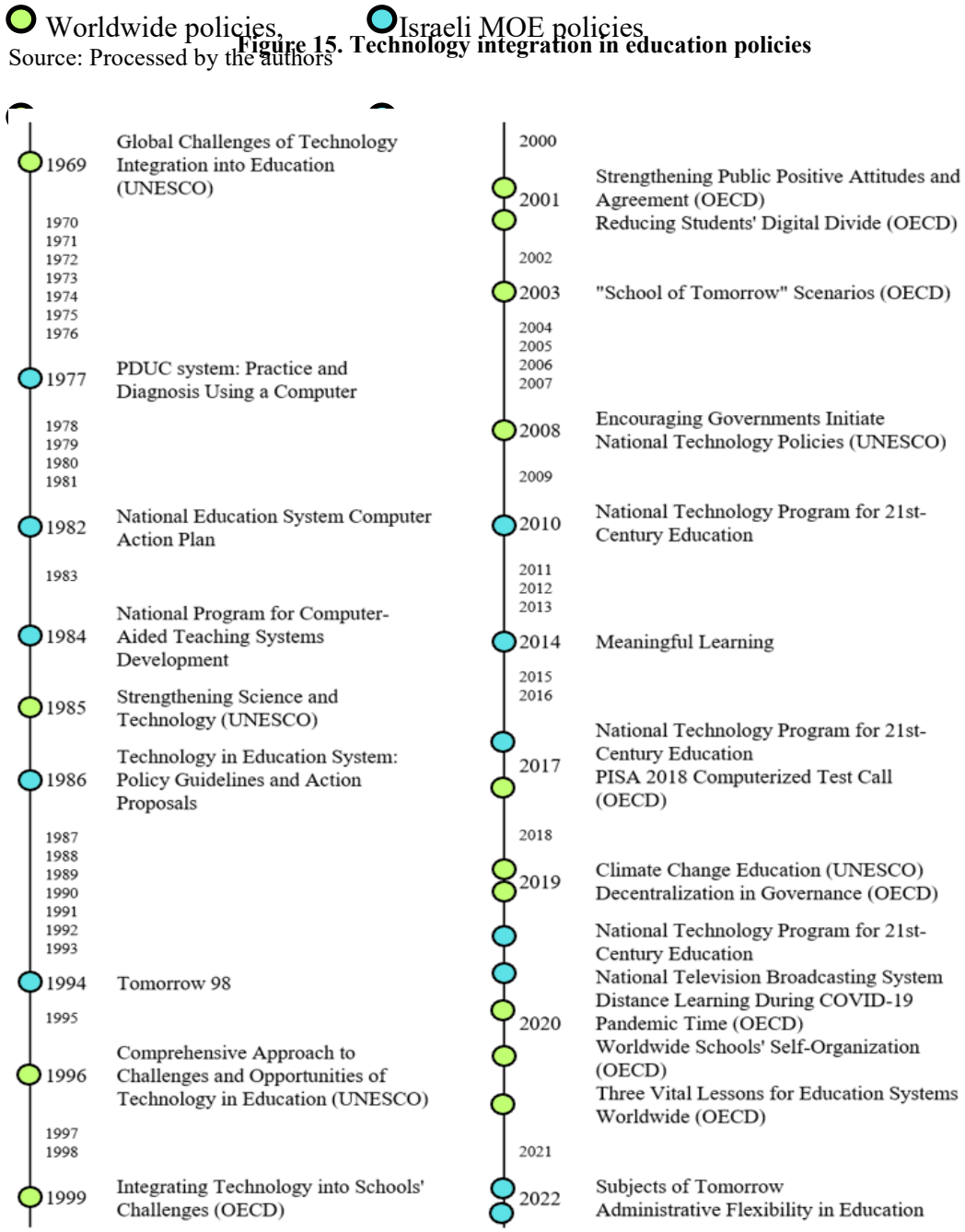


Figure 15. Technology integration in education policies

Source: Processed by the authors

In response to COVID-19 pandemic, the educational landscape has undergone a significant transformation. Surprisingly and rapidly, schools autonomously reorganized, adjusted their schedules to the situation, and established support and professional development groups, all without explicit guidance from the Ministry of Education. Amidst these changes, teachers swiftly enhanced their technological proficiency. Nevertheless, their innovation did not stop there; they pioneered diverse experiential, creative, and innovative teaching methods, notably embracing project-based learning with students at the forefront. This shift rendered the education system more adaptable and significantly heightened student engagement in lessons (Israel's National Authority for Measurement and Evaluation in Education, 2021). Teacher Ella misses the teaching opportunities she had using the abundance of technological means available during distance teaching: "If I could, I would replace the books and notebooks with computers".

The government allocated 4.5% of the budget to education in response to COVID-19, the highest among OECD countries average of 2.1% (OECD, 2023). The MOE took a significant initiative to bridge the digital divide among students. About 2450 schools joined the National Technology Program for 21st-Century Education during the pandemic, resulting in all schools being part of the program and receiving budgets for resources and infrastructure to support distance learning. In addition, 150,000 computers, modems, and communication packages were provided to students and teachers, costing approximately 105 million USD. Comprehensive professional development was provided to equip educators with essential skills for effective digital teaching and distance learning. The training was tailored to various audiences, including supervisors, school principals, teaching staff, and individual teachers. MOE developed diverse distance teaching and learning practices, including remote contact with parents, research, assessment, and teachers' staff meetings (Englman, 2021).

OECD (2020c) observed self-organization of schools has become a worldwide phenomenon, particularly evident during COVID-19 pandemic. Education systems globally demonstrated adaptability, embracing innovative teaching and learning methods, highlighting achievability of educational reform, and emphasizing education can evolve to become more innovative, distinct, and improved than ever before. OECD's 2020 strategic education policy outlined three vital lessons for education systems worldwide. First, it emphasized the need to embrace diverse modes of educational delivery, nurture resilient mindsets, and move beyond the binary online or offline learning model. Second, it highlighted the importance of equipping educators with new knowledge and skills through effective professional development. Lastly, the policy called for urgent action to address learning gaps exacerbated by crises by implementing personalized learning interventions and providing targeted resources. (OECD, 2020c).

Returning to school regularly was in September 2021, the MOE focus shifted from digitally enhanced learning to the well-being of students as OECD (2020c) recommended and narrowing students' learning gaps due to distance learning. In addition, MOE implied OECD's (2019) policy on climate change education was postponed due to COVID-19 pandemic. Moreover, OECD (2020b) PISA report showed a negative correlation between the number of computers in school and PISA reading scores, reinforcing MOE's neglect of technology funding. Teacher Anna was sorry using technology regularly stopped: "I loved it. Too bad it didn't stay". Teacher Nicole enjoyed integrating technology into her lessons.

Still, she wanted to use it in class under regular circumstances: "I was highly active during the pandemic, but if distance learning resumes, I'll consider resigning".

In 2019 OECD published on decentralization in governance policy. Decentralization is defined as transferring a range of powers, responsibilities, and resources from the central government to local authorities, which is defined as a legal entity elected in elections and enjoying a certain degree of autonomy. OECD report emphasized decentralization as a crucial reform, hinges on its well-planned and executed design, influencing governance, national wealth, and citizen well-being. Moreover, the report indicated the Israeli government was highly characterized (OECD, 2019). Given this, in November 2021, government resolution 675 was adopted: Decentralization of Powers to the Local Government and Reduction of Excess Regulation (Lerer, 2023).

In August 2021, the government approved Administrative Flexibility in Education reform to regulate decentralization aimed to empower school principals, giving them direct funding and budget authority, and the reform started in September 2022 (Wininger & Moshe, 2023). Consequently, technology infrastructure and resources responsibility shifted to schools' administrative responsibility, bringing the end to National Technology Program for 21st-Century Education. Administration perceptions set prioritization of technology integration. Teacher Michael, who is a technology enthusiast, was worried:

I'm concerned about school administrators' new budget responsibilities. Those prioritizing other areas might neglect technology, leaving them without essential resources.

In 2022, MOE initiated Subjects of Tomorrow reform in high schools, planning to combine humanistic study subjects like History, Literature and the Bible, allowing students time to learn through research and gain 21st-century skills. Before the program started, a new minister was appointed, and the reform that could once more boost digital technologies was stopped (Noi, 2023).

The OECD (2023) report barely mentions technology integration beyond school assessments. This suggests that other countries may be similar to Israel.

Identification of problems

The numerous policies implemented by MOE and their frequency indicate education system's failure to embrace technology may be attributed to several problems:

- Frequent exchanges of education ministers who seek to leave their mark prevent plans for assimilating technologies in the long term. Meaningful Learning and Subjects of Tomorrow reforms demonstrated how new ministers apply new reforms, while former reforms were not completed. Reforms in education are changes initiated at the systemic level. Most reform changes miss long-term planning in a situation of uncertainty, and they disappear within five years. Also, most reforms imposed top-down fail to create change because they create resistance at the field level (Brandes & Strauss, 2013). Moreover, Policy implementation requires resources. A lack of adequate resources would prevent effective policy implementation (OECD, 2020a).
- The influence of many stakeholders complicates the establishment of in-depth processes for implementing reforms. The Treasure Ministry approved only 4% of the budget needed to include all schools in the National Technology Program for 21st-Century Education. Likewise, during COVID-19 pandemic, the Treasure Ministry intervened in the education budgeting and decided that National

Broadcasting replace teachers and they could be dismissed. Hence, the Treasure Ministry has control over budgeting technology. Additionally, local authorities and school networks funded schools' technology; less-established authorities invested less (Brandes & Strauss, 2013).

- Administrative Flexibility in Education program shifted technology promotion responsibility to school principals. Their perceptions of technology's contribution determine their actions and consequences in schools. Moreover, teachers are the primary change agents as they integrate technology into lessons. Teachers who could not effectively use computer applications showed resistance and posed significant obstacles. Parents expect advanced technology-enhanced learning (Brandes & Strauss, 2013).
- Aligning the education system with frequent technological changes demands swift responses despite its bureaucratic nature. Technology improvement opens new possibilities. Internet and Email, for example, enable connectivity. Cloud storage enables collaboration. Browsers provide access to information. Artificial intelligence (AI) can support and adapt learning to students' preferences. Technology needs modifications to enable teachers to benefit from its advantages. Moreover, learning the educational uses and dangers inherent in using new technologies is needed to integrate them properly (Brandes and Strauss, 2013).

Alternative solutions

Long-term plan and adequate budgeting: Frequent exchanges of education ministers who seek to leave their mark prevent plans for assimilating technologies in the long term. There is a need for a budgeted and coordinated long-term action plan. In addition, reform should include all goals, a timing that will support one goal at a time. For example, National Technology Program for 21st-Century Education could have been a key element in Meaningful Learning reform and should have been included. Moreover, policy should build on existing practices and structures where possible (OECD, 2020a).

Creating a stakeholders coalition: Influence of many stakeholders complicates the establishment of in-depth reform implementation processes. The key to success is knowing the forces driving change together: interest groups, parents, the wider community and organizations operating in it, acquainting the reform operators with the factors and achieving co-operation, including setting an agreed and common agenda for policymakers, managers, teachers and academics (Brandes & Strauss, 2013).

Self-organization to face challenges: Aligning education system with frequent technological changes demands swift and agile responses despite its bureaucratic nature. Operative action plans and policies must be flexible enough to consider changes and technological developments in different time frames (Brandes and Strauss, 2013). Moreover, teachers' self-organization proved effective in coping with changes. Self-organization started long before COVID-19 pandemic, as UNESCO (1990) recognized development of teaching methods using technology to enhance learning. These

Recommended courses of action

Establishing National Council for Education: An independent entity will oversee education with adequate stakeholder representation and no advocacy coalitions. The council will collaborate with MOE but remain autonomous, enabling long-term decisions and

neutralizing ministerial whims. (Brandes & Strauss, 2013). The flaws may be creating a large and bureaucratic institution driven by stakeholders' political interests over the benefit of the education system. Moreover, disagreements may arise if there is a significant gap in the stakeholders' perceptions, and the council may become paralyzed.
Decentralization MOE authority: Decentralization of school budget control has resulted in administrative flexibility, requiring adequate funding. Consequently, by breaking down the extensive education system into smaller, agile school units, administrative flexibility allows schools to swiftly respond to innovative technology compared to the Ministry of Education (MOE). Moreover, teachers can gain firsthand experience with innovative technology, enabling them to grasp its benefits and shortcomings rapidly, accelerating their learning of optimal integration practices. One potential drawback is possibly losing a broader perspective as school administration becomes localized focused. Additionally, school principals may prioritize avoiding failure over innovation, inhibiting progress.

Conclusion

"The road of education reform is littered with good ideas" (OECD, 2020a).
MOE acknowledged the significance of technology early on, investing considerable efforts and budgets in program development and implementation. However, being a large and bureaucratic entity, it grappled with the challenges posed by the dynamic nature of technology over the years. In contrast, teachers demonstrated adaptability to evolving technology, though constrained by inadequate conditions. With COVID-19 pandemic outbreak, conditions ripe for change emerged: matured technology, available resources, and the imperative to incorporate technology in teaching. The lack of MOE leadership allowed schools to self-organize, leading to improved teaching methods. As normalcy returned, MOE's bureaucratic mechanisms resumed, halting the progress of technology integration. However, analyzing the events that spurred success, albeit temporary, provides insights into necessary actions. Despite the focus on Israeli MOE policies, the global context in UNESCO and OECD publications suggests that this local phenomenon could be an example of a global trend with potential insights applicable to other countries.

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QUALITIES OF THE IDEAL LEADER

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Abstract: Sharing power and information and fostering the growth of self-leading skills are the objectives of leadership. Even the most influential and powerful people become leaders accidentally since most people don't seek the position. It might be challenging and even terrifying to speak in front of others and convince them to do something. Leadership is jointly formed. It is neither with one side nor the other. We all take part in the illusion, which is what it is. In this article, we will explore what are the traits of the ideal leader and how to be improve them with Self-Ledership Also we take a short look on who will be best leader from the genders.
Keywords: Leadership, character, team, leadership behavior.
JEL Classification: O15

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Introduction

Theory about leader's is an incredibly complex and varied topic. A leader's long-term success is determined by their own leadership style, strengths, and development needs as how effective they think and act. Leaders focus attention on results by: knowing what is needed and focus on results; shared vision, challenging and inspiring others; commitment to goals; balancing idealism and realism; demonstrating business skills.

Leaders create a productive work environment by: taken responsibility for the norms in their workgroups; encouraging and communicating facts and concepts in an understandable way; enabling people to make decisions without needing to appeal to a higher authority; designing and managing the work environment, that provides context and meaning for they followers.

Leaders take charge of their own self-management and set an example for others to follow by: setting aside personal issues and getting on with the job; approaching problems and relationships in the present; trusting others; being able to function without constant approval and recognition from others; assessing people's skills and the requirements of the job; understanding people's strengths, and finding ways to compensate for their limitations; treating people courteous; insisting on performance while accepting people as they are.

Leaders encourage teamwork by: using consensus as opposed to command, coercion, or compromise; accepting conflict and mediating them on rational grounds; supporting

decisions based on knowledge and technical competence; encouraging expression of emotion while emphasizing task accomplishment.

Habits and practices of successful leaders

Exercising initiative: Not blaming others for the actions in everyday life; Work with the things within your "circle of influence"; Take the lead, in organization and in personal life; Encourage others to foster these habits.

Visioning the future: Envision the future and refine what you are trying to accomplish; Value people who look at the big picture; Doing the right things comes first before doing things right; With a changing environment, a desire will emerge for more controlling efficiencies.

Keep perspective: A clear mission statement that provides meaning, purpose, and direction; Actions need to be aligned with the mission and based on values and principles and not upon moods, feelings, and circumstances; Most important things in life are usually not urgent, are easy not to do, and are often avoided; Say "no" to the unimportant, no matter how urgent this appear to be.

Encourage interdependence: Seek agreements or solutions that are mutually beneficial to all parties; Encourage relationships of mutual benefit; Have an abundance mind-set.

Show empathy: Exercise patience and thoughtfulness, reflecting of what others have said, before seeking to be understood by them; Diagnose before you prescribe; Understanding people and their actions

Value differences: Creativity is based in differences and seeing things in new ways. Foster a climate where people will share their ideas and be open to each other; Value different opinions and perspectives when seeking solutions.

Continually improve: Renew the physical, intellectual, emotional, spiritual, and social dimensions of your life; Formulate a personal program to keep balance in your life, and encourage others to do the same; Become more self-aware through personal development activities

Women and Leadership

Global challenges require diverse views, experiences and styles of leadership if they are to be successfully tackled. Evidence shows a slowdown, or reversal, of women's leadership. In the last decade (2007-2017) women's progression to senior management has increased by only 1%; the percentage of women in Information and Communication Technologies (ICT) has declined by 6%. Women comprise only 23% of parliamentarians, 27% of judges and 26% of media news leaders (KCL 2018). Gender differences in occupations reflect existing assumptions about men's and women's emotionality. Men are more motivated to stay in control, repress emotional responses (Matud, 2004), and express powerful emotions such as anger or pride. In contrast, women are concerned more with getting along (Timmers, Fischer, & Manstead,1998); emphasizing benevolent and universal values (Ryckman & Houston, 2003). It has been argued that people-oriented work is related more closely to women's traditional caretaking role, encapsulating a higher suitability for service jobs (cf. Bulan et al., 1997; Hochschild, 1983).

Research has shown that effectiveness in working with people is more important to job success and satisfaction for female workers than their male counterparts (Bulan et al., 1997). This is consistent with Hall's (1995) theory that women's professional performance

is more likely to be judged on the basis of their ability to work well with others, which is a traditionally feminine quality. Because of this, women may view those activities as being more gratifying than those that do not provide them (Bulan et al., 1997). Several theories, like Bowlby's attachment theory (1951) and the relational theory (Boatwright & Forrest, 2000), have been used to explain gender disparities in leadership. Female leadership development was discussed in relation to the socialization of women by Carless (1998). Only the formal, genderless role structures of people, groups, and organizations are used to describe roles in the workplace. Gender inequalities can be explained by one's own expectations as well as those of others, based on gender roles, claims the social role theory (Eagly, 1987). In general, women are supposed to exhibit feminine ideals, sometimes referred to as "communal," through warm, helpful, kind, empathetic, and interpersonally sensitive actions.Typical male characteristics, which are sometimes referred to as "agentic," include traits like assertiveness, ambition, dominance, forcefulness, self-sufficiency, and self-assurance (Newport, 2001). Leadership behaviors were referred to as gender-role spillover effects since these gender-based expectations have an impact on workplace roles (Eagly & Carli, 2003). According to Eagly's (2005) theory, female leaders may be perceived as belonging to an outgroup, making it difficult for them to gain the respect and approval of their followers. To clarify preconceptions that could be faced by women in leadership roles, Eagly and Karau (2002) created the role incongruity theory of prejudice in this context.This phenomena is based on the notion that the requirements for leadership jobs, which are often understood in male terms, are inconsistent. Female leaders are more likely to experience negative assumptions about their future job performance and less favorable results (Bass, 1990). It was further stated that in these situations, the more women emulate the conduct of their male counterparts, the more they may endanger their prospects of gaining followers and being seen favorably.

Eagly and Johnson (1990) also suggested that competent women might be able to reduce gender-role violations and role conflict by modifying their behavior and acting in a stereotypically feminine manner as a result of their meta-analytic findings. A large amount of research demonstrates that gender stereotypes frequently exist in leadership styles (see, for instance, Eagly, Karau, & Makhijani, 1995). Compared to male leaders, female leaders typically exhibit a more democratic and people-oriented approach (Eagly et al., 1995).

10 Essential Attributes of Effective Leaders

Being a good leader is fantastic, but understanding why and how one develops into a strong leader gives real substance and depth to the discussion. Instead of just having someone without understanding do the same, it makes more sense to have someone who understands the aims and objectives give advice and direction. Therefore, the question of whether it is crucial to have the appropriate people in place to lead does not exist. What does it take to be the best leader you can be?

To become very effective leaders inside their enterprises, managers (and followers) must exhibit ten essential qualities.

Active Listening

A skill that is usually underutilized and a natural gift that is frequently taken for granted is listening. Proven leaders will have an advantage when it comes to gaining the desired and expected outcomes from their followers because of this talent, which requires regular use

and awareness. Exercise is not necessary for listening per se; it is necessary for learning how to listen and who to listen to. How many times have you attended a community meeting, an interview, or a conference and already forgotten some of the most crucial takeaways? Or how frequently do people virtually instantaneously forget someone's name after just meeting them? According to the U.S. Department of State, "active listening is a skill taught to teachers and police officers, counselors, ministers, rabbis and priests. It is a skill we would all do better having learned, practiced."1 To become an active listener, one must first understand the attributes of active listening:

1. Seek to understand before seeking to be understood.
2. Be non-judgmental.
3. Give your undivided attention to the speaker.
4. Use silence effectively.2

The "who" leaders should actively listen to is all stakeholders. Dr. Martin Luther King Jr. once said, "A genuine leader is not a searcher of consensus, but a molder of consensus."3 A leader's intended results will also become the consensus of those affected when he or she actively listens to and genuinely cares for his or her supporters and followers. There is a greater chance that those individuals will support the intended goals when the leader listens to them, solicits their comments, and obtains information from them. Another way a leader may get insightful suggestions from individuals who manage the day-to-day parts of the work is to have regular listening sessions with the rank and file. Additionally, people who support the objectives will work very hard to bring the initiatives through to a successful conclusion.

Education

Regardless of one's level of leadership ability, education is a component of continual leadership growth. College degrees and certifications, online and in-person workshops and seminars, as well as self-education are just a few of the alternatives for training development; the possibilities are virtually endless. No matter where one is in life, they should always be seeking ways to improve themselves, their team, and their department.

Attention to Detail

It is crucial to have a broad conceptual understanding of the organization, but a good leader also understands the specifics, such as which employees are best suited for various kinds of responsibilities. To improve the effectiveness of the agency, to increase legitimacy and, as a result, buy-in from the officers and the community, law enforcement executives need to be adept at developing vital connections inside the agency and the community.

A strong leader must be able to handle details effectively enough to address all potential questions before giving information to any group. Paying close attention to details demonstrates to individuals that the leader is capable of handling the current situation.

Directions

The effectiveness of the instructions given to a subordinate depends on how they were delivered. A great leader communicates instructions in a clear and consistent manner. To do this, the leader must be aware of the intended audience for his or her instructions and must make sure that the message is understood clearly. In order to guarantee that tasks are accomplished with the fewest possible errors, it is frequently helpful to provide instructions in writing, whether by email or another format. This gives everyone the chance to study

the document in roll-call or small groups, check for understanding, and ask questions. Although it may seem repetitive, various people have distinct ways of understanding information. A great leader must be able to speak clearly in order to be understood.

Evolution

A good leader may become a high-achieving leader with a devoted following if they have the capacity to change and adapt. It's likely that the leadership philosophies that police executives developed early in their careers would need to be modified in order to adapt to new generations and advance personally. In order to be more relevant and to both inspire and be inspired by younger generations, leaders must adapt and educate themselves on a broad spectrum of the various forms of technology. For instance, younger generations relate and interact well with more recent technology, such as virtual devices and social media platforms. Other leaders aspire to be like a leader who can change with the times and adapt to them.

Resourcefulness

When it comes to completing challenging or time-consuming undertakings, being resourceful, creative, and imaginative are especially crucial. When managing and leading any team of employees within a law enforcement organization, resourcefulness is undoubtedly essential. If commanders are unable to use their team to accomplish goals despite potential obstacles, how can they mentor and direct the troops who look to them for skill development? Leaders must maximize followers' performance skill sets and inspire them to think creatively in order to help them develop their leadership abilities.

Service

The followers who work on the front lines and who will eventually lead the organization must also be taken care of by managers. When using this strategy, the employers may be surprised by some of the responses they receive because the demands are often manageable. Serving the followers shows them that the leaders genuinely care about them, and it gives everyone much more reason to work more and feel more motivated.

Humor

Everyone interprets and delivers humor differently, and some individuals are just inherently funnier than others. If used in a timely and suitable manner, this social ability may do wonders for trust and morale. According to a Bell Leadership Institute research, the most effective leaders use humor to increase teamwork, promote productivity, put employees at ease, communicate an honest message in a kind manner, and perceive the funny in every given circumstance. Less effective leaders use humor in negative ways—to show off, cut people down with sarcasm, and overly distract people from the task at hand. Leaders should never disparage or minimize any victim or situation because it reflects poorly on the organization.

Integrity

A leader with integrity will uphold the goal of the organization and society's expectations by acting with strong values and honesty. Without integrity, it is unlikely that others would see you as legitimate or trustworthy.

People

People are the basis on which leadership is constructed; effective leaders develop effective followers. People require public recognition for a job well done, and they value leaders who look beyond their uniform to people with unique goals and concerns. Additionally, people require coaching to improve and feel more at ease in their roles. Occasionally, they also want encouragement to keep chasing exceptional performance and congratulations on achieving accomplishment. An successful leader recognizes people's abilities and assists them in using them, which boosts productivity and morale. The leadership task will be made significantly easier if a leader is a "people person" and maintains humility. Simply clearly a good leader cannot ignore the need of putting people first.

The essential components of effective leadership include listening, education, attention to detail, direction, evolution, resourcefulness, service, humor, integrity, and people (LEADERSHIP). It takes experience to gain an understanding of how to successfully and individually blend these qualities into one's management style, but it is important to keep in mind. The organization, the followers, the leader, and the community all benefit when the LEADERSHIP idea is used properly. Any leader may achieve success by cultivating and perfecting these qualities.

Self-Leadership

In general, self-leadership is defined as a self-influencing process for improvement of personal effectiveness (Influencing Oneself, Neck and Manz 2010, p. 4). Self-Leadership does not specifically refer to the leadership of others. More fundamentally, if someone wants to lead others successfully, they must first be able to successfully influence and guide themselves. Self-management skills are the foundation for effective leadership. A leader must first develop their own leadership and influence skills before they can effectively influence others. Self-leadership, according to Peter F. Drucker, a leading management theorist and visionary of the 20th century, is the key to the success of many historical greats, including Napoleon, Leonardo da Vinci, and Mozart. They were able to identify and utilize their skills while simultaneously eradicating their deficiencies thanks to excellent self-influencing tactics. The manager and knowledge worker of the twenty-first century need to use effective self-influencing techniques in order to succeed. According to Drucker (1999), a person must be conscious of their own strengths and flaws. People are often rather adept at observing and critically analyzing their surroundings. The ability to concentrate on the outside world is something that is taught and learnt in early life. However, it's common practice to overlook the close analysis of one's own strengths and limitations as well as the monitoring of internal (psychological) processes.

It also doesn't educate individuals how to influence others or move themselves efficiently in the direction they want to go. Knowledge is power. Control is the next step after power. The first step toward successful self-influence is to gain one person's conscious understanding of their inner processes and procedures (such as wants, ideas, and ambitions). Self-Leadership is a skill that can be learned and developed (see Furtner and Sachse 2011; Lucke and Furtner 2015; Müller and Wiese 2010). Positive effects on performance and personal success will be visible right away if you have excellent self-leadership abilities. One of the few theories in psychology and economics that offers advice on how people may really utilize and lead themselves more successfully is self-leadership.

Self-leadership refers to self-influence effective and goal-oriented control of one's own thoughts and behavior. Self-leadership refers to self-influencing strategies to increase personal effectiveness and performance. In general, self-leadership is associated with a higher ability to innovate and be creative. This can be ensured in particular if a leader has sufficient autonomy, scope for action and self-determination. In order for leaders to be successful, they also have to be successful in an interpersonal context have appropriate emotional skills. In order to achieve their goals, they must on the one hand, show expressiveness regarding their emotions and on the other hand, social ones.

Conclusion

In conclusion, being a leader requires a lot of effort. Because people are frequently complex, being in a position of leadership is challenging. It is impossible for a leader to win over everyone. People frequently have a short recall of the pleasant things and a long remember of the unpleasant things. Why then do it? It's essential, thus the solution is simple. There will never be a period when leaders are not needed, no matter what occurs in society. Anyone could be a leader if it were simple to do so. Leadership is beautiful in its complexity. That is another reason why mentoring is so crucial. Leaders must want to support the development of emerging leaders and provide time and resources to those who want to advance.

The path to leadership is not a sprint, nor even a marathon; it is an ultra-race, which is both extremely difficult and extremely rewarding. That's how you lead!

In order to discriminate between male and female followers while interacting, leaders must change their approach. However, this should not be taken as a need as followers of both men and women are equally attracted to leaders who exhibit profound acting. In other words, deep acting by a leader is not "problematic" (remember the beneficial effects of this tactic on one's health), but it is preferable to use less (deep) acting while speaking to a female follower.

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TAX EVASION AND CORRUPTION-CHALLENGES FOR THE ROMANIAN ECONOMY

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Abstract: The article aims to highlight the characteristics of some negative phenomena, such as tax evasion and corruption, which affect the economy Romanian. Tax evasion is the most important component of the mechanism of economic-financial crime, and the EU space faces an impressive dynamic of the export and import of economic crime, combating this phenomenon becoming the primary goal of specialized bodies. In this research, the aspects, concepts and causes of these negative phenomena will be analyzed, as well as the interdependence between them and the fiscal pressure.
Keywords: tax evasion, corruption, fiscal pressure

Introduction

Although from the perspective of scientific research, the concept of tax evasion has given rise to numerous analyzes both from the perspective of the fiscal or legal field, the definitions of this concept have not always been eloquent, the approach being carried out in a unilateral, contradictory way and that launched hypotheses more or less precise, but lacking realistic and achievable objectives. Tax fraud and tax evasion is a serious and complex problem that requires a coordinated approach at national, European and international level. The economic and financial crisis has generated many problems for most European governments, which have tried to adopt viable measures to ensure that they can keep public spending under control, ensure a more efficient collection of budget revenues and reduce the phenomenon of tax evasion and fraud, in such a way that economic growth can be achieved. It is very important to study the evolution and behavior of tax evasion, in order to find quick solutions to reduce this phenomenon.

Aspects from the specialized literature in the field of tax evasion and corruption

In the specialized economic literature, the analyzed problem is the subject of scientific studies by various economists, teaching staff, scholars, and more recently also students, considering the history of the phenomenon of evasion and fraud fiscal in the context of increasing the budget deficit caused to a large extent by the level of collection of taxes owed by taxpayers. In theory, it is known that tax evasion can be seen as a phenomenon with two main actors, on the one hand, the taxpayer - lacking a financial education, who tries to evade paying the established taxes and fees, in order to achieve some advantages of an immediate material nature, and on the other hand - the state that seeks through various instruments to prevent a reduction in tax payments to the consolidated budget. While some studies of specialized literature such as those of Dinga E., 2008, claimed that tax evasion is not a specific component of the underground economy as it involves legal activities not reported to the authorities, and in this context it would be much more appropriate that evasion tax to be located in the border area between the underground economy and the

official economy, other studies such as Olabisi, J., 2010 state about tax evasion as an intentional practice of economic agents not to report the real values to the authorities, in order to be able to reduce the obligation fiscal, although this method involves certain illegal actions from a fiscal point of view. Instead, the study carried out by Schneider and Klingmair, 2004 highlighted the fact that between the underground economy and tax evasion there is a link of interdependence, and the condemnation of the activities that make up the underground economy through effective legislative measures will be felt in full, contributing to the reduction of the phenomenon of evasion fiscal.

In the specialized literature, there are other studies that empirically address the interdependence between tax pressure and tax evasion. Amarița A.2017, following the study, identified several causes underlying tax evasion, considering that the excess of tax burdens and the insufficiency of citizens' education determine the extent of tax evasion. Under this aspect, he considered that the efficiency of a tax system consists in the degree of tax consent and that an insufficient education of citizens also has effects on the increase of the phenomenon of tax evasion and concluded that the lack of control carried out by qualified personnel and the gaps of the tax legislation can determine the amplification of the effect of tax evasion and that a decrease in the tax pressure on taxpayers would lead to the decrease of tax evasion, launching a solution in this sense, the best way to achieve the objectives is to create structures that adapt to the changes from the market, to be based on low taxes and to be charged at an extended level of taxation. Gyuricza I. et al. 2017, following the study, they came to the conclusion that the spirit of tax evasion is born from the simple game of interest, they argued that, whatever the tax rate charged, man, by his nature, always tends to put the general interest behind to the private, as he is inclined to regard the tax as more of a detriment than a legitimate contribution to the public expenditure, and to always look with evil eyes on him who wants to diminish his patrimony, drawing attention to the fact that it is known that some taxpayers will seek the kind of ingenious methods to reduce the amount of tax obligations. While Sudharshan C. et al., 2012 in the study carried out on the Romanian economy concluded that, the main reason why the revenue/GDP ratio is relatively low in Romania is tax compliance, in addition, the tax base is so narrow and there are numerous tax exemptions, so that the receipts represent only a small part of the theoretical maximum collection considering the statutory tax. John Maynard Keynes1970, was a supporter of the idea that, if the state reduced its taxes, it would cause an increase in the consumption rate of individuals, a relaxation of business processes and an increase in the demand for ordinary goods. He stated that, the level of a contribution consisting of fees and taxes must be correlated with the level of wealth and income, otherwise tax evasion would occur, also launching a solution in this regard, namely the introduction of a substantial tax on transfers, which would have been applied to all transactions to combat the speculation of the entrepreneurial spirit. Đurović et al., 2019 concluded that reducing the number of taxes to be paid encourages economic growth, while a decrease in the level of taxes contributes to and increases the level of economic activity, but in terms of fiscal effects, research results are somewhat contradictory , as Pjesky (2006) stated that, the impact of state taxes could be both positive and negative on the economy of the respective country.

We all know that the Gross Domestic Product is the performance indicator of a state's economy, in this sense at the level of the European Union, Mutașcu et al. (2007) researched the impact of direct and indirect taxes on gross domestic product for the period between

1995 and 2005 and concluded that, for a 1% increase in direct taxes, GDP per capita will increase by 1, 61%, and in the case of indirect taxes, an increase of 1% will cause GDP per capita to decrease by 0.83%, suggesting the idea that, the process of fiscal harmonization would be more appropriate instead of competition.
Other authors were of the opinion that, at the basis of this phenomenon, lies the incorrect and incomplete management of records regarding the determination of income, expenses, and tax obligations, nothing could be more true, but no analysis was made of the causes that led a taxpayer to avoids declaring, highlighting and paying tax obligations.
It is known that the evasionist phenomenon cannot be eradicated if you do not make a correct diagnosis and evaluation of it and do not have the necessary levers to combat it at hand. Because why not, we must recognize that as long as there is an obligation to pay, there is also the temptation to evade payment, therefore, any of the procedures for evading the payment of tax obligations are based on multiple causes, which can be identified and kept under control by the state. While other authors had a more realistic approach to the concept of tax evasion, starting from the idea that the reality of a healthy economic system derives from the very principle of contribution, so if we choose to live in a community, it is necessary to contribute each in part to its proper functioning, because inevitably, the state must regulate a fiscal system, the purpose of which is to ensure the revenues necessary for the optimal functioning of state institutions and authorities.Bottom of Form
Regarding corruption, in the specialized literature for a long time researchers considered corruption as a predominantly political and cultural phenomenon and its removal impossible to achieve (Tudorel, Roșca, Matei, 2008). Specialized studies have highlighted the fact that this negative phenomenon is present in all countries, both developed and less developed, but each country has a specific corruption potential, but its extent is influenced by the country's general fiscal structure and fiscal management systems (Martinez Vasquez, Arze, Boex 2006). Also, the integrity of civil servants is an important factor in combating tax evasion, if the corrupt civil servants find during a specialized check the existence of an illegal act with the consequence of depriving the budget of the statute of collecting some income from fees and taxes and decide to cooperate with these taxpayers in the exchange of bribes, then corruption becomes a serious problem for the institution that manages the finances of a country if no measures are taken to combat it. Through the prism of the arguments listed above, in the context of the accentuation of the budget deficit caused to a large extent by the degree of collection of taxes owed by taxpayers, we consider current research, its approach requiring a documentation based on the knowledge accumulated in a practical way, corroborated with a perseverance in researching from a fiscal, accounting, legislative point of view, the causes that influence this phenomenon in relation to the surrounding reality.

Research methodology

The present research was carried out in an area where, from an academic point of view, there are not many recent studies, and combating these phenomena, over time, became the primary goal of the specialized bodies that imposed themselves by developing policies fiscal adapted to the dynamics recorded by tax evasion and corruption, through which to combat their weight in society through effective measures. The research started from analyzing the share of budget losses due to the phenomenon of fiscal evasion. In this sense, we collected information by consulting the statistics provided by Eurostat regarding the

value of GDP and tax revenues as a percentage of this indicator, for each of the 28 EU member states in 2021. We also added the CPI variable that reflects the index of the perception of corruption taken from the Transparency International statistics, respectively the level of taxation taken from the reports of the World Bank in order to establish the various connections and correlations between the dimension of tax evasion and the level of taxation. It is known that the tax pressure is fully felt by the tax and tax payers, so an honest, honest taxpayer voluntarily agrees to pay tax obligations, but the problem arises when the level of taxes and fees reach the limit of bearability, a fact that causes that taxpayer to change his behavior, being "obliged" to resist the competitive economic environment, to look for different methods of evading the payment of taxes and fees. This behavior was best captured by the economist Arhur Laffer, who in 1980, starting from an idea experimented by the famous Adam Smith, graphically translated the so-called Laffer curve, according to which tax rates that are too high destroy the basis on on which taxation acts, respectively, the income resulting from taxation increases more sharply at low levels of taxation. The concept of the Laffer curve was first mentioned by Jude Wanniski, who in 1974 published an article in The Public Interest, entitled Taxes, Revenues, and the Laffer Curve.

Results

According to the data highlighted in Table no.1, it follows that the countries in the EU that register the highest level of tax evasion are Greece, Italy and Romania. If we analyze the data we can conclude that there is a close interdependence between the level of tax evasion and the corruption perception index, it can be seen that in the countries that register a low level of the CPI (Austria, Denmark, Estonia, the Netherlands, Germany, Sweden, Luxembourg) the share of tax evasion in GDP is lower, while in countries where the corruption perception index registers a high level and the share of tax evasion in GDP shows a high share. Regarding the correlation between the average level of taxation and the CPI index , it should be mentioned that the study highlighted the fact that in some countries, such as Ireland, Luxembourg, Denmark, which register a level of taxation below the EU average, the CPI index shows us a system that tends to be as least corrupt, in time that in other countries such as Austria, Belgium, the Netherlands, Sweden, although they register a level of taxation above the average of the EU states, the CPI index shows us a system that tends to be as least corrupt, which means that a high level of taxation it does not always imply a high level of corruption and that other factors must be introduced into the relationship, which can influence the behavior of the taxpayer.

Table no.1 -variables subject to analysis

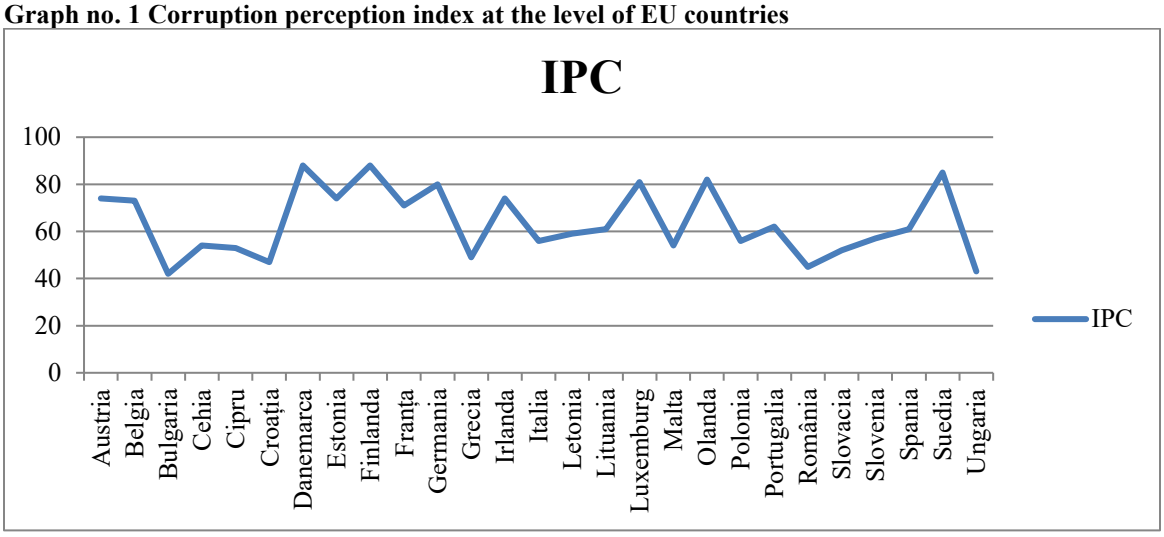
Country	Share of tax evasion in relation to GDP %	Average level of taxation	IPC 0-100, where 0 is very corrupt, 100-not corrupt	Tax revenues, percentage % of GDP
Austria	3,81	53,00	74	44,53
Belgia	7,42	57,00	73	44,35
Bulgaria	8,43	27,1	42	31,40
Cehia	5,31	48,52	54	34,90
Cipru	9,13	23,21	53	35,99
Croația	7,97	19,00	47	36,15
Danemarca	6,29	26,10	88	48,80

Estonia	6,81	49,40	74	34,90
Finlanda	5,18	40,10	88	42,93
Franța	5,41	66,50	71	47,70
Germania	4,18	48,80	80	43,88
Grecia	11,31	49,90	49	40,30
Irlanda	2,71	25,95	74	22,54
Italia	11,48	65,41	56	43,50
Letonia	7,12	35,00	59	33,80
Lituania	8,39	42,70	61	31,45
Luxemburg	3,19	20,30	81	38,90
Malta	9,51	41,80	54	32,50
Olanda	3,35	39,00	82	38,85
Polonia	8,28	38,80	56	37,60
Portugalia	6,70	42,54	62	37,45
România	10,27	43,80	45	27,20
Slovacia	6,91	48,70	52	35,12
Slovenia	6,90	32,00	57	37,90
Spania	5,68	58,30	61	42,93
Suedia	3,81	49,45	85	44,60
Ungaria	8,32	48,00	43	33,60

Source: author's works /Eurostat-Fiscal revenues include CAS

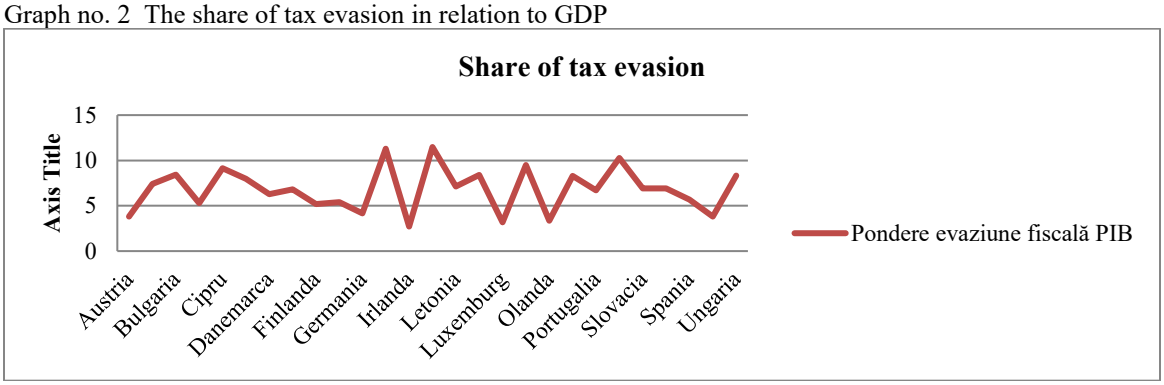
In the images below, the evolution of the 3 analyzed indicators CPI, Weight of ev. tax revenues from GDP, respectively the share of tax revenues in relation to GDP.

Graph no. 1 Corruption perception index at the level of EU countries



Source: author's works

Graph no. 2 The share of tax evasion in relation to GDP



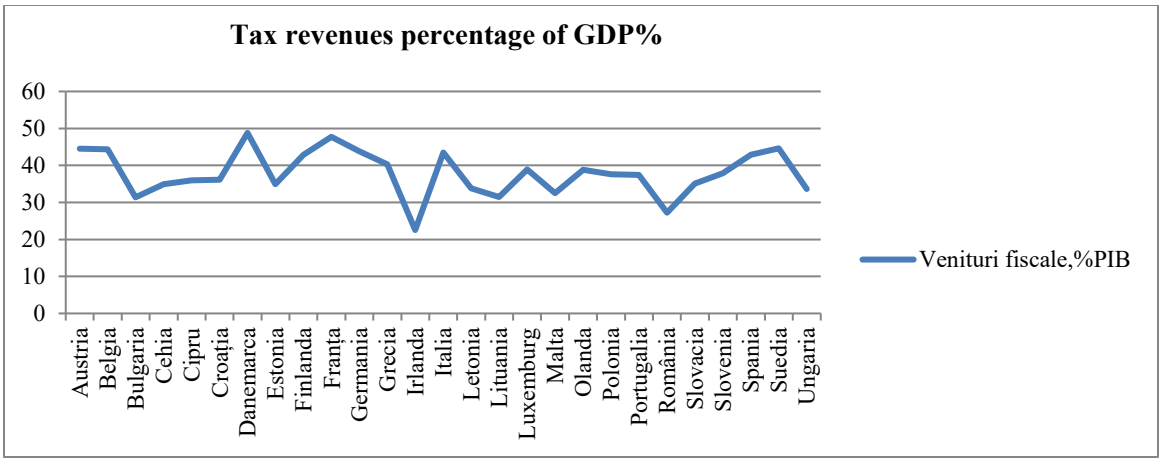
Source: author's works

Regarding the relationship between the level of tax evasion and the level of taxation, it can be stated that in principle there is a link between the two variables, in the sense that a high level of taxation also corresponds to a high share of the weight of tax evasion in GDP, with the exception of some countries such as France, Spain, Sweden, Germany which, although they record a high level of taxation, the degree of tax evasion is still low, which leads us to the idea that when analyzing the phenomenon of tax evasion, we must also take into account other criteria of a cultural nature , geographical, respectively the level of financial education of taxpayers. Regarding the collection of taxes in Romania compared to the other EU states, according to the Annual Report prepared by the Fiscal Council, a low level of the share of budget revenues in GDP was also recorded in 2021, respectively of 32.8%, resulting in a gap of 14.1 pp compared to the European average of 46.9%, Romania being followed only by Ireland compared to EU memberstates.

The level of fiscal revenues composed of taxes and social contributions reached 27.2% of GDP in 2021, Romania still being in the penultimate place, with a gap of 14 pp compared to the EU average (41.2% of GDP). Therefore, if we analyze the evolution of these indicators compared to the previous year (2020), we find that the gap that separates Romania from the EU28 average has deepened both in the case of fiscal revenues by 0.2 pp, and in the case of budget revenues by 0.6 pp. as regards the share of tax revenues in GDP recorded by Romania in 2021, it is significantly below that of other countries with similar economies, such as Slovenia (37.9%), Poland (37.6%), the Czech Republic (34.9%) and Hungary (33.6%). Compared to Bulgaria, the share of budget revenues in GDP is lower by 6.2 pp, and that of tax revenues by 4.6 pp. If we refer to the structure of tax revenues in Romania, the share of receipts from indirect taxes in 2021 was of 39.3% being higher than the European average which reflects a percentage of 33%, but below the level recorded by countries such as: Hungary 52.1%, Bulgaria 50.6%, Poland 40.4%.

Regarding the share of insurance contributions social sector in tax revenues reached a level of 41.9% in 2021, occupying the fourth position after countries such as the Czech Republic 47.6%, Slovakia 44.8% and Slovenia 44.3%. The same situation was not the case direct taxes, where Romania registers one of the lowest shares in tax revenues in the EU, namely 18.8% compared to the EU average, 32.3%.

Graph no. 3 Share of tax revenues in relation to GDP



Source: author's works

The structure of budget revenues in Romania is predominantly oriented towards indirect taxes and revenues from social contributions (together they represent 82.6% of tax revenues, the highest value in the EU), while, at the European level, there is a tendency to balance the weight direct taxes, indirect taxes and social security contributions (respectively, an EU average of 32.3%, 33% and 34.7%). If we continue with a brief analysis of the level of VAT collection in Romania (the main source of fiscal budget revenue), in nominal terms, we can say that in 2021 our country collected 15.511 billion euros from the VAT budget in 2021, compared to expected revenues of 24.5 billion euros, resulting in a deficit of 8.996 billion euros, thus our country recorded the third largest VAT compliance gap in the EU, after Italy (-14.6 billion euros) and France (-9.5 billion euros). In the graph below we have presented the evolution of the VAT Gap in the 27 member states of the European Union

Table 2. Descriptive statistics of the variable – VAT Gap

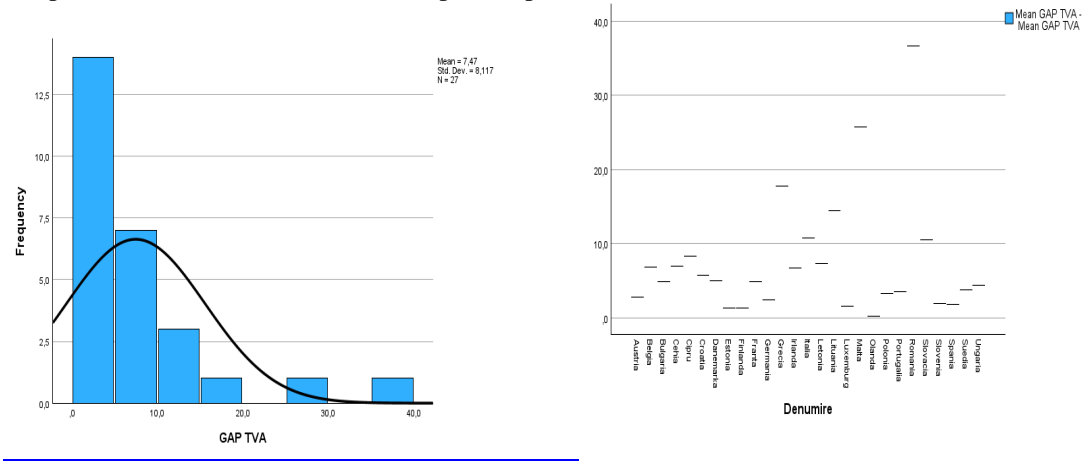
Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
GAP TVA	27	36,5	,2	36,7	7,467	1,5620	8,1166	65,880	2,385	,448	6,284	,872
Valid N (listwise)	27											

Source: author's works

Analyzing the data in the table, we can see that the average value recorded by the dependent variable for the year 2021 in the member states of the European Union is 7.467, with a variation that starts from 0.2 and reaches 36.7. We can also observe that the value of the Skewness asymmetry coefficient is 2.385, reflecting the fact that the distribution is skewed to the right which means that a positive skewness.

Graph no. 4. Evolution of the VAT Gap, European Union, 2021



Source: own processing based on data provided by Eurostat

The approach to tax evasion must also be reanalyzed from the perspective of human behavior, as studies have shown that this phenomenon, which derives from the individual's mode of action, is not devoid of rationality, and with the rapid increase in taxes, there is a considerable increase in this phenomenon, in this sense, we intend that through a future study we will analyze the evolution of the phenomenon of tax evasion for a period of 15 years, after which we will obtain results that will allow us to make a prediction regarding the evolution of this negative phenomenon. Regardless of its size, tax evasion is a negative phenomenon, and failure to achieve the collection program from the perspective of tax revenues can have a significant impact on the budget deficit. In the context of failure to achieve the collection program, the following effects may occur:

- Increase in the budget deficit, so the government must to cover expenses with available resources, including through loans or by reducing other expenses;
- Pressures on public finances, decision-makers will have to find other sources of financing to cover the resulting deficit, and this may lead to concerns about the sustainability of public debt and may affect the country's credit ratings;
- Reduction of investment capacity;
- It affects the national economic stability:
- It can lead to the emergence of social and economic inequities;
- It affects the purchasing power of the national currency.

Conclusions

Tax fraud and tax evasion represent a serious and complex problem that requires a coordinated approach at national, European and international level. The economic and financial crisis has generated many problems for most European governments, which have tried to adopt viable measures to ensure that they can keep public spending under control, ensure a more efficient collection of budget revenues and reduce the phenomenon of tax evasion and fraud, in such a way that economic growth can be achieved. Following the study undertaken, we can appreciate that between the level of tax evasion and the corruption perception index there is a close link of interdependence, thus we identified that countries such as (Austria, Denmark, Estonia, Holland, Germany, Sweden) which register

a low level of the CPI, the share of tax evasion in GDP is lower, while in countries where the corruption perception index registers a high level (Romania, Greece, Hungary, Malta, Cyprus, Bulgaria) and the share of tax evasion in GDP presents a share raised. Also, a high level of taxation, which has the effect of increasing the fiscal pressure on taxpayers, causes an increase in the level of tax evasion. Since ANAF has the central role in the administration of the collection of taxes and duties and holds all the levers to reduce the "motivation" of taxpayers to avoid paying tax obligations in order to increase the degree of voluntary compliance with the payment of duties and taxes owed to the state budget, we believe that a reform of this institution is required.

Thus, the ANAF reform through digitization provided for in the PNRR aims to increase the revenue/GDP ratio by:

-reducing the fiscal gap to VAT;

-efficient administration of taxes and fees;

-increasing the degree of voluntary compliance on the part of taxpayers when paying fees and taxes;

-decreasing corruption among fiscal structures with fiscal verification duties.

In conclusion, achieving fiscal objectives by increasing the quality of services, implementing integrated digital solutions, as well as increasing institutional efficiency and transparency, followed by an upward trending collection level, can contribute to reducing the phenomenon of tax evasion.

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ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION. A LITERATURE REVIEW

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Abstract: *During the last decade, and especially since the launch of ChatGPT in late 2022, artificial intelligence has become a very hot topic for both professors and universities, raising concerns and challenges, as well as a wave of controversies. Using the methodology of bibliometric studies and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses protocol, the purpose of the investigation is to analyse the scientific production in the field of artificial intelligence's applications in higher education. The paper is an overview of the main discussions and trends reflected in articles published between 1989 and November 2023 and indexed in the Web of Science Core Collection.*
Keywords*: Higher Education; Artificial Intelligence; systematic literature review; bibliometric study.*

This Article was presented as a paper at the 15th edition of the Annual International Conference Globalization and Higher Education in Economics and Business Administration (GEBA 2023), which was held at the Alexandru Ioan Cuza University, Faculty of Economics and Business Administration in Iasi, Romania from the 19-21 October 2023.

Introduction

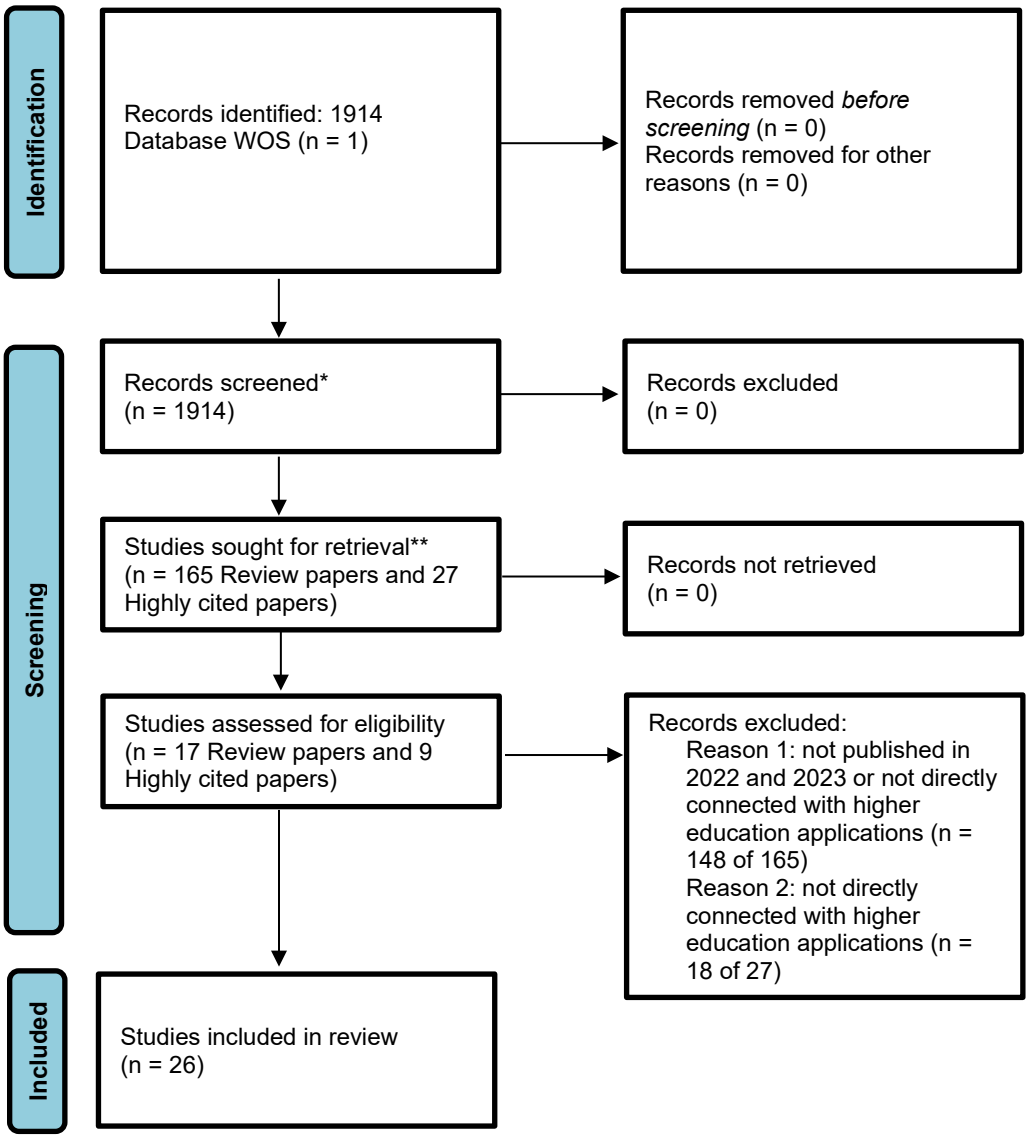
The use of artificial intelligence (AI) in education has been a topic for investigation since the early 1970s. However, concerns and challenges about the application of artificial intelligence in higher education (HE) reignite especially in late 2022, following the launch of ChatGPT. This paper provides general insights and details on current trends in the field and future directions of investigation. The structure of the review paper is organized as follows: Section 2 provides an overview of the methodology and tools used; Section 3 includes a comprehensive discussion of the contributions and findings of selected articles, and Section 4 contains the concluding remarks.

Methodology and data

This paper uses the bibliometric analysis approach. Pritchard (1969), was the first to use quantitative methods to measure and analyse different aspects of research articles; later,

the term "bibliometrics" was widely adopted and the approach was used for in-depth analysis different subject fields. Nowadays, the investigation of bibliographic material from a quantitative perspective is very convenient to provide a general overview of research in a specific field, identify trends, the most influential papers, authors or journals. Furthermore, bibliometric research can help to advance a field of study in novel and meaningful ways (Donthu et al., 2021) and represents an essential component of the research evaluation methodology, particularly in science and applied science (Ellegaard & Wallin, 2015).

We follow the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol (Page et al., 2021) for selecting the relevant articles from the Web of Science Core Collection (WOS), *the most relevant database in social sciences.* The query concentrated on papers indexed between 1989 and 24th of November 2023, using as keywords: "artificial intelligence" and "higher education". The selection process of the articles is shown in Figure 1.



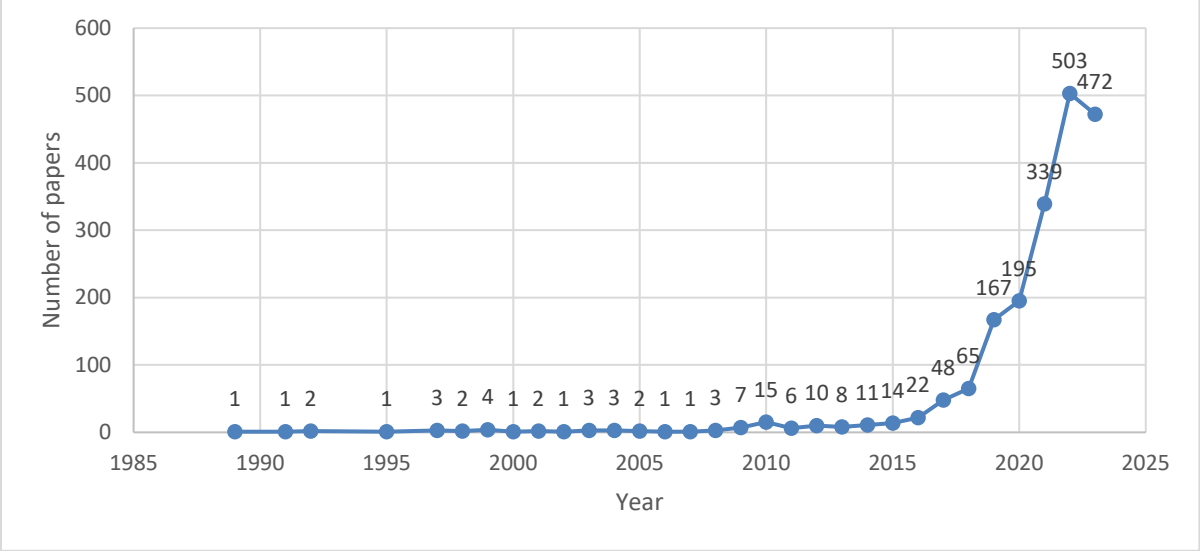
* Stage 1: For VOSviewer use
** Stage 2: Review papers and Highly cited papers
Source: Adapted from Page et al. (2021)

Figure 1. PRISMA flow chart of article identification and screening

The initial research query using the WOS database (https://www.webofscience.com/) and the above-mentioned keywords returned 1,914 results, spanning to 1989.

At this early stage, before refining the search, several interesting facts need to be highlighted about the query in Web of Science. As one could expect, in a detailed structure of the results (refined by *Document Types*), the majority of the indexed materials are *article journals*: 1284 of the total documents (including 165 *Review Articles*), while the others have been structured as follows: 147 *Early Access*, 27 *Editorial Materials* and 3 *Retracted Publications*), 420 *Proceeding Papers*, 21 *Book Chapters*, 9 *Book Reviews*, 2 *Books*, 2 *Meeting minutes*, 1 *Letter*, and 1 *Meeting Abstract*. Among the indexed papers, 27 *Highly Cited Papers* and 5 *Hot Papers* have been highlighted. Moreover, the Open Access publications have surpassed subscription-only publications: the majority of the documents (1,027 of the resources, or roughly 54% of the total), were made available Open Access, indicating that the research landscape is rapidly shifting, as academic journals and books move from Subscription to Open Access publishing - a trend that major publishers have been following for the past few years.

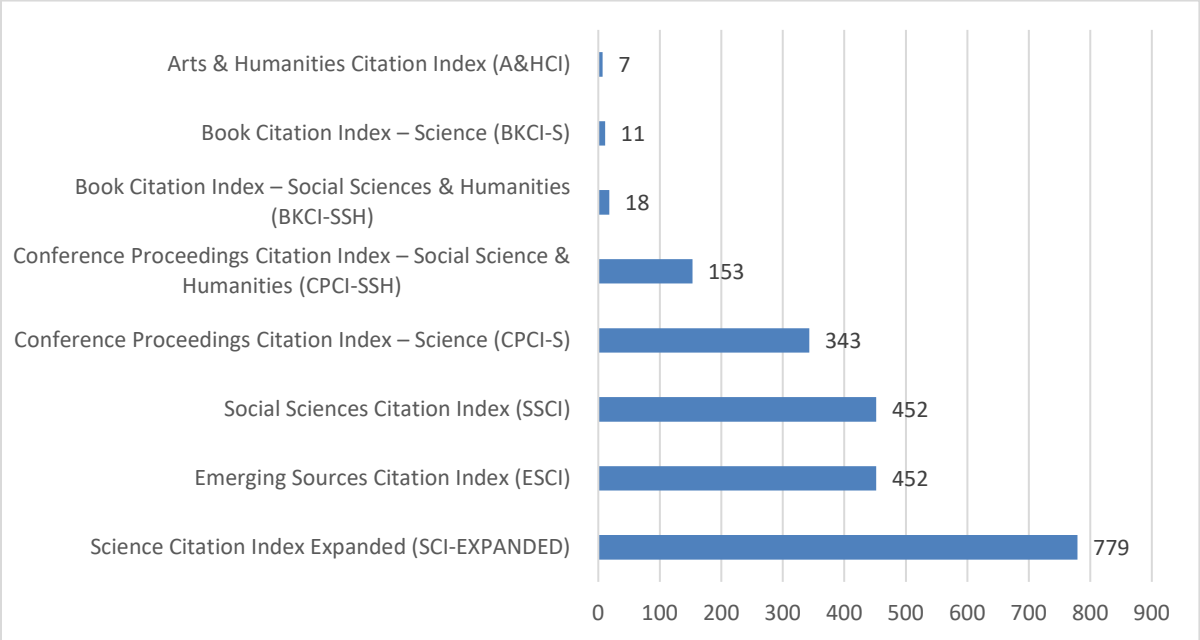
A more detailed analysis shows that the number of papers in the field has increased significantly over the years, but especially since 2020. In total, 1509 papers were published starting with 2020, representing 78.84% of the materials; if we include 2019 as well, the percentage increases to 87.56%. In fact, all the papers published between 1989 and 2019 count less than the number of materials published only in 2022. We also need to take into consideration that our analysis stops in late November 2023 and by the end of the year more resources will have been published and indexed.



Source: Web of Science Core Collection, https://www.webofscience.com/

Figure 2. Number of papers published annually from 1989 to 2023 in journals indexed in Web of Science

In terms of *Web of Science Categories*, around 24% of the total (464 of 1914) belonged to *Education Educational Research,* where can be added the 132 papers included in *Education Scientific Disciplines*, reaching 31.13%. Apparently, the second field was *Computer Science Artificial Intelligence* (with a total of 205 items), at close range with *Computer Science Information Systems* (202) and *Computer Science Interdisciplinary Applications* (186), followed by *Engineering Electrical Electronic* (155), *Computer Science Theory Methods* (135), *Engineering Multidisciplinary* (127) and *Telecommunications* (122). However, all these fields interconnected include 1132 papers, i.e., 59.14%, taking the largest share of the total. The *Economics and Business* fields account only for 6.82% of the indexed papers (133 papers), distributed as follows: 49 in the field of *Management*, 40 in *Business* field, 23 in *Economics* category, 11 in *Ergonomics*, while *Business Finance* counts only 10 papers.
As expected, in terms of indexing, most of the papers belonged to the *Science Citation Index Expanded*, as shown in Figure 3; another interesting fact is that the newest category created by Clarivate Analytics a few years ago, the *Emerging Sources Citation Index*, included the same number of papers as the *Social Science Citation Index*.

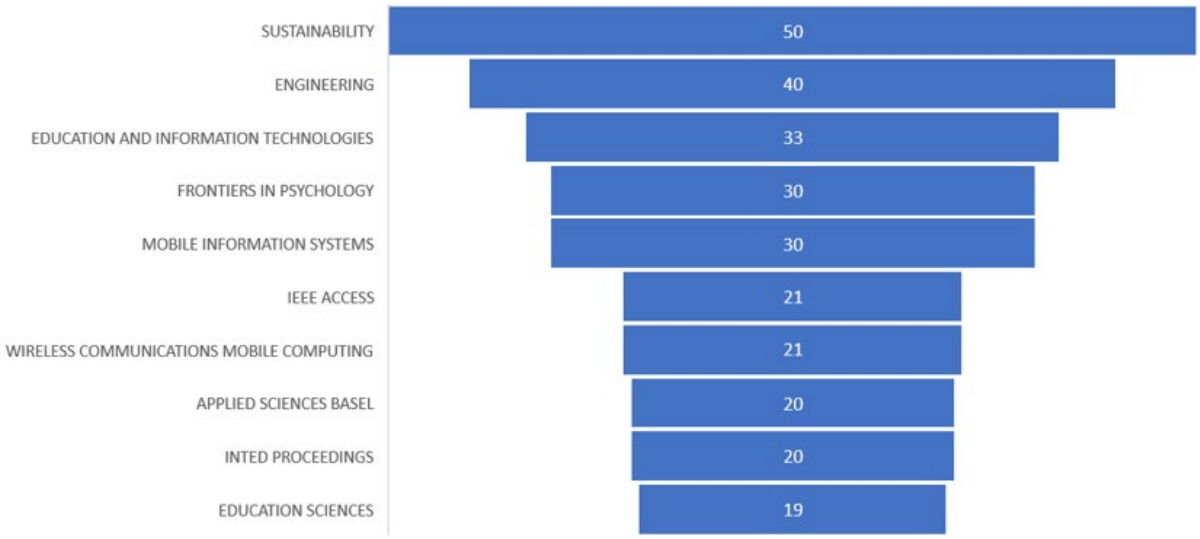


Source: Web of Science Core Collection, https://www.webofscience.com/

Figure 3. Web of Science Indexes – repartition of indexed papers

In terms of *language of publication*, it results once again that the lingua franca for research and investigation is English, with the largest majority (97.23%, with 1861 papers), followed by Spanish (23) and Russian (12), as well as a few in Chinese (7), Turkish (4), German (3), Portuguese (2), Arabic (1) and Bulgarian (1 item). Most of the authors are from China (468), the USA is the second ranked with 333, followed by England, with 130 authors, Spain with 106, while Germany closes the Top 5 ranked countries, with only 85 authors. When the results of the query are refined by *Affiliations*, the top 5 universities are the University of London, with 36 papers, Harvard University with 27 articles, the

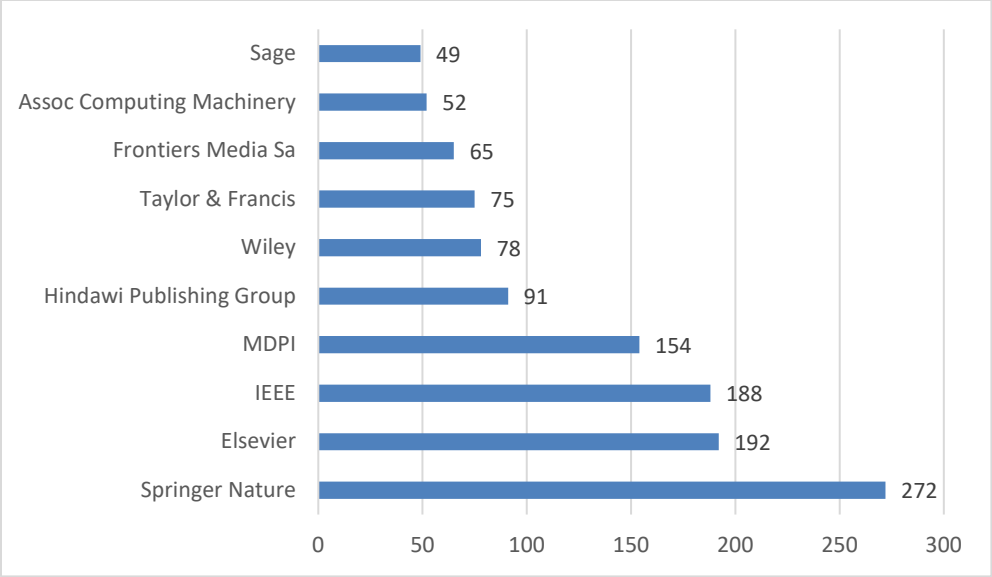
University of California System with 24, Tecnológico De Monterrey counts 21 items, while 20 are signed by authors affiliated to the University College London. The Top 10 journals, when the sample is refined by *Publication Titles* account for more than 10% of the total number of papers published in the field, while when expanding to Top 20 journals, they account for almost 23% of the papers. *Sustainability*, an MDPI multidisciplinary open-access journal, ranks the first, with 50 papers published over the years.



Source: Web of Science Core Collection, https://www.webofscience.com/

Figure 4. Publication titles with highest numbers of papers in the field of artificial intelligence, in connection with higher education

An investigation in this field could not be completed without the publishers. The publishers' marketplace is becoming increasingly competitive. While most small independent publishers are struggling to survive, the market is dominated by major publishers, representing nowadays an oligopoly (Nishikawa-Pacher, 2022), where the top five publishers in terms of journals, with 12,248 journals, account for 43.64% of the total number of journals (28.060) published by the top 100 largest academic publishers, ranked by number of journals. In the digital era, top commercial publishers have achieved a significant rise in the share of scientific literature they published (Larivière et al., 2015).



Source: Web of Science Core Collection, https://www.webofscience.com/

Figure 5. Top 10 Publishers in the field

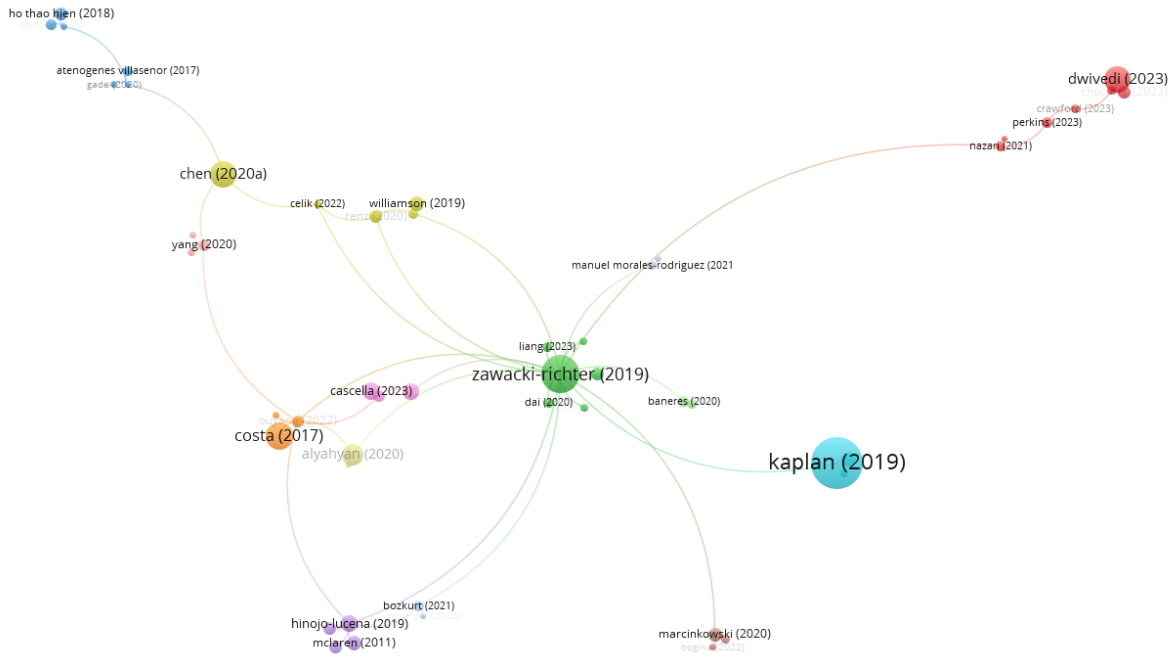
The ranking of the publishers does not show significant surprises, most of the papers are published by the publishers with the highest visibility in the world today. While Hindawi Publishing group appears in the top 10 in the 5th position and Wiley on the 6th, separately, ranked in the 12th position is Wiley Hindawi1 with 38 papers. As a result, including Hindawi in the Wiley group, would rank Wiley in 4th position.

Discussions

Bibliometric analysis with VOSviewer

In order to deepen the bibliometric analysis of our sample, we used VOSviewer software, version 1.6.20 (van Eck & Waltman, 2010). Starting from the entire sample of 1914 papers, in order to graphically highlight the citation network, we selected the papers with at least 10 citations, which resulted in a sample comprised of 319 items, among which the largest number of connected articles is 51.

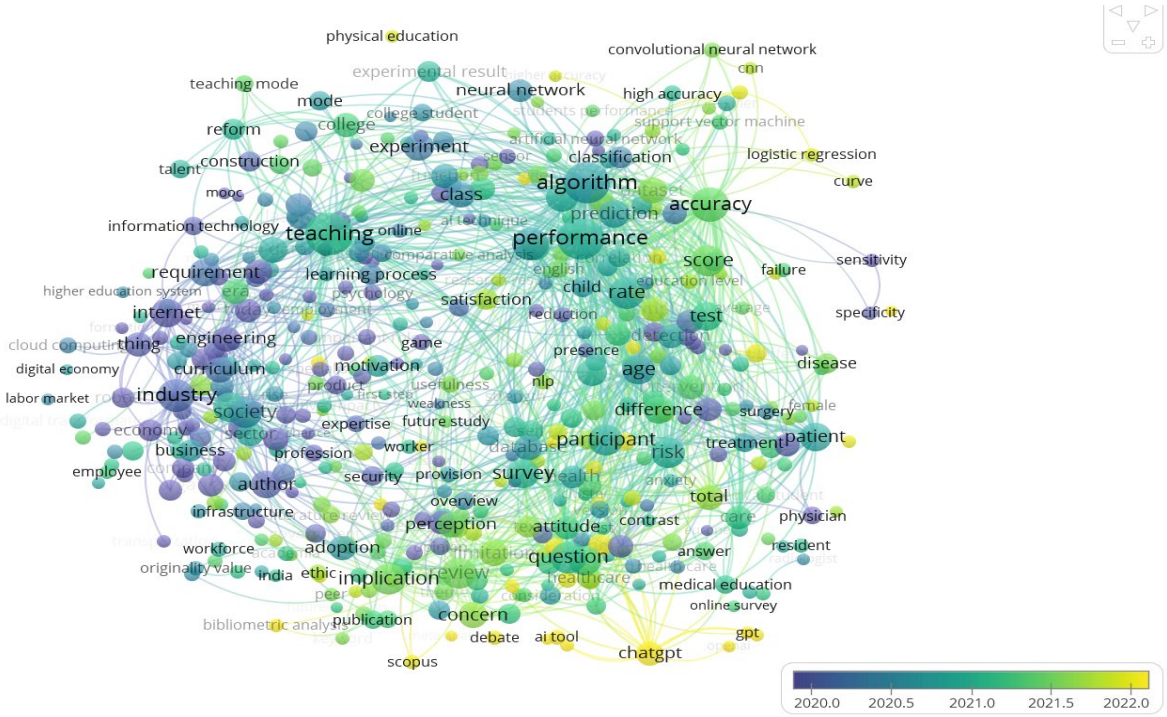
[1] Wiley and Hindawi collaborated on an Open Access publishing partnership since 2017 and in January 2021, John Wiley & Sons acquired Hindawi Limited.



Source: Web of Science Core Collection, using VOSViewer

Figure 8. Network visualization of the largest set of connected items - Citation network

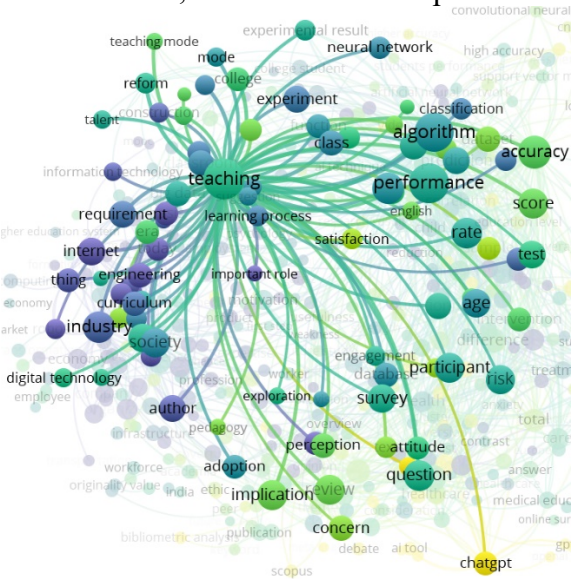
The visualisation available in Figure 8 suggestively places two research papers (Kaplan & Haenlein, 2019, with 619 citations in WOS, and Zawacki-Richter et al., 2019, with 473 citations in WOS), in central positions. A map generated in VOSviewer based on text data, using the title and the abstract fields for the entire sample of 1914 available items, resulted in a term co-occurrence map, with colours indicating the year of publication and the size (the importance, i.e. number of occurrences of the words, the minimum being set to 15) is available in Figure 9.

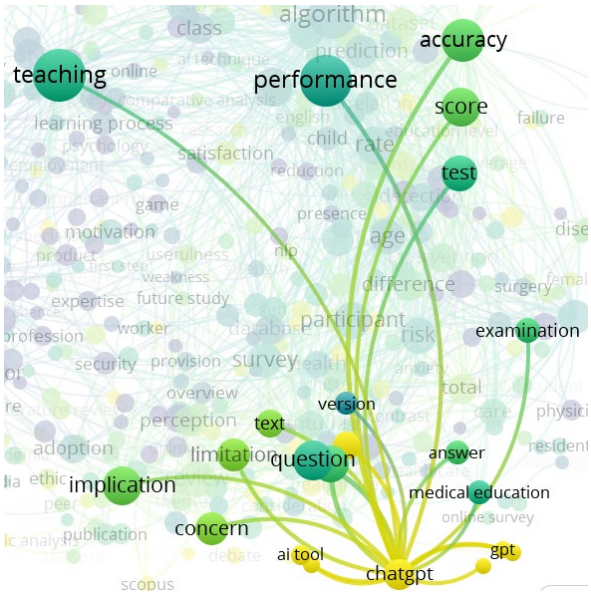


Source: Web of Science Core Collection, using VOSViewer

Figure 9. Keywords grouped by clusters - Co-occurrence map

The concentration in Figure 9 suggests that teaching was a common topic of investigation in papers published in 2020 and 2021, in connection with performance, class and algorithm.





Source: Web of Science Core Collection, using VOSViewer

Figure 10. Evolution of keywords over time - Co-occurrence map with main connections

Figure 10 takes a closer look at the two main themes identified, and shows that teaching was the main topic, with its connections, while in 2022-2023 ChatGPT and AI tools increased significantly in terms of occurrence as keywords. The use of AI in higher education has brought a paradigm shift in the idea that learning is delivered and experienced. In order to explore the advancements, challenges, and opportunities associated with the integration of AI in higher education we will discuss the main points.

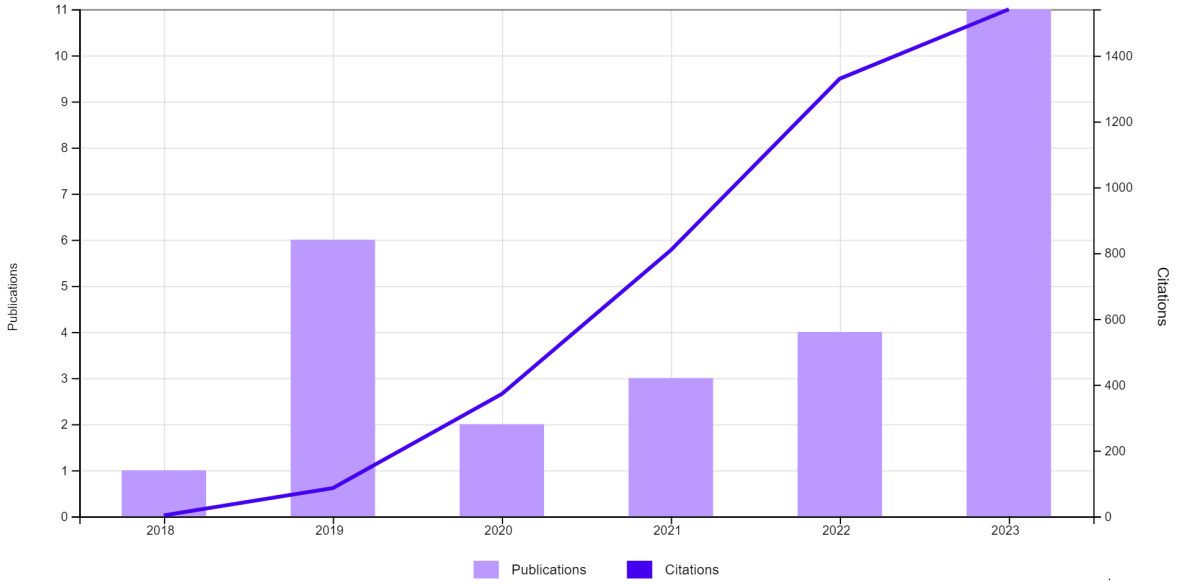
The integration of artificial intelligence in HE brings forth intriguing insights into the dynamics of student-machine interactions (Hu et al., 2023). Although the study did not reveal statistically significant differences in academic performance between the groups exposed to an Intelligent Tutoring Robot and traditional human instruction, the higher average performance in the latter group prompts us to critically examine the current efficacy of AI in significantly enhancing academic outcomes.

Likewise, the functionality of ChatGPT has limitations in handling scenarios that require application and interpretation. This demands a deeper consideration of ChatGPT's role in HE contexts, focusing on the need for further research and improvements to delineate its strengths and weaknesses. When considering the ethical dimension of AI integration in academic writing, the caution and transparency are fundamental, with concerns about the authenticity and credibility of academic works. The ethical considerations around the use of AI tools need a well-balanced approach, where the efficiency of those tools is leveraged beside the integrity of scholarly output. Furthermore, Farrokhnia et al. (2023) reveal the importance of a holistic evaluation of AI's impact on educational processes. For that reason, HE institutions must navigate these complexities, taking advantage of AI's strengths while mitigating its weaknesses and addressing potential threats. However, in this sense, it is important a broader institutional responsibility. The exploration of opportunities and challenges associated with AI in HE highlights the importance of robust policies and procedures to ensure ethical and responsible use, particularly in preventing academic dishonesty.

From an interdisciplinary perspective, we need to focus on the interconnections of AI with different academic disciplines. This may promote a better collaboration of experts from diverse fields and highlights the need for a deeper understanding of the implications of AI on knowledge, transparency, and ethics. The feedback from computer science, marketing, information systems, and education amongst others, underscores the collaborative effort required to use AI in HE. However, it is necessary that HE institutions seek to capitalise on AI's potential, without forgetting the imperative for a more critical reflection on the challenges, risks, and the study of different theoretical pedagogical perspectives.
Finally, as institutions embark on this transformative journey, a synthesis of interdisciplinary perspectives, ethical guidelines, and strategic policies emerges as the cornerstone for maximizing the benefits of AI while addressing potential risks. The ongoing dialogue and research in this domain will undoubtedly shape the future path of AI in HE.

An investigation of the Highly cited papers in the field of Artificial Intelligence in Higher Education

This is one of the most interesting categories, because the 27 papers included in the *Highly cited papers* category in WOS were cited in total 4148 times (4138 without self-citations) in the last 5 years.



Source: Web of Science Core Collection, https://www.webofscience.com/

Figure 6. Highly cited papers: the yearly evolution of number of papers and citations

However, some of these papers deal with medical research topics (Clinical Medicine) or Engineering and are not directly connected with our main research, AI in HE, so we manually selected them and finally investigated the 9 papers below. These papers together were cited 1449 times in the Web of Science Core Collection, while the first two, (Zawacki-Richter et al., 2019 with 619 and (Kaplan & Haenlein, 2019) with 346, represent almost 67% of the citations for the sample of 9 papers selected, and over 23% of the citations for the entire category of 27 Highly cited papers sample.

Hu et al. (2023) used Robotic Process Automation on a sample of 123 students as a control group in order to relate the interactions between the Intelligent Tutoring Robot, students, and experimental groups to describe the synergy between students and teachers. They found a slight difference between the control and the experimental groups with a view to the educational achievements. As the integration of technology has become a priority for most of us in recent years, Fergus et al. (2023) investigated the functionality of Chat Generative Pre-Trained Transformer (ChatGPT) in answering to chemistry evaluation inquiries which needed further analysis to determine its possible influence on learning. They used two modules, focused on chemistry in the first and the second year of a pharmaceutical science programme and they reached the conclusion that ChatGPT generated answers to questions that concentrated on knowledge and comprehension, using verbs such as "describe" and "discuss". They discovered that ChatGPT offered limited results for questions concentrated on the application of knowledge and interpretation with non-text information. In addition, ChatGPT was not classified as a high-risk instrument able to facilitate cheating, but rather a possible catalyst for educational discussions about academic integrity.

In their turn, Dergaa et al. (2023) examine the potential advantages and disadvantages of ChatGPT and other Natural Language Processing (NLP) technologies in research and academic publishing, highlighting the ethical aspects raised by their use, considering the potential effects on the academic work's legitimacy and authenticity. They found out that ChatGPT, as well as other NLP technologies, have the ability to increase the effectiveness of academic writing and research, however worries regarding the consequences on the authenticity and credibility of the academic work were also raised, highlighting the role of critical thinking and human intelligence in research.

Farrokhnia et al. (2023) used SWOT analysis to query ChatGPT's advantages and disadvantages, as well as its potential benefits and risks for education. They emphasized the ability to produce plausible, personalized, and real-time responses. According to their findings, ChatGPT can facilitate access to information, can ease personalized learning, and reduce teaching overload. Among shortcomings, they mentioned the failure to fully understand the context, possibly endangering academic integrity and facilitating plagiarism.

In their paper, Ouyang et al. (2022), by the help of a systematic review, offered a summary of empirical researches focusing on the use of AI in online HE. More precisely, they investigate the roles that AI plays in empirical researches, the algorithms employed, and the results obtained. There have been identified 434 articles (published between 2011-2020) for screening, using WOS, Scopus, ACM, IEEE, Taylor&Francis, Wiley, and Ebscohost, and only 32 papers being selected for the final investigation. The findings were as follows: traditional AI technologies are frequently used, but more sophisticated approaches (such as genetic algorithms or deep learning) are increasing; prediction of learning status and user satisfaction, resource recommendation, automatic assessment, as well as enhancement of learning experience became common ground, aiming to improve students' engagement in online classes and finally, their overall academic performance.

Cotton et al. (2023) scrutinized the possible dangers and benefits of using ChatGPT in higher education. The article tackled the challenges in identifying and discouraging unethical behaviour, suggesting policies that academia could use to enforce the accountable use of such tools.

Dwivedi et al. (2023) highlight the opinions of 43 experts in different domains, like computer science, marketing, IT, education, policy, hospitality and tourism, management, publishing, and nursing. While acknowledging ChatGPT's potential to increase productivity, the experts shed light on some drawbacks, including privacy and security concerns. The experts' opinions diverge if ChatGPT's use must be restricted or regulated.
Chen et al. (2020) focus on how artificial intelligence is applied and impacts teaching, learning, and administration. Using a qualitative approach and extensive literature review, they conclude that AI has been widely incorporated into education, especially by educational institutions, evolving from computers to web-based and online education systems and eventually to chatbots and humanoid robots performing teaching tasks.
Zawacki-Richter et al. (2019) conduct a systematic review to offer a complete picture of AI's use in HE. 146 papers were included in the final overview, out of 2656 papers published between 2007 and 2018. Most of the studies belong to Computer Science as well as to the STEM area and used a quantitative approach. The four areas of artificial intelligence applications in education identified were *profiling and prediction*; *assessment and evaluation*; *adaptive systems and personalisation*; and *intelligent tutoring systems*. The findings highlighted the nearly complete absence of investigation on challenges and threats, and the need for a more in-depth focus on ethical and pedagogical characteristics of AI use in HE.
Kaplan & Haenlein (2019) analysed how AI differs from associated notions, like the Internet of Things (IoT) or big data, and suggested that AI should be seen more nuancedly, either by concentrating on various AI system types (i.e. analytical AI, human-inspired AI, and humanized AI) or by seeing them by the help of the evolutionary stages (narrow, general, and artificial super intelligence). Using case studies involving colleges, businesses, and governments, they showed the possible risks of AI. In addition, they presented the Three C Model of Confidence, Change, and Consistency, a framework that can assist stakeholders in considering the repercussions of AI within the educational framework.

A review of review papers about artificial intelligence and higher education

Among the 165 articles marked as review papers in the WOS database, we first selected the ones published in the last couple of years, 2022 and 2023, in order to be able to extract the latest trends in the field; we excluded ESCI papers, and focused only on SSCI and SCIE indexed papers.
The structure of the papers is shown in Figure 7.

Source: Web of Science Core Collection, https://www.webofscience.com/

Figure 7. Web of Science categories for review papers published in 2022 and 2023

Later, we manually selected the papers, among them being papers mainly connected with industry, medicine, etc. and we obtained 17 review papers directly related to our scope, the applications of AI in HE, and the key findings are synthesised in Table 1.

Table 1. A summary of Review papers investigated

Paper	Sample	Methodology	Findings
Currie, (2023)	273 papers published between 2022 and 2023, from Medline	Literature review	- It is difficult to forecast ChatGPT's future effects; - It is possible to use inadequately large language models like ChatGPT to produce convincing text based on false material. With proper handling, it may turn out to be a useful instrument for professors; - A major concern is the use of ChatGPT in creating low-quality articles targeting predatory journals, fuelling them with questionable or flawed papers in an increased number.
Salas-Pilco & Yang, (2022)	383 articles July 2016 to June 2021 Web of Science, IEEE, Xplorer, Scielo, and CAPES Portal	Systematic literature review	- The paper outlines the findings regarding the implementation of AI technologies in HE in the context of Latin America; - The key AI applications in education identified are: predictive modelling; intelligent analytics; assistive technology; automatic content analysis; and image analytics; - AI applications are useful in identifying students with drop-out risk.

Paper	Sample	Methodology	Findings
Wu & Yu, (2023)	24 randomized studies	Meta-analysis Stata software (version 14)	The paper examines how AI chatbots influence students' learning results, and shows a significant outcome, greater for HE students in comparison with schoolchildren enrolled in elementary or secondary education.
Deng & Yu, (2023)	Web of Science, Wiley Online Library, Springer Link, Taylor & Francis Online, ScienceDirect (Elsevier), Google Scholar	VOSviewer, PRISMA	- The findings showed that chatbots had a significant positive effect on the learning results, irrespective of chatbot roles, length of intervention, or learning content; - Learning achievement was positively and significantly improved by the usage of chatbot technology, as well as the engagement in learning, the retention of information, and the explicit reasoning; - Chatbots did not considerably increase critical thinking, learning engagement, or motivation.
Bearman et al. (2023)	29 articles 1980-2020 Scimago, JCR and Google Scholar	- Linguistically based approach - critical literature review	- The authors found unclear definitions and a lack of explicit reference to AI as a research object; - Two Discourses were identified and discussed: the one of imperative change, which describes how AI is perceived, and the second one of altering authority, concentrating on how AI is positioned - the teacher is not anymore in the centre of the process and the authority is distributed across stakeholders, including staff and students.
Garlinska et al., (2023)	- 208 documents - Scopus, Web of Science, websites, selected government and European Union Documents	PRISMA	- Technologies improved significantly the learning process; students benefit from a more immersive experience generated by the online content; - The lack of face-to-face interaction specific to distance learning, caused women to feel more exhausted; - Online learning satisfaction is influenced by self-perception.
Polin et al., (2023)	2017-2022 236 articles	- Systematic literature review; - Meta-Analysis PRISMA	- The results provide an overview of smart campus conceptualization and offer guidance for future investigation regarding smart campuses.
Alotaibi & Alshehri, (2023)	55 articles Scopus, Web of Science	PRISMA VOSviewer systematic literature reviews Meta-Analysis	- The findings emphasize the imperative need to integrate AI into higher education institutions in order to improve the quality in education and address learning challenges.
Almufarreh & Arshad, (2023)	565 articles 2015-2022 Web of Science, Scopus, Science Direct,	VOSviewer	- Emerging technologies enhance educational experience, particularly concerning fast feedback, collaboration, and student-teacher engagement;

Paper	Sample	Methodology	Findings
	IEEE Xplore, MDPI, Google Scholar and internet resources		- Education institutions are supposed to develop governance bodies and mechanisms to integrate the emerging technologies into the teaching process; - The use of new technologies in education can assist and facilitate updating outdated teaching materials.
Chu et al., (2022)	50 articles 1996-2020 Web of Science	based learning model	- The most frequent application domain was engineering; - The AI was used especially for profiling and prediction of learning status; - The investigation topics mainly included learning behaviour, accuracy, sensitivity and precision, cognition and affect.
Essa et al., (2023)	2015-2022 IEEE, Springer, Science Direct (Elsevier) and ACM	Systematic literature review	- The results contain an investigation of the most recent advancements in this rapidly developing field, with regards to the uses of machine learning techniques in order to create better e-learning environments, capable to identify automatically participants' learning styles to facilitate learning; - The results that more empirical research should be done in the area of deep learning algorithms, connected with the learning styles, in order to increase their adaptability.
Yenduri et al., (2023)	145 articles Google Scholar, arXiv, Springer, Nature, Wiley, Elsevier, Taylor and Francis, MDPI, and IEEE	Systematic literature review	- Artificial Intelligence, Extended Reality (XR), IoT, Human-Computer Interaction (HCI), digital twins, and the metaverse are new technologies that can offer inclusive education for students with learning difficulties.
Ansari et al., (2023)	69 articles	Systematic literature review PRISMA	-The results show that ChatGPT can assist teachers, students, and researchers with a variety of activities. Although the particular needs differ, the main goal is the same: for academics, it means seeking personal advantages or easing the academic burden, using it for personal and professional learning, while students utilize it as personal tutors for learning objectives. - Though, a large body of research brought up issues connected with the accuracy, reliability, academic integrity, and even detrimental consequences on cognitive, as well as social development.
Grimalt-Álvaro & Usart, (2023)	2006-2021 518 articles	Systematic literature review PRISMA	- Sentiment Analysis as a research area is expanding, however still the majority or articles adopt a technical perspective,

Paper	Sample	Methodology	Findings
			while are published mainly in journals pertaining to the digital technologies field.
Fang et al., (2023)	2018-2022 27 articles Web of Science, Scopus, ACM digital library, ERIC (Education Resources Information Centre), ProQuest, IEEE Xplore	Systematic literature review	- The results reveal a growing interest in using AI technologies; - In terms of research methodology, most papers employ quantitative approaches, however, mix-methods are frequently employed as well, while the least used methods are the qualitative ones; - The majority of studies utilized planning-based models, followed by research using machine learning models; - According to the majority of research, using AI technology to augment human storytellers improved kids' motivation, creativity, presentation, sketching, and knowledge acquisition abilities as well as their interpersonal and story-related skills. They also enhanced the creativity, writing abilities, engagement, and sense of fulfilment of adults and university students; - Educators or teachers should evaluate integrating AI-based story-writing into course learning (like English, or STEM) in order to help participants develop their writing skills, problem-solving skills, and AI literacy; - Schools should implement AI-based story-writing courses or activities to offer students the chance to practice their writing skills, creativity, and AI comprehension; - Policymakers should design policies to encourage AI-supported story writing in school education.
Rangel-de Lázaro & Duart, (2023)	107 articles Scopus, Web of Science and EBSCO	Systematic literature review Meta-Analysis PRISMA	- The study provides a comprehensive overview of how extended reality and artificial intelligence have been implemented and impacted the online HE during the COVID-19 pandemic; - The investigation reveals the increasing attention to leveraging extended reality and AI to enhance learner's experience, to support a more collaborative, and self-paced experience, and improve online education's accessibility and effectiveness.
Shahzad et al., (2023)	50 articles 2000-2022 Summon, LISA, LISTA, Scopus, Web of	Systematic literature review Meta-Analysis PRISMA	- Psychological Ownership (PO) has a key position in personal knowledge and information management (PKIM);

Paper	Sample	Methodology	Findings
	Science, EBSCO Host, Google Scholar, Pro Quest, Emerald, Wiley Inter Science, Taylor & Francis, and Wiley Inter-Science Databases		- PO encourages individuals to better organize knowledge and information to provide peak performance. PO is a noteworthy instrument that could be used to encourage creative contributions from their staff; - Empirical research demonstrated a strong positive correlation between IT self-efficacy and PKIM for lifelong learning; - The use of social media instruments, the implementation of new technologies, professional development, AI, and teamwork are popular strategies both for implementing PKIM activities successfully as well as for producing innovative outcomes in academia.

Source: Compiled by the authors.

The investigation of review papers allowed to briefly synthetise the main themes of research as well as concerns about the use of AI in HE nowadays.

Conclusions

The exploration of artificial intelligence in higher education, as examined through the diverse lenses of the discussed studies, underscores the intricate relationship between technological innovation and the evolving landscape of academia. As we draw insights from the nuanced investigations into student-machine interactions, the capabilities, and limitations of AI-driven tools, ethical considerations, and the broader implications for the educational ecosystem, it becomes evident that the integration of AI is a multifaceted endeavour that requires careful consideration and strategic planning.

The implementation of AI in HE unravels a complex set of opportunities, challenges, and ethical considerations. The studies analysed shed light on the multifaceted impact of AI, from refining subject-specific interactions to reshaping pedagogical landscapes. While AI exhibits notable strengths in knowledge-based domains, its nuanced limitations underline the indispensability of maintaining the delicate balance between technological integration and traditional pedagogical approaches.

For instance, ethical considerations in preserving academic integrity, emerge as one of the most important assets. Indeed, the design of educational policies is necessary and these policies must analyse the situation from a strategic synthesis of interdisciplinary insights and ethical frameworks, as it becomes imperative for utilizing AI to its fullest, while preserving HE's core principles.

Future research in the realm of AI in HE should explore the evolving dynamics of human-AI collaboration, delving into more nuanced analyses of student-machine interactions, as well as the perceptions of students about the use of AI in HE, and this information will allow for a better design of the future educational policies.

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EFFECTS OF IMPLEMENTING TALENT MANAGEMENT IN ROMANIAN PUBLIC INSTITUTIONS

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Abstract: The human resources field is constantly changing and adapting to the fast-paced changes on the labor market. The re-evaluation of human resources strategies in order to attract top performers required the development of a new research field, talent management. Although many specialized papers have been published in recent years, empirical research has not provided sufficient evidence to demonstrate that talent management practices are useful and necessary in all branches of activity and especially in the public sector. In Romania, the field is little known, and research is reduced in number, and for these reasons, through this approach, we aim to investigate the effects of implementing talent management in Romanian public institutions. The study is based on the quantitative analysis of the data collected with the help of the questionnaire applied to 50 specialists in the field of human resources and persons in leadership positions in educational institutions and in the health field.
Keywords: talent management, public sector, Romania
Jel Classification: M12, J45

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Introduction

Attraction of talented employees is determined by the context of labor relations, built in organizations that fit into the enterprise model centered on human capital (Lawler, 2008). In the author's opinion, such an organization is characterized by the simultaneous attention paid to human resource planning, task design, recruitment and selection, organizational structure and information system, in order to enable those employment relationships that attract talented people to enable them to work together efficiently. The need for qualified personnel in many sectors of activity has increased in the last decade, and organizations have been forced to identify new methods of attracting and motivating valuable human capital.

The evolution of artificial intelligence will bring new challenges to the labor market, will play a key role in determining ideal candidates for a particular project (Rugg-Gunn, 2023)

and will lead to the need for re-adaptation and reinterpretation of current human resources policies and strategies. Armstrong (2007) believes that in organizations with a high-performance culture, employees are more engaged and motivated to meet or exceed expectations and goals.

First used in the paper "Selection of Management Personnel" (Dooher and Marting, 1957), the concept of Talent Management developed as a research field after 1998, with the publication of the paper "The War for Talent" by practitioners at McKinsey consulting company. If at first it was not of particular interest to the academic world, the field of talent management has developed year by year, after 2010 there was an increase in the number of scientific papers, (Sparrow, 2019), but which still failed to provide clarity to the concepts of Talent and Talent Management.

Currently, private organizations are constantly adapting and developing the processes for identifying valuable human capital, while in public institutions in Eastern European countries the methods for recruiting, selecting, motivating and retaining human resources have not evolved significantly in recent years. Although globally the number of studies is increasing, in Romania the field of talent management is little known, and the scientific papers are limited to a few doctoral theses published in the rei.gov.ro database and a small number of articles, most of them based on the descriptive qualitative analysis of the current Talent and Talent Management concepts. The acute crisis of personnel with special skills and competences has increased in recent years in Romanian public institutions, due to the massive migration to better-paid jobs in the private sector or to countries with a developed economy that encourages and promotes the spirit of initiative, the autonomy of the workplace or the involvement of employees in decision-making.

Numerous empirical studies and research on talent management have been initiated globally in recent years. However, in Romania, the field has received little attention from the academic world and there is little large-scale research that provides clear theoretical and practical perspectives on the definition, role and importance of implementing talent management practices in all sectors of activity. The objective of this approach is to determine the current state of knowledge in the field of talent management and to present the results of the empirical research carried out on the basis of a questionnaire applied in public institutions in Romania. The research aims to determine the effects of implementing talent management in Romanian public institutions.

Literature review

According to current approaches, Talent "can be conceptualized as a naturalness, commitment and fit revealed in the innate skills, knowledge and acquired skills of employees that lead to achieving outstanding results" (Gallardo-Gallardo, Dries and Gonzales Cruz, 2013), but the biggest challenge is not defining talent but identifying the right skills for a particular job (Ross, 2013). In practice, Talent refers to high-potential personnel within organizations; consequently, their own definitions are outlined according to their own needs (Neri and Wilkins, 2018).

Talent management was initially considered a subset of human resource management (Lewis and Heckman, 2006; Tarique and Schuler, 2010), but following changes in recent years, the global labor market has developed as an independent field of research. According to Collings and Mellahi, 2009, Talent Management refers to the processes that lead to "the systematic identification of key positions that contribute differentially to competitive

advantage as well as the development of a talent pool for filling these positions". Singh (2021) believes that the factors influencing researchers' concern for expanding talent management studies are global talent shortages, declining demographic trends, corporate social responsibility, diversity, increasing migration, the shift to a knowledge-based economy, and the growing importance of emerging markets.

Research in recent years is focused on clarifying the concepts of Talent and Talent Management, but there are few studies that also pursue other issues, such as the implications and ethical dimension of implementing talent management practices. The first empirical research in the field of talent management was published after 2006 (Gallardo-Gallardo and Thunnisen, 2016; Thunnissen and Gallardo-Gallardo, 2019) and most studies aim at analyzing talent management from an inclusive or exclusive perspective (Gallardo-Gallardo and Thunnissen, 2016). Following empirical questionnaire-based research applied to 373 employees and 65 supervisors from health organizations in Romania, the authors analyzed from the perspective of employees the implications of inclusive talent management practices, and the results confirmed a positive relationship between inclusive talent management practices and employee satisfaction (Graham, Osoian, and Zaharie, 2023).

Some authors argue that only a small proportion of an organization's employees have exceptional skills (Michaels et al., 2001; Akanda et al., 2021), and consequently prioritizing investment in these limited resources is crucial to increasing organizational performance. Hongal and Kinange (2020) and Mohammed and Saksena (2023) believe that talent acquisition has lasting consequences and it is necessary for organizations to have state-of-the-art technologies to facilitate recruitment for key positions. Based on the systematic review of 120 scientific papers by Aljbour, French and Ali (2021) found that empirical research focused on identifying talent management practices across organizations, but few studies have investigated how talent management practices influence employee performance and lead to improved organizational performance. The same authors (Aljbour et al., 2021) identified six sets of talent management practices: talent needs planning, talent acquisition, talent development, talent performance management, talent involvement in decision-making, and talent retention.

The latest studies draw attention to the fact that talent management offers insufficient insights into the development of strategic agility, an essential condition to respond to changes in the business environment (Jooss et al., 2023 Apud Farndale et al., 2021; Harsh and Festing 2020). Strategic agility is the ability to respond quickly to changes in the internal and external environment through a set of activities (Weber and Tarba, 2014)

Although research in the field is growing from year to year, to date there are few studies that propose and validate clear tools for measuring Talent, of which we mention the Model 9 boxes proposed by the McKinsey consulting company in the 1970s and initially used by General Electric to identify key investments (Lee, 2018) was then adapted for the field of human resources in order to identify the right employees for important positions. Yogalakshmi and Supriya (2020) considered talent an abstract construct, hard to measure, and conducted empirical research in IT organizations in India based on which they developed a six-factor, six-sixteen-item scale that can be used to objectively assess employee performance.

Current research confirms that talent management is a huge challenge facing organizations around the world (Gallardo-Gallardo, Thunnisen, & Scullion, 2019) and is the fastest

growing discipline in management (Collings, Scullion, Vaiman, 2015).Organizations wishing to retain their competitive advantage will need to implement a valuable talent management system (Fatol et al. 2020) and to boost the culture of innovation and lifelong learning. We believe that talent refers not only to the ability to be a leader but also to the totality of skills and competences that allow people to excel in one or more areas of activity. Thus, we support the need to expand empirical research in the field of talent management in public institutions in Romania to identify new methods of attracting and retaining staff with special skills and competences to ensure the development at the highest standards and increase the quality of educational and medical services.

The following are the results of the research carried out in Romanian public institutions.

Data collection and analysis

This research aims to determine the current state of implementation of talent management practices in Romanian public institutions and the effects these practices exert on employees and organizations. In order to collect the data necessary for the quantitative analysis, we undertook an exploratory research based on a questionnaire applied to a randomly chosen sample of 50 people with management positions and human resources specialists in the health and education field, from Iasi, Bacau, Brasov, Galati and Suceava Counties.

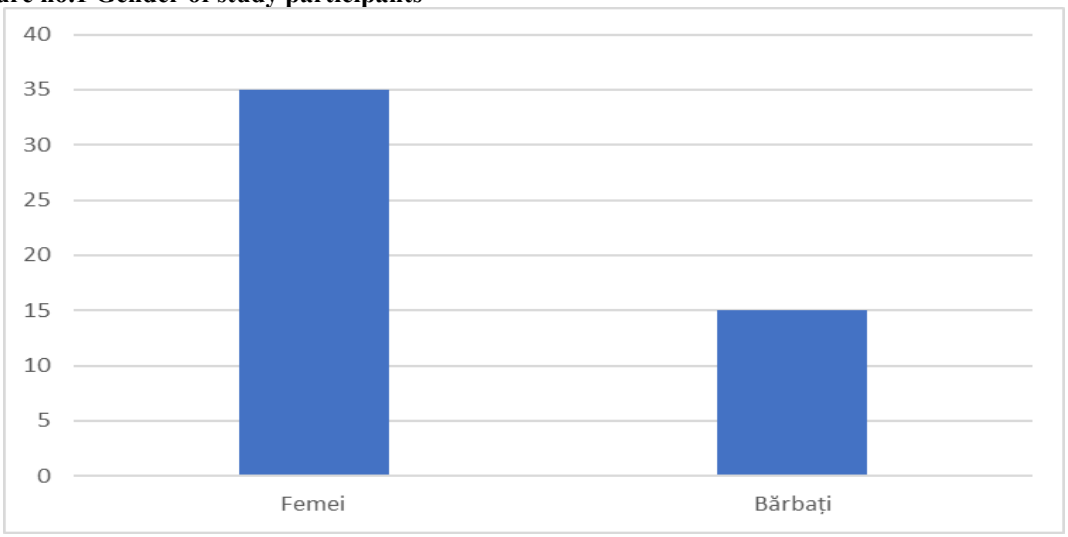
The questionnaire includes 25 closed-ended questions and 7 demographic questions and did not request information on confidential data (name, surname, PIN, residence, e-mail address) or any other data based on which respondents can be identified. Personal data were requested regarding the age, position, studies, field of activity and size of the organization in which the respondents operate.

Based on the literature we formulate the following research hypotheses:

- H1 Talent is a characteristic of all employees (What's the meaning „talent" in the world of work Gallardo-Gallardo, E., Dries, N., Gonzales-Cruz, T., F., 2013; Dries, N. 2022, "What's Your Talent Philosophy? Talent as Construct Versus Talent as Phenomenon
- H2 Talent Management is a collection of HR practices (Lewis, R. E. and Heckman, R. J., 2006. Talent management: A critical review)
- H3 Financial rewards help motivate employees (Herzberg, Mausner, Snyderman, 1993, The Motivation to Work)
- H4 Recognition of merit helps motivate employees (Herzberg, Mausner, Snyderman, 1993, The Motivation to Work)
- H5 Implementing talent management practices helps to increase the organization's performance (Sareen and Mishra, 2016, A Study of Talent Management and Its Impact on Performance of Organizations)

The transmission of questionnaires and data collection took place between August 15 and October 15, 2023, and the target group was represented by senior management and human resources specialists in the field of education (pre-university education, post-secondary education, higher education) and in the health field. The data collected were centralized and analyzed using the SPSS quantitative analysis program. We present below the descriptive statistics of the selected sample, from a demographic point of view:

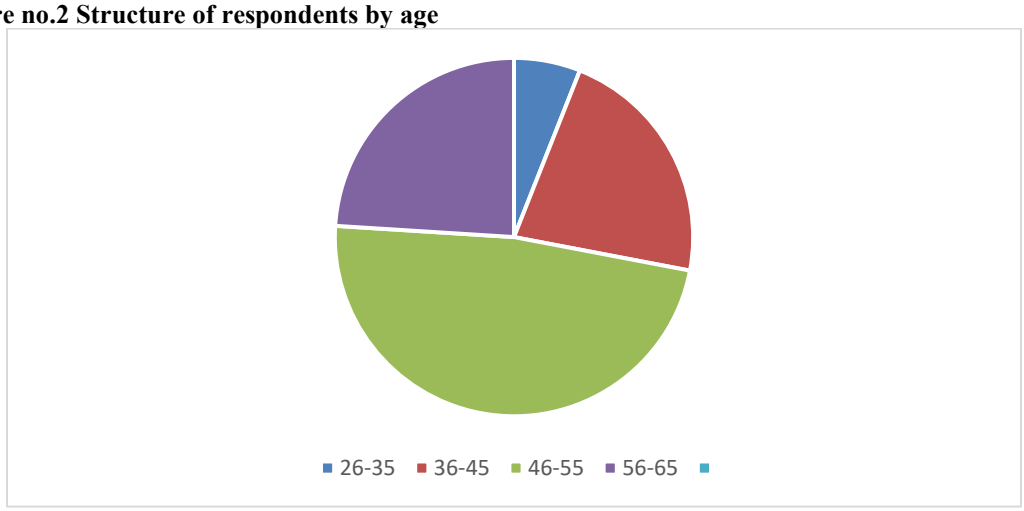
Figure no.1 Gender of study participants



Source: responses from study participants

Depending on the structure of the sample by gender, of the total study participants, 35 are women and 15 are men.
Depending on age, the vast majority of respondents are between 46 and 55 years of age, while only three respondents are between 26 and 35 years of age.

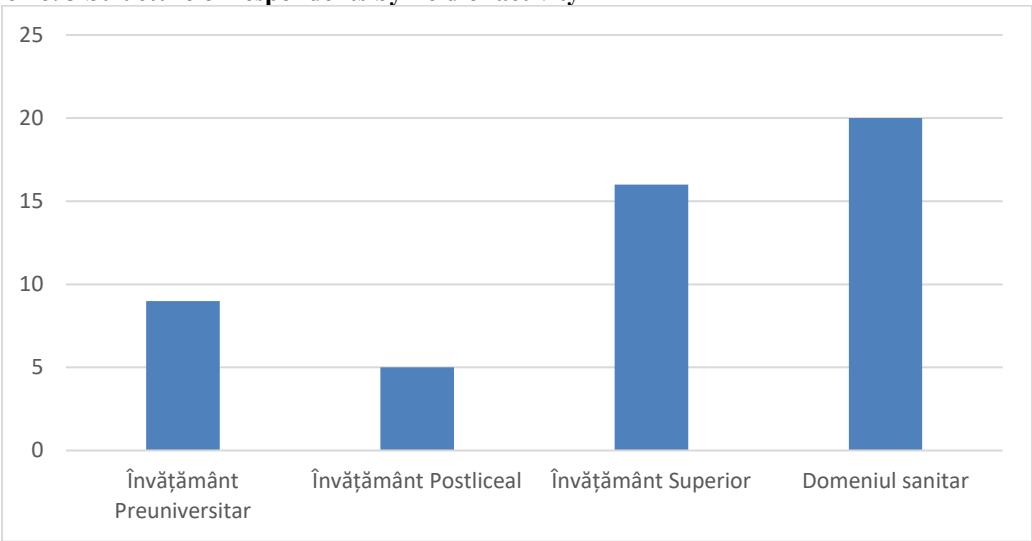
Figure no.2 Structure of respondents by age



Source: responses from study participants

By field of activity, 30 people work in educational institutions and 20 of the respondents in the health field.

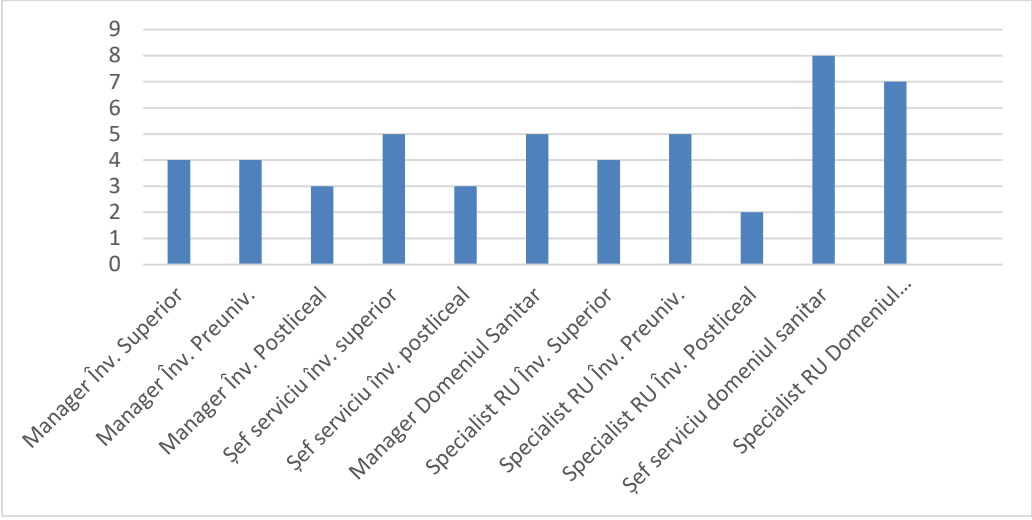
Figure no. 3 Structure of respondents by field of activity



Source: responses from study participants

Of the total number of study participants, 18 are specialists in the field of human resources, and 32 are persons in management positions: managers, directors, heads of office, service or departments, from selected public institutions. As shown in Figure 4, 11 people are managers in educational institutions, 5 are managers in the health field, 8 are heads of services or departments in education, 8 in the health field, 11 human resources specialists in education and 7 human resources specialists in the health field.

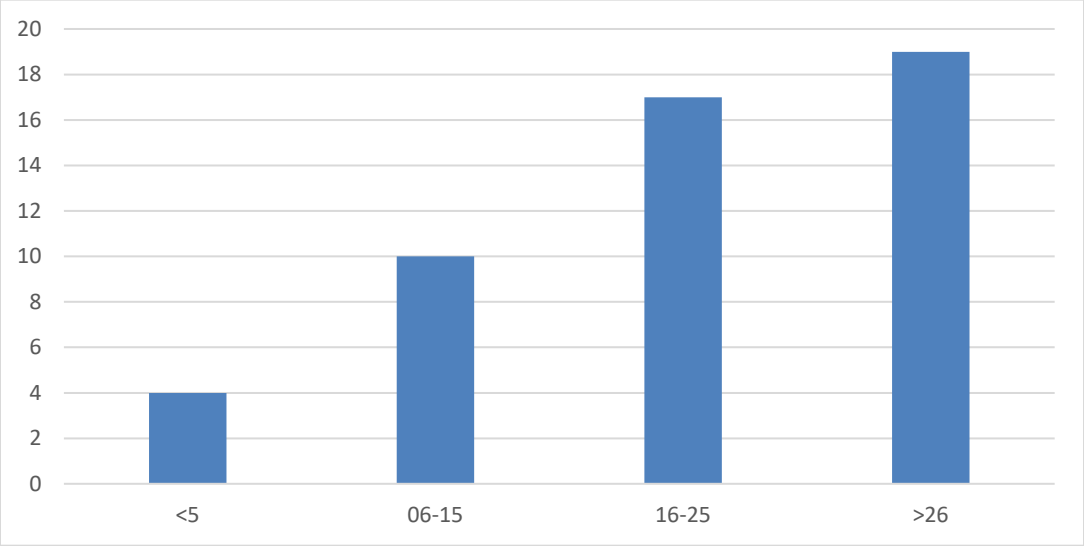
Figure no. 4 Structure of respondents by position held in the institution



Source: responses from study participants

According to their employment duration in the organization, we can say that the sample illustrates an experienced workforce: 34% of the respondents are between 16 and 25 years old, 38% have over 26 years of service, 20% have between 6 and 15 years of service and 8% have less than 5 years of service.

Figure no.5 Sample structure by seniority within the organization



Source: responses from study participants

Testing the validity of assumptions

In order to test the hypotheses formulated based on the literature, we will analyze the correlation between the variables provided in the Questionnaire administered in Romanian public institutions.

H1 Talent is a characteristic of all employees

In order to test hypothesis 1, we checked the association between the variables Q1 (talent as an innate or acquired skill), Q2 (talent is characteristic of a minority or majority) and Q3 (how to identify talented people in the organization). From a statistical point of view, according to the frequency table (Table no. 1) we note that 78% of respondents believe that talent is innate and developed, 14% of respondents believe that talent is acquired and developed, 2% believe that talent is innate, and 6% believe that talent is acquired.

Table No.1 Talent - natural or acquired skill

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	natural	1	2.0	2.0	2.0
	acquired	3	6.0	6.0	8.0
	natural and developed	39	78.0	78.0	86.0
	acquired and developed	7	14.0	14.0	100.0
	Total	50	100.0	100.0	

Source: responses from study participants

Within variable Q2, 56% of respondents believe that only a minority of the organization's employees are talented, 4% believe that all employees are talented, and 40% of respondents believe that the vast majority of employees are talented.

Analyzing the correlation between variables Q1(talent as an innate or acquired skill) and Q2(talent is characteristic of a minority or majority), we determined that the probability associated with the calculated test statistic is sig = 0.049, which indicates an association between the variables for a 10% risk.

Table no.2 Testing the association between variables Q1 and Q2

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.650a	6	.049
Likelihood Ratio	10.056	6	.122
Linear-by-Linear Association	1.179	1	278
N of Valid Cases	50		

Source: responses from study participants

The correlation analysis between variables Q1 (talent as an innate or acquired skill) and Q3a (based on individual skills and abilities) indicates a probability associated with the test statistic calculated sig=0.134. (table no.3). The correlation analysis between variables Q2 ((talent is characteristic of a minority or majority) and Q3a, sig=0.043, indicates a strong link between the variables (tab.no.4)

Table no.3 Testing the association between variables Q1 and Q3a

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.580a	3	.134
Likelihood Ratio	7.063	3	.070
Linear-by-Linear Association	2.370	1	.124
N of Valid Cases	50		

Source: responses from study participants

Table no.4 Testing the association between variables Q2 and Q3a

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.314a	2	.043
Likelihood Ratio	6.419	2	.040
Linear-by-Linear Association	4.266	1	.039
N of Valid Cases	50		

Source: responses from study participants

Following the analysis of the association of variables Q1, Q2 and Q3, we can see that there is a close link between the variables and we can state that talent is innate and developed and is characteristic of a limited number of people who are identified on the basis of individual competencies, In conclusion Hypothesis 1 Talent is characteristic of all employees is not valid.

To verify the validity of hypothesis 2 Talent management is a collection of human resource practices we analyzed the variables Q4 - the definition of talent management and Q6 - talent management practices. The frequency table (Table 5) indicates that 88% of respondents believe that talent management differs from human resource management. 12% of survey participants consider talent management to be a collection of HR practices.

Table no.5 Talent Management is a collection of HR practices

		Frequency	Percent	Valid Percent
Valid	No	44	88.0	88.0
	Yes	6	12.0	12.0
	Total	50	100.0	100.0

Source: responses from study participants

The correlation analysis between variables Q4a (a collection of HR practices) and Q6c (talent identification) indicates a close link between them, and the probability associated with the calculated test statistic is sig = 0.005.

Table no. 6 Testing the association between variables Q4a and Q6c

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.927a	1	.005
Continuity Correctionb	5.245	1	.022
Likelihood Ratio	6.495	1	.011
N of Valid Cases	50		

Source: responses from study participants

According to the study participants, talent management can be defined as the process of identifying talents in the organization and creating a talent pool to ensure future valuable human capital needs, as well as attracting, developing, motivating, engaging and retaining high-performing employees, consequently Hypothesis 2, Talent management is a collection of human resource practices, it is not valid.

Testing Assumptions 3 Financial Rewards help motivate employees and 4 Recognition of merit helps motivate employees.

In order to test the validity of assumptions 3 and 4, we analyzed the variables Q19 - forms of rewarding valuable employees, Q21 - forms of reward for attracting valuable personnel and Q22 - the rewards preferred by employees. 64% of respondents believe that currently due to rigid legislation no financial rewards can be offered, but that they are preferred by employees. There is a correlation between variables Q19a (financial rewards) and Q22 b (recognition of merits as a form of reward), which indicates that recognition of merits contributes to employee motivation, but the highest degree of satisfaction is provided by financial rewards.

Table no.7 Testing the association between variables Q19 a and Q22 b

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.752a	1	.009
Continuity Correctionb	5.155	1	.023
Likelihood Ratio	6.605	1	.010
N of Valid Cases	50		

Source: responses from study participants

The correlation analysis between variables Q19c (recognition of merits) and Q21d (substantial rewards and recognition of merits) presented in Table no. 8 indicates that the probability associated with test statistics calculated sig=0.019 confirms that in public institutions, recognition of merits is a form of attracting, motivating and retaining valuable employees that leads to increased self-esteem and increased desire for self-improvement and continuous development. According to the responses received from the respondents, the forms of reward that bring the greatest satisfaction to employees are salary rewards and recognition of merits.

Table no.8 Testing the association between variables Q19c and Q21d

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.500a	1	.019
Continuity Correctionb	4.121	1	.042
Likelihood Ratio	5.785	1	.016
N of Valid Cases	50		

Source: responses from study participants

In conclusion, we can state that Hypothesis 3 Financial rewards contribute to employee motivation and Hypothesis 4 recognition of merits contributes to employee motivation are valid. In order to research the validity of Hypothesis 5, The implementation of talent management practices contributes to increasing organizational performance, we proceeded to the testing of variables Q24 (the implementation of talent management contributes to increasing the performance of organizations), Q6 (talent management practices), Q18 (employee participation in professional development courses) and Q19 (forms of rewarding employees).
Following the analysis, we identified correlations between the variables presented in Tables 9, 10 and 11.

Table no. 9 Q24 and Q6a attracting talent

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.513a	2	.039
Likelihood Ratio	6.288	2	.043
Linear-by-Linear Association	1.021	1	.312
N of Valid Cases	50		

Source: responses from study participants

Table no. 10 Analysis of the correlation between variables Q24 and Q18 vocational training programs

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	31.387a	4	.000
Likelihood Ratio	14.891	4	.005
Linear-by-Linear Association	15.892	1	.000
N of Valid Cases	50		

Source: responses from study participants

There is a correlation between variables Q24 (the implementation of talent management contributes to increasing the performance of organization and Q19a (financial reward)

Table no. 11 Analysis of the correlation between variables Q24 and Q19a financial rewards

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.327a	2	.026
Likelihood Ratio	7.794	2	.020
Linear-by-Linear Association	574	1	.449
N of Valid Cases	50		

Source: responses from study participants

Variable testing confirmed that all processes of attracting, integrating, developing and rewarding contribute to stimulating the desire for self-improvement and maintaining a high level of human capital performance in Romanian public institutions; consequently, the

implementation of talent management practices contributes to increasing organizational performance. Based on the results obtained, we conclude that Hypothesis 8 The implementation of talent management practices contributes to the performance of the organization is valid.

Discussions and conclusions

Although in recent years the literature has been enriched with numerous articles, these are represented by descriptive studies and a small number of papers are based on empirical research. There are clear research directions, directed towards the inclusive or exclusive approach of talent, but at present there are no clear methods and tools to measure this skill. Factors influencing talent management differ from one institution to another depending on the field of activity or the country in which the research was carried out, therefore comparative studies between different sectors of activity is vital for establishing generally valid theories.

The current challenges in the field are due to the confusion and conceptual ambiguities that prevent the identification of the precise meaning of talent management (Gallardo-Gallardo and Thunnissen, 2015) which leads to a strong disagreement between practitioners and the academic world. Economic crises in recent years and environmental changes will lead to the disappearance of more than 80 million jobs by 2030 (Fatol et al., 2020), which will increase the migration of the workforce to areas where they can make a living. For these reasons, we believe that it will be necessary to intensify research in the field of talent management in order to identify the most optimal solutions for the revitalization of economic sectors in disadvantaged areas.

Employment in state jobs is changing more and more today. The Human Resources Department was reorganized and re-dynamized throughout the public administration system. Public organizations will thus be able to transform the human resources function into a strategic resource that can search for and retain talents, so that their managers become aware of their competitive capacity. While innovation becomes a fundamental strategy to promote performance and competitiveness, civil service reforms are equally innovative, they take into account the meritocracy of the state, based on talented people, who are selected and promoted both based on their talent and their achievements.

The effects of implementing talent management in public institutions are also observed by the fact that the public function is no longer integrated in a closed system, but has evolved towards an open system (Losey at all, 2005), for all human resources activities. Attracting and retaining talented employees in areas subordinated to the state (education, health) are the most obvious activities in the sense of implementing possible management and is possible in various forms.

In a synthesis that we consider necessary, some possible solutions can be identified:

a) recognizing/rewarding the creativity and effectiveness of state employees and teams of civil servants;

b) allowing people to access and/or exit the system more easily;

c) developing competent managers;

d) maintaining a quality workforce in addressing those situations that show poor performance;

e) providing a work environment that uses the latest and most up-to-date information and digital technologies;

f) offering competitive salaries compared to those of private employees;
g) changing recruitment strategies to attract new talents at all hierarchical levels in organizations;
h) offering the possibility of training and professional development as an advantage;
i) the privilege of retaining experienced talents by improving the satisfaction of their work;
j) developing and implementing succession plans that identify and respond to the future needs of employees;
k) improving and simplifying the processes of political appointments in the public environment. (The Partnership for Public Service, 2007, 2008)

In Romania, the field of talent management is in its early stages of development, and as far as public institutions are concerned, we believe that there is no real concern for attracting, developing and retaining high-potential human capital. The study confirmed that the implementation of talent management in Romanian public institutions contributes to maximizing the value of employees and will produce long-term effects by providing staff with special skills and competences that will contribute to the development of future generations by providing education at the highest standards and by providing high-quality medical services. In order to obtain results that allow the generalization of the theories in force, it will be necessary to include in the future studies also the academic staff, the auxiliary teaching staff, the non-teaching staff as well as the doctors, assistants, nurses. Definitely, the field of talent management will constantly evolve and it will be necessary to constantly readjust to the increasing demands of the labor market.

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THE SIGNIFICANCE OF INVESTIGATING THE RELATIONSHIP BETWEEN MATHEMATICAL THINKING AND COMPUTATIONAL THINKING USING LINGUISTIC ASPECTS

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Abstract: Computational thinking, defined as a way of thinking that can be applied to various fields that require problem-solving skills, has become prevalent in education. Students, i.e., future specialists, have to be prepared for complex thinking competence, necessary for solving business and societal problems, for which a combination of mathematical thinking and computational thinking is essential. The preliminary premise is that there is a correlation between ability in specific mathematical and computational fields. Therefore, this paper aims to highlight the significance of investigating the relations between those fields from linguistic point of view. In order to better understand the relationship between abilities in specific mathematical and computational fields, this paper presents an analysis of a new approach, namely, developing hypotheses for exploring the relationship between metalanguages of different fields of Mathematics and Computer Science. Additionally, the paper describes the first stage of a study on a doctoral level in an attempt to suggest possible statistical analyses suitable for testing hypotheses based on meta-analysis of the current literature.
Keywords: mathematical thinking, computational thinking, undergraduate students, education skills, metalanguage.
JFL Classification: C1, Y90

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Introduction and historical background

Computers and programming have revolutionized the world and have promoted technology literacy as a crucial skill to achieve academic and career success in the digital 21st century (Shute et al., 2017). Accordingly, Computational thinking (CT), a way of thinking that can be applied to various fields that need problem-solving skills, has become widely used in

education. Students, who are future specialists, should be prepared for engaging in complex thinking, required for the solution of business and societal problems. Thus, it is necessary to apply a combination of mathematical thinking (MT) and computational thinking (CT).
The field of computer science is relatively young, compared to the area of mathematics. However, what was the starting point? Analytic philosophy (Glock, 2013) began being popular on the verge of the 20th century. The term analytical indicates the ideals of clarity, accuracy and logical rigor of thinking that representatives of this area of philosophy strive to implement. Analytical philosophy aims to formalize knowledge in the fields of humanities and mathematics (formalization on some axiomatic basis). Many philosophers have conceived the concept of analytic philosophy (among them, Bertrand Russell, Alfred North Whitehead, Ludwig Wittgenstein, Gottlob Frege, etc.). Yes, as for programming, the most fundamental work is Principia Mathematica (often abbreviated PM). This is a three-volume work about the foundations of mathematics, written by the mathematician–philosophers Alfred North Whitehead and Bertrand Russell and published in 1910, 1912, and 1913 (Whitehead and Russell., 1997). It developed the Type Theory, the concept of types in programming today (Russell., 1908). Based on the formalization process of mathematics and the process of constructing formal calculus, such as mathematical logic, the Turing machine and lambda calculus concept were developed in 1936 (Petzold., 2008). Alan Turing (Petzold, 2008) responded to the question of what an algorithm is and what can be calculated at all. He built the abstract machine, so everything that could be calculated on this machine was defined as an algorithm. The concept of Turing machine and lambda calculus have attributed formal definitions to two types of programming languages that exist today: Functional Programming (programming languages like Lisp, Haskell) and Imperative Programming (programming languages like C, C++, Java) (Alegre and Moreno, 2015; Frame and Coffey, 2014). The first imperative programming language (Fortran) was originally developed in the 1950s, and the first functional programming language (Lisp) was developed in the 1960s.

A Short background of Computational thinking (CT) and Mathematical thinking (MT)

The nature of the relationship between MT and CT has been extensively researched. There are different definitions and characterizations for these two types of thinking. MT and CT are two complex processes. The first involves the application of mathematical skills for solving mathematical problems and it is enriched and enhanced in an atmosphere of questioning, challenge, and reflection (Mason et al., 2011). CT can include processes such as decomposition, abstraction, algorithmic design, debugging, iteration, and generalization of problems (Shute et al., 2017).
What are the main similarities between the two processes? Both are problem-solving methodologies, as they involve pattern recognition in the structure of problems. Moreover, both of them involve processes, such as decomposition (breaking down problems into smaller steps); algorithm design (deriving general principles from multiple examples); and modelling (translating real-world objects or phenomena into mathematical equations and/or computational relationships) (Liu and Wang, 2010). These two processes also have some common heuristic strategies and more general problem-solving behaviors, e.g., abstract thinking and metacognition, trial and error, ambiguity, flexibility, and the ability to consider and assess multiple ways of problem-solving (Shute et al., 2017).

Compared to MT, CT is a relatively new area of research. It was first presented by Papert in 1990 and, since then, its definition, teaching, and assessment have been discussed by various scholars (Grover and Pea, 2013). Being a relatively new field, the most widely researched issue is in which way the development of CT can assist in teaching math subjects. Furthermore, most empirical studies have targeted CT in school and, hence, little attention has been paid to CT in higher education. In order to differentiate between CT and MT, it is necessary to determine properties that characterize only one type of thinking or, alternately, characterize both types but are a necessary part of one of them.

MT Properties

Discovering – every "new" property that is discovered in the mathematics area, actually already exists in nature. This is the ability to recognize the existing model and to describe it precisely.

Invariant recognition – in mathematics, an invariant is a property of a mathematical object (or a class of mathematical objects) that remains unchanged after operations or transformations of a certain type are applied to the objects.

Proof of existence without design – sometimes, the proof is theoretical, and it is not possible to build a physical model or structure for it. This kind of thinking ability is a part of MT.

CT Properties

Engineering thinking (invention thinking) – a way of thinking that looks for invention. For example, developing new algorithms that do not exist yet. It requires creative and critical thinking.

Solutions without precision. For example, attempting to find a graph sufficiently large is definitely suitable for engineers. For mathematicians, however, it is not defined properly at all.

Algorithmic thinking – also a part of MT. Nevertheless, there is one of the most significant examples of CT skills (Doleck et al., 2017).

Ability to understand and use different programming languages belonging to conceptually different types of programming – Functional Programming (programming languages like Lisp, Haskell) and Imperative Programming (programming languages like C, C++, Java).

Since the field of computer sciences is relatively young, the distribution into fields is less stable than the distribution into field of mathematics. Finding out that in some field, there is a strong correlation to some field of mathematics, it follows that there is justification for this field to be a separate field of computer sciences.

Significance of studying this topic

The field of CT has been rapidly developing. However, most empirical studies have targeted CT in school and, as a result, relatively little attention has been paid to CT in higher education. According to Harris et al. (2015), the value of mathematics in engineering remains a central problem. The researchers argue that mathematics should be a fundamental concern in the design and practice of first-year engineering. The data was gathered from interviews with engineering students (and their lecturers) who experienced problems with mathematics during their first-year study in different courses. This study has exerted efforts in the enhancement of their understanding of the problems of 'becoming

engineers'. These problems were due to the mismatch between their expectations and the realities of the course and have once again highlighted the fact that mathematics was central to these problems. A continuing effort is required for clarifying the value of mathematics to engineering in practice.

Flegg et al. (2012) conducted an exploratory study of students' experience in their first year of engineering mathematics studies. Their findings illustrated the relevance of mathematics to different engineering majors, to future studies, and the importance of problem-solving tasks in conveying the relevance of mathematics more effectively than other forms of assessment. Flegg et al. argued that acknowledging the role of mathematics in engineering was perceived by students as crucially relevant. Hence it was necessary to ensure that students take steps to overcome any mathematical difficulties they encounter, promoting progression through the engineering degree.

CT is a rather new area of research and, thus, the relevant question is how to learn and how to teach computational thinking. According to Hsu et al. (2018), CT is considered as an important competence that is required for adaptation to the future. However, educators, especially school teachers and researchers, have not clearly identified the way of teaching it. This study performed a meta-review of the studies published in academic journals between 2006 and 2017, aiming to analyze application courses, adopt learning strategies, participants, teaching tools, programming languages, and course categories of CT education. The review results indicated that the promotion of CT in education made considerable progress in the last decade. In addition to the increasing number of CT studies, conducted in different countries, the subjects, research issues, and teaching tools became also more diverse in recent years. Furthermore, the review found that CT was mainly applied to the activities of program design and computer science, while some studies were related to other subjects. Most of the studies focused on programming skills, training, and mathematical computing, while others adopted a cross-domain teaching mode to enable students to manage and analyze materials of various domains by computing. Moreover, as the cognitive ability of students of different ages varies, the CT ability to cultivate methods and content criteria, should vary accordingly.

University is a configuration part of much bigger establishments and processes, corresponding to the social and individual demands of youth and students. The benefits of this study reside in the possibility of building a model that facilitates effective teaching based on knowledge of the CT-MT relationships even at an early stage (school). Thus, it allows educating better future specialists.

Hypotheses and a brief introduction to the methodology

The preliminary hypothesis is that there is a strong correlation between ability in specific mathematical and computational fields. This study uses the deductive approach (Saunders et al., 2009), according to which the hypothesis was developed, and a research strategy for examining the hypothesis was designed, as is described below. This research process corresponds to five sequential stages of deductive research processing presented by Robson (2002):

1. deducing a hypothesis;
2. expressing the hypothesis in operational terms;
3. investigating this operational hypothesis;
4. examining the specific outcome of the inquiry;

5. if necessary, modifying the theory considering the findings.

The key question is how to test thinking. This study suggests paying attention to the linguistic aspect of the question. Mathematics and programming were not chosen by chance; both disciplines are purely language constructs. There is no possibility of directly analyzing the differences in the types of thinking; rather, there is an option of more or less acknowledging the statement that thinking always happens in some language as a fact (De Saussure, 1916; Heidegger, 1927). Chomsky (1968), "the father of modern linguistics," maintains that there is a strong relationship between language and thinking.

All languages can be divided into a "formal language" and a "metalanguage" (Tarski, 1944). A metalanguage is a language used for describing a formal language. The theory of truth, conceived by Tarski in 1935 (Gruber, 2016) - advocates that formal language should be encompassed in the metalanguage. For example, the proposition "2+2=4" belongs to formal mathematical language, while "2+2=4 is valid" is categorized as belonging to metalanguage of mathematics.

Since mathematics and programming have explicit languages, and people use metalanguage while thinking, we can investigate the relationship between metalanguages to assess the thinking process. Every field of Mathematics and Computer Science has its professional slang. It consists of terms, specific syntax construction of sentences, specific order of words in any sentence, etc. This professional slang of any separate field of Mathematics and Computer Science is defined as local metalanguage.

In order to obtain a more explicit hypothesis regarding the relationship between abilities in specific mathematical and computational fields, this study presents a new approach, i.e., comparing separately the local metalanguages of different field of Mathematics and Computer Science. The data mining stage of this study applies modern technology - a suitable neural network that compares texts written in different local metalanguages.

Research methodology

The methodology of this study consists of three main stages, as follows:

- Data mining stage with technology for text comparison, probably using a suitable neural network. This stage compares many text files from different fields of Mathematics and Computer Science. The aim is to obtain a more explicit hypothesis regarding the relationship between abilities in specific mathematical and computational fields.
- Qualitative research conducted with the students' participation, according to the hypothesis formulated at the first stage.
- Quantitative research conducted with the students' participation, according to the first stage hypothesis and analysis of the results from the second stage.

This paper focuses on the analysis of the first stage.

The First Stage - Data Mining

Data mining (Cheng, 2017; Roiger, 2017; Hand, 2007; Romero,2013) is a collective name that refers to a set of methods for detecting previously unknown, non-trivial, practically useful and accessible knowledge of data, necessary for making decisions in various fields of human activity. The more complete definition of data mining is finding knowledge in databases. The basis of data mining methods is all kinds of classification, modeling, and forecasting methods based on decision trees, neural networks, genetic algorithms, etc.

Usually, the process is as follows:

- There is a sufficiently large database.
- It is assumed that there is some "hidden knowledge" in the database.
- Developing methods for discovering knowledge hidden in large volumes of initial "raw" data is necessary. In the current conditions of global competition, the found patterns (knowledge) can be a source of additional competitive advantage.

What does "hidden knowledge" imply? It must be knowledge of:

- previously unknown - that is, such knowledge that should be new (and not confirming any previously obtained information);
- non-trivial - that is, those that cannot be seen (with direct visual analysis of data or when calculating simple statistical characteristics);
- practically useful - that is, such knowledge that is of value to the researcher or consumer;
- accessible for interpretation - such knowledge that is easy for visual presentation to the user and for explanation in terms of the subject-matter.

Data mining methods can be applied both for working with big amounts of data and for processing relatively small amounts of data (obtained, for example, from the results of individual experiments or when analyzing data about the company's activities). As a criterion for sufficient amount of data, both the field of research and the applied analysis algorithm are considered.

Models for Text Comparison

For the purpose of comparison, a text must be transformed into some mathematical object, for example, a vector. It means that Natural Language Processing must be applied to any text.

What is Natural Language Processing (NLP)?

Natural Language Processing (NLP) (Chowdhary, 2020; Kang et el., 2020) is a machine learning technology that allows computers to interpret, manipulate, and understand human language. Organizations today have large volumes of audio and written text data from various communication channels, such as e-mails, text messages, social media feeds, video, audio, and more. They use NLP software to automatically process these data, analyze the intent or sentiment in the message, and respond to human communication in real time.

Natural language processing is important to the efficient analysis of written and audio data. In this way, differences in dialects, slang, and grammatical irregularities, typical of everyday conversations, can be overcome. It may be used for text classification and extraction.

How does NLP work?

Natural Language Processing combines computational linguistics, machine learning, and deep learning models for human language processing.

Computational linguistics constitutes the science of understanding and building models of human language by using computers and software tools. Researchers use computational linguistics techniques, e.g., syntactic and semantic analysis, to create platforms that are designed to help machines understand spoken human language or texts. Tools such as

language translators, text-to-speech synthesizers, and speech recognition software are based on computational linguistics.

Correlation and a Measure of Correlation between Two Sets of Data

Correlation (from Latin correlatio "ratio"), or correlation dependence - a statistical relationship between two or more random variables, while changes in the values of one or more of these quantities are accompanied by a systematic value change of one or other quantities. In mathematical statistics, the Pearson correlation coefficient (Cohen et el.,2009), also known as the pair correlation coefficient or the Pearson moment product correlation coefficient, measures the magnitude of a linear relationship (correlation) between two variables. It takes values from -1 to +1. A coefficient value of +1 means the presence of a complete positive linear relationship, and a value of -1 means the presence of a complete negative linear relationship.

Clusters

Clustering (or cluster analysis) is the task of dividing a set of objects into groups called clusters. Each group comprises "similar" objects, and the objects of different groups should be as different as possible. The cluster analysis is described by the following steps:

- Selection of a sample of objects for clustering.
- Definition of a set of variables by which the objects in the sample are assessed. If necessary, normalize the values of the variables.
- Calculation of similarity measure values between objects.
- Application of the cluster analysis method to create groups of similar objects (clusters).
- Presentation of analysis results.

After obtaining and analyzing the results, changing the selected metric and clustering method is possible until an optimal result is achieved.

Methodological process of the first stage of this study

At the first stage, the following fields of mathematics are investigated: linear algebra, abstract algebra, combinatorics and probability, mathematical analysis, set theory and logic. Moreover, the following fields of Computer Science are explored: functional programming, imperative programming, object-oriented programming, data structures and algorithms, automata-based programming, and compilation.

About 1000 texts in each field of Mathematics and Computer Science are given. Thus, the process of the first stage is the following:

- Using any NLP model for text comparison, like n-gram model (syntactic analysis) or Word2vec (semantic analysis). As a result, each text is converted to a vector (or any other mathematical object that enables comparison).
- Choosing suitable metrics for calculating the distance between the vectors. It should be a correlation metric, like Pearson or Spearman coefficient.

After obtaining the matrix of distances between the texts, any clustering method is applied to find the correlation between different fields of Mathematics and Computer Science.

Variables and measures

MT ability: The functionality of math ability is based on math-related tests, separately for the following math fields: linear algebra, abstract algebra, combinatorics and probability, mathematical analysis, set theory, and logic. Students will be asked to solve a set of exercises, some from each field, and a grade will be given separately for different fields. For each field, students will obtain a grade between 1 (lowest grade) and 10 (highest grade) (a 6 is a pass) (Korpershoek at el., 2015).

CT ability: The operationalization of computational ability is performed and measured in the same way. The tests are related to the following fields: functional programming, imperative programming (Alegre et al., 2015), object-oriented programming, fata structures and algorithms, automata-based programming, and compilation.

Suggested Statistical analysis

Descriptive statistics for the entire study is presented in the form of means and standard deviations for continuous variables, including CT and MT outcomes.

The Spearman correlation matrix is analyzed to identify bivariate correlations between CT and MT variables. The researchers of this study use principal component analysis (PCA) for the purpose of obtaining common factors between the elements of CT and MT both jointly and separately. Advance analyses are performed to find meaningful structure between CT and MT, specifically Partial Least Squares (regression (PLS) (Höskuldson, 1988) and hierarchical clustering. PLS assist in identifying which combinations of MT elements predict CT, while clustering indicates common combinations of MT and CT which are beyond the scope of bivariate analysis.

Discussion and conclusions

There are several points for discussion about the methodological process of the first stage of this research:

Since the two models, N-gram model and the Word2vec model, perform different kinds of analysis (syntactic and semantic analysis), it is recommended trying both of them in order to compare the results.

It seems that the Euclidean metric is not suitable here. Let us suppose there are two text files. Each word of the first file appears in the second file ten times. The result of calculating the Euclidean metric is that there is a sufficiently significant distance between the two files. However, they have the same words and, thus, they have the same meaning. Since the correlation is measured, a correlation metric such as Pearson or Spearman coefficient (Van Dongen and Enright, 2012) can be applied here.

Since the Euclidean metric is not suitable here, so K- means clustering method (Lloyd, 1957; Steinhaus, 1957). It is a key question whether the PAM algorithm can find the correct cluster partition. For example, if there are three points A, B, and C., A is close to B, and B is close to C. However, A is not sufficiently close to C, according to the calculated distance method. As a result, A and C will be divided into different clusters. In the case of different field of Mathematics and Computer Science, though, they should be in the same cluster. Thus, density-based spatial clustering of applications with noise seems to be suitable here. As mentioned above, the preliminary hypothesis is that there are specific fields of mathematics in which success is correlated with specific areas in the programming field. When investigating which areas exactly correlate, one should know how the correlation

relates to the learning method in these courses. Examination of the type of these relationships can provide an understanding of successes or failures among students in specific courses. Hence, it can provide tools that can improve teaching processes that help students in acquiring the necessary missing skills and forms of thinking in CT. These tools are helpful for several categories of people. Students are able to plan higher education studies, even at the school stage, if the relationship between MT and CT is known in advance. Lecturers can teach according to the plan that should lead to fewer students' failure in specific courses.

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DELIVERY PREFERENCES (BIRTH) IN THE EUROPEAN UNION AND TRENDS BETWEEN 2010 AND 2021: EVIDENCE OF SHIFTS BEYOND PUBLIC HEALTH RECOMMENDATIONS

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Abstract: Methods for neonates' delivery have evolved over the course of the years, to match the existing evidence, the access to care and the personal preferences of clinicians and prospective mothers. While clinical evidence points towards recommendations to reduce the rates of deliveries using surgical procedures (i.e., Caesarean delivery or c-section) in favour of natural deliveries and its variations; the evidence suggest that trends points in the other direction. This paper explores the trends within European Union counties, the changes over time and explore potential explanations for the dichotomy between recommendations and actual practices.
Keywords: Education, Health, Welfare, public health. technology; research projects.
JEL Classification: I, I11, I12, I13 (I1 Health, I10 General, I12 Health Behaviour, I13 Health Insurance, Public and Private.

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Introduction

The delivery method of a new-born in an overly simplified way, can be described as taking place in either of 2 general categories: natural or normal delivery and surgical procedures commonly known as c-sections. Among them, many sub-classifications can be found including induced, epidural, assisted, and vaginal birth after caesarean. Historically, the delivery was decided based upon purely clinical reasons based on the condition of both foetus and the mother, as well as other considerations including risk factors and opportunity to access health care. Both health care professionals and health care administrators, have leaned towards natural delivery as preferred method, for clinical and economic reasons. On the former, there is a wealth of evidence pointing towards the benefits for both the new-born and the mother1, 2, 3, with the child showing improved immune response particularly when is about food and allergies. This is also paired with evidence about shorter hospital stay, faster recovery of the mother and a significantly lower rate of complications, particularly for the mother due the general risks of a surgical procedure (e.g., potential for surgical site infection, tissue healing process, pain, and discomfort after delivery). From a health economics perspective, the natural delivery incurs in the use of fewer resources (e.g.,

delivery room, drugs, and therapies post-delivery, medical follow up and sanitary personnel) and due reduce hospital length of stay, the general resources are used more efficiently, hence the preference among health administrators mostly in a public health care setting.

Types of health care systems.

In general, there are currently 4 types of health care systems in place. in the world, with some combinations of them to adapt to local market nuances: Beveridge or universal access which provides access to health care to all the country citizens and is funded through tax payments. This system is common in several commonwealth countries and western Europe and is generally known in the United States as "socialized medicine". The Bismarck or co-funded model which relies on funding coming both from government and employers and usually the health care facilities are not for-profit organizations. This system is common in central Europe and Japan. The National Health Insurance which involves by using private providers elements of both Beveridge and Bismarck models using an insurance premium or deductible. Lastly, the out-of-pocket model is that prevalent in most undeveloped economies and consist of direct payment to the provider, usually working on private consult settings with limited infrastructure.

The challenges most health care systems face due changes in the population tapestry, namely increased life expectancy, reduced health contributions at retirement age and higher morbidity and prevalence of diseases among the population they serve, has become a driver in the development of private for-profit insurers and providers. This has been becoming more prevalent due the increased participation of employers who subscribe additional health care insurance as benefits for their employees, increasing the value proposition to their employees. These new these providers/insurance services -often vertically integrated- often provide a reduce wait time when compared with public health care providers. This does not necessarily mean the quality of care is better, but often perceive as such due the more modern facilities and general infrastructure. Often, these additional insurances are sponsored or subsidized by employers to increase their value proposition to highly talented and scarce human resources.

Clinical recommendations about delivery.

As far as 1985, there has been discussions around what an adequate rate of deliveries from c-section as a percentage of the overall deliveries. In 2015, the World Health Organization6, proposed the use of the Robson Classification System to standardize the identification and assessment of c-sections in members countries through a statement on caesarean sections rates. This suggested that rates of C-Sections of up to 10%, are inked to a decrease on maternal and neonatal mortality, however an increase beyond 10% is not driving a reduce ed mortality. Their approach is holistic as considers not only mortality of the procedures but adverse events for the both the mother and newborn. Despite this, the trends in caesarean sections continue to increase both due unmet need and overuse8, the rates of c-sections in several European countries are significantly higher than the proposed WHO Rates. Moreover, the 12 years trend on the compound annual growth rate of c-section in the selected countries, is in 9 out of the 23 countries studies, higher than the 10% recommendation. Moreover, 5 countries have rates above 30% and up to 62%. Other recommendations have leaned towards multidisciplinary scientific societies

recommending a better assessment of both expecting mothers and those in labour to prevent the caesarean section as much as clinically possible9.

Scope of the research.

This research spans the period 2000 to 2021 and within the scope are the members of the European Union with available data10 for the period between 2000 and 2021. Cyprus, Greece, Malta, and Portugal were not included due lack of data.

Shifts in delivery method for the 2000-2021 period.

Over the period 2000-2021, the annual growth rate of deliveries through caesarean section shows median of 41,3% and range between -8.3% and 244.99% (Table 1, Figure 1). The growth rate has increased in 22 out of the 23 countries, with Italy as one outlier which after a peak in 2008, shows a growth rate of 8.31%. The remaining 22 countries, show growth rates between 7% and 245%. On the upper end of growth rate, Austria (81.4%), Czechia (92.4%), Slovenia (95.2%), Slovakia (102.0%), Poland (119.4%), Croatia (165.8% and Bulgaria (245.0%); show the most significant growth rates in the area.

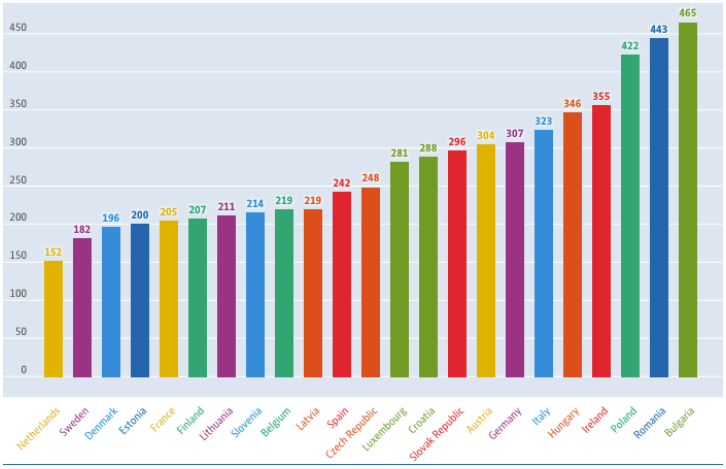
Table 1: Caesarian deliveries CAGR -2000-2021.

Country	CAGR
Austria	81.4%
Belgium	14.9%
Bulgaria	245.0%
Croatia	92.4%
Czechia	16.7%
Denmark	27.4%
Estonia	7.8%
Finland	37.8%
France	31.4%
Germany	19.6%
Hungary	165.8%
Ireland	34.7%
Italy	71.3%
Latvia	-8.3%
Lithuania	64.3%
Luxemburg	41.3%
Netherland	46.2%
Poland	27.7%
Romania	119.4%
Slovakia	46.0%
Slovenia	102.0%
Spain	95.2%

Sweden	6.9%

Source: Author, August 2023.

Figure 1: overall c-sections in 2020.



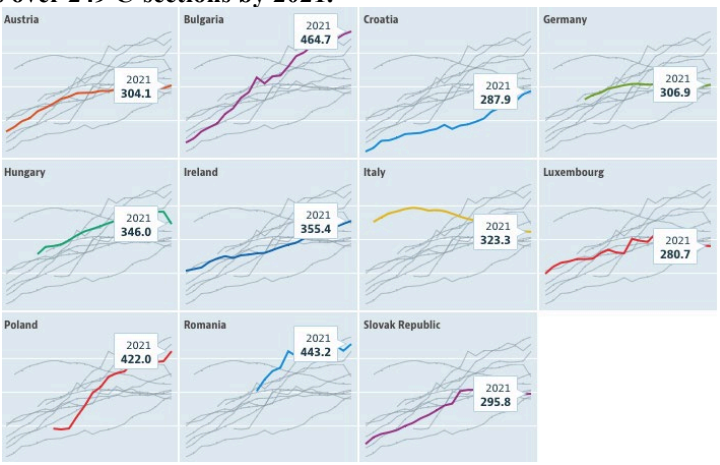
Source: OECD (2023), Caesarean sections (indicator). doi: 10.1787/adc3c39f-en (Accessed on 07 August 2023)

From a caesarean section rates perspective, all the countries are above the WHO recommended rate of up to 10% established back in 2015 with 3 countries reporting over 4 times the recommended rate in 2021 (Hungary 38.3%, Poland 39%, Romania (43.9% and Bulgaria 44%) Table 2, Figure 2. For visualization purposes, two classifications have been selected: countries under 248 c-sections by 2021 and countries over 249 C-sections by 2021, shown on figures 3 and 4.

Figure 3: countries under 248 c-sections by 2021 4.

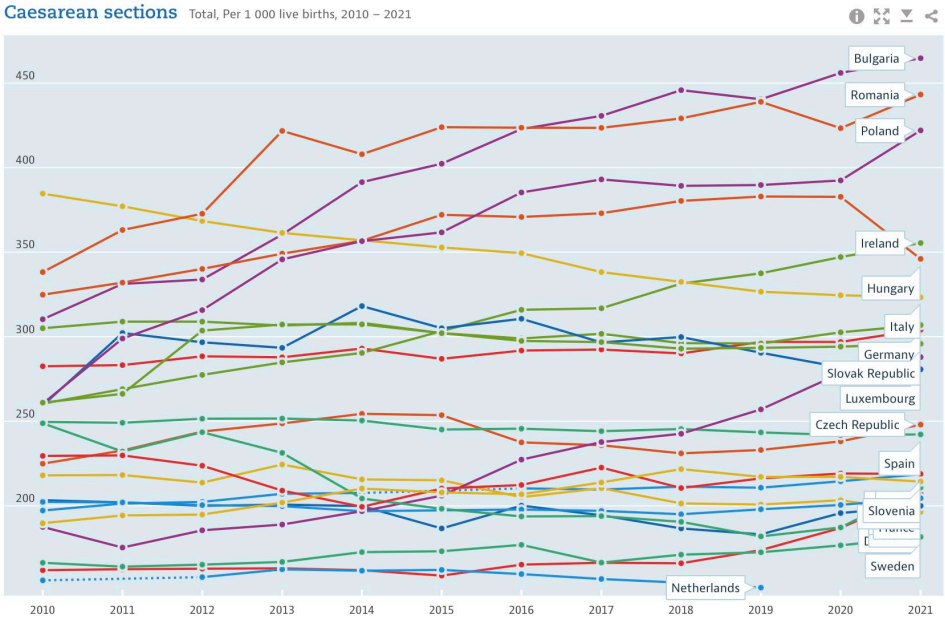
Source: OECD (2023), Caesarean sections (indicator). doi: 10.1787/adc3c39f-en (Accessed on 07 August 2023)

Figure 4: countries over 249 C-sections by 2021.



Source: OECD (2023), Caesarean sections (indicator). doi: 10.1787/adc3c39f-en (Accessed on 07 August 2023)

Figure 2: Trends on the selected countries over the period 2000-2021.



Source: OECD (2023), Caesarean sections (indicator). doi: 10.1787/adc3c39f-en (Accessed on 07 August 2023)

Table 2: Caesarean sections rates in 2019

Country	% of C-Sections over 100 live births
Austria	29.7%
Belgium	21.1%
Bulgaria	44.0%
Croatia	23.3%
Czechia	29.6%
Denmark	20.1%
Estonia	24.3%
Finland	18.3%
France	17.4%
Germany	19.8%
Hungary	25.7%
Ireland	38.3%
Italy	33.8%
Latvia	32.7%
Lithuania	18.2%
Luxemburg	29.1%
Netherland	21.6%
Poland	15.2%
Romania	39.0%
Slovakia	43.9%
Slovenia	29.3%
Spain	21.7%
Sweden	17.3%

Source: OECD (2023), Caesarean sections (indicator). doi: 10.1787/adc3c39f-en (Accessed on 07 August 2023)
Source: Author, August 2023.

From a linear regression perspective (Table 3), over half of (n=14) of the countries shows a positive regression (≥0.6), effectively suggesting that the trends are substantial and will remain in the near future. Given the observed p-values, it is possible to reject the null hypothesis (no statistical change over time) to lean towards the alternative hypothesis that times, in this case the years of measurements does have an impact in the increase of most.

Table 3: Regression analysis.

Regression Analysis	R Square	P-value
Austria	0.79	0.000004314
Belgium	0.93	0.000000003
Bulgaria	0.98	0.000000000
Croatia	0.94	0.000000000
Czechia	0.74	0.000004156
Denmark	0.21	0.030182555
Estonia	0.41	0.001366650
Finland	0.33	0.005429030
France	0.57	0.000044965
Germany	0.35	0.012743440
Hungary	0.86	0.000000034
Ireland	0.97	0.000000000
Italy	0.60	0.000041897
Latvia	0.42	0.001160471
Lithuania	0.17	0.054724263
Luxemburg	0.71	0.000000732
Netherland	0.42	0.001160471
Poland	0.92	0.000000005
Romania	0.76	0.000097297
Slovakia	0.86	0.000000001
Slovenia	0.93	0.000000000
Spain	0.03	0.431297348
Sweden	0.85	0.000002977

Source: Author, August 2023.

Discussion

The evidence suggests that the trends towards an increased number of neonates delivered by means of caesarean section is, albeit at different rates; increasing; with non-existence observation of the recommended rates proposed by WHO. This trends, may be rooted on several different factors, including economic, financial, social, and education related. The increase of disposable income may lead to higher health care related expenses, including the subscription of private health care insurance with coverage of delivery in private care settings.; which in turn provide health care in a newer, better health care facilities. This economical and financial aspect shifts the perception of need of health care, particularly the delivery of neonates; as well as it shifts from public to private providers. Changes in the social tapestry may also have a positive impact on the increase of caesarean sections delivery due the increased age of expecting mothers and the increased risk factors that comes with age, for both the neonate and the prospective mother. Moreover, migration from low- and middle-income country may also impact the preferences towards c-sections,

due the limited access in these countries to qualify health care professionals and adequate access to health care for prospective mothers. In addition to that, for-profit health care providers may lean towards recommending caesarean section delivery to increase the reimbursement rates from either public of health care insurance; as this type of delivery is considered a surgical procedure and therefore has an increase cost to the payer; either solely as the insurance or paid through deductible or premiums to the patients.
Lastly, the educational and information aspects of the different types of delivery methods are limited for the prospective mothers, relying mostly on health care professional advice focusing mostly on the delivery itself and not the short- and long-term consequences of caesarean delivery not clinically needed.

Conclusion

There is a dichotomy between the clinical evidence, clinical guidance's and regulatory bodies recommendations and the actual trends on delivery through caesarean section. Despite the evidence supporting the natural delivery and its variances as preferred option, trends in the in-scope countries are broadly leaning towards increased number of c-section deliveries. This dichotomy may be related to the ongoing transformation of the demographic elements of prospective mothers, a similar transformation in the health care systems and insurance due the ongoing demographic changes and its inherent pressures on their economic viability, or diverging views between the evidence and the personal preferences of medical practitioners. A deeper assessment at country level, could shed better light on what the actual drivers are and how to balance the clinical needs with the long-term benefits for both prospective mothers and neonates.

Disclosure

This research provides general information around trends in delivery methods based on clinical and public health information, as well as that provided by regulatory bodies and professional and medical societies as recommendations or clinical guidance. It is not meant to be used as sole guidance to decides on the best method of delivery. The author acknowledges the complexity of such decision and strongly support such decision to be made by expecting mothers with the advice of qualified health care professionals.

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WHAT'S IN A ROSE? IDIOMATIC EXPRESSIONS THROUGH THE LENS OF DIFFERENT LANGUAGES. CONTRASTIVE APPROACH

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Abstract: The purpose of this study is to compare rose-containing idiomatic expressions from English, German, French, Italian and Romanian in order to determine their equivalents. The first part of the analysis focuses on theoretical factors connected to the description and classification of these structures in the literature. An overview of several idiomatic expressions that can be found in various languages that make use of "roses" is presented, together with their definitions, histories, Romanian equivalents, and, when available and relevant, their etymological roots. The research concludes by comparing and contrasting the idioms in all the above mentioned languages that use the word "rose".
Keywords: rose, idiomatic expressions, contrastive approach, foreign languages

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Introduction

Like any other living thing, language evolves over time to meet the requirements of the people who speak it. The lexicon, and thus the idiomatic expressions, are the levels of linguistic analysis that most accurately reflect the historical events and influences to which a group of speakers is subjected. New linguistic terms are constantly emerging on a near-daily basis, while others gradually decline in usage until they ultimately vanish from the language entirely. Figurative language is, certainly, the use of evocative words, phrases, and sentences to express a message that implies something without explicitly saying it. The

utilisation of creative language serves to enhance the audience's comprehension and infuse words with heightened impact through the incorporation of diverse emotional, visual, and sensory associations. Figurative language is commonly seen in both literary works and everyday discourse. The process of assigning meaning to a concept or idea is achieved by prompting the reader or listener to comprehend it in light of its association with another entity, activity, or visual representation. This linguistic device is sometimes referred to as idiomatic expression, when comparisons are employed to enhance the level of information in a certain context.

Defining idioms

Idioms are a vital part of the curriculum when teaching English as a Second Language (ESL), and more specifically horticultural terminology, to undergraduate students in Romanian. This is because they allow students to not only expand their general vocabulary, but also make connections between idioms and characteristics of plants. The primary objective of this study is to ascertain the presence of the word rose in all five languages and afterwards analyse the similarities and dissimilarities. The higher the degree of similarity, the greater the probability of the acquisition by students. It has been observed that idioms present a persistent challenge in terms of their classification and are considered among the most arduous vocabulary terms to instruct (McPherron and Randolph, 2014, p. 1).

For all those interested in the study of idioms, including those who are in the business of learning or teaching idioms, the fundamental question of what constitutes an idiom is extremely crucial but challenging (Cornell, 1999; Moon, 1998). Upon doing a comprehensive review of scholarly literature pertaining to idioms, it becomes evident that the definition of idiom exhibits significant variation among different scholars. According to many researchers, the term is commonly used in a comprehensive manner, encompassing various linguistic elements such as fixed phrases, clichés, formulaic speeches, proverbs, slang expressions, and, in some cases, even individual words with multiple meanings. Thus, there have been incorporated individual words, particularly those employed metaphorically, such as the term "weigh" in the expression "weigh a decision," into the category of idioms. However, some scholars have a more limited definition of the term "idiom," referring specifically to expressions that are fixed, semantically opaque, and metaphorical, such as "kick the bucket" or "spill the beans" (Moon, 1998, p. 4). In fact, a small number of scholars even exclude metaphorical idiomatic expressions from their concept of "idiom" (Grant & Bauer, 2004). When faced with the various interpretations of the term "idiom," it is reasonable to concur with Moon's (1998, p. 3) assertion that "[t]he term 'idiom' is ambiguous and subject to conflicting usage". The ambiguity of the phrase arises from the inherent complexity and elusive nature of idioms. Given the intricate and enigmatic nature of this idea, it is arguable that a singular description may not enough, or even be feasible, particularly when considering the many research interests of scholars.

Rose chromonym

The perception of colours among humans is universally facilitated by the visual system. According to He (2011), the examination of colour as a fundamental cognitive domain may be traced back approximately 2500 years ago (p. 1805). Closer to our times, Goethe, in his work Theory of Colour published in 1840, posits that specific colours elicit distinct

emotions within individuals, and asserts that colours possess an inherent capacity to bring pleasure to humanity at large. He asserts that the sight necessitates it in the same manner that it necessitates light (pp. 304-5). Within the realm of objective reality, the issue of colour is primarily a matter related to society (Pastoureau, 2012, p.12). In essence, it is the society the one that constructs colour, assigning it definitions and significance, establishing codes and values, and organising practises while determining its implications. As for the pink-rose colour, Haller K., in her Psychology of Colours, asserts that it expresses "empathic love, full of care and attention, […] being relaxing and tempering the energy" (Haller K. p. 74, 76)

An Analysis of expressions containing rose in various languages

In what follows, we will present the origins and meaning of several idioms containing rose and their equivalent in French, German, Italian and Romanian. We started from the English ones, as they seem to be the most numerous. We also grouped their significance according to colour or plant.

Idioms related to colour

This category includes three idioms and expressions from English: bring the roses to one's cheek, as red as a rose, through rose-coloured glasses. The expression in French is voir tout en rose, in Italian arossire, and Romanian a roși. The expression through rose-coloured glasses express an unduly idealistic, optimistic, sentimental, or wistful perspective on or about something. Primarily heard in UK. Its French counterpart, voir tout en rose signifies "to always look on the bright side, to consider everything in an optimistic way", according to La Rousse. The expression was highly popularised due to Edith Piaf's song (Voir la vie en rose). As for the Italian and Romanian verbs, they both are derigations from the word rosso/roșu (red). The expression to bring the roses to one's cheek means "to make someone vigorous and healthful, or to make them appear as such". The Romanian equivalent is connected to another flower, i.e. peony (a se îmbujora).

Idioms and expressions connected to the flower

In this category we can find more expressions both in English and in other languages. We present a general view below:

Table 1 Idiomatic and fixed expressions

Nr crt	English idiomatic expressions	Equivalent in other languages
1.	As fresh as a rose	Être frais comme une rose(French)
		Fresco come una rosa (Italian)
2.	There is no rose without a thorn	Trandafir fără spini, nu se poate (Romanian)
		Il n'y a pas de roses sans épines (French)
		Non c'è rosa senza spine (Italian)
		keine Rose ohne Dornen, keine Liebe ohne Dorn
3.	Be no bed of roses	Trai pe roze (Romanian)
		Être couché sur le roses Être sur un lit de roses (French)
		Letto di rose (Italian)

		Nicht auf Rosen gebettet sein (German)
4.	Said under the rose	În secret/ taină, pe șoptite (Romanian)
		Être sur le roses (French)
		Sotto la rosa (Italian)
		Sub Rosa (German)

Fresh as a rose

This expression appears in half of the languages taken into study here. It generally refers to being alert, energetic, and enthusiastic, typically after some refreshing activity. Its equivalent in French and Italian are identical to the English version. In French it appeared for the first time in the 14th century. In Italian, it has the same meaning, i.e. excellent physical condition, rested; also vital, lively, full of energy. Referring to the healthy, fresh, rosy complexion, particularly said of a child. As an exception, in Italian it is also used for someone who makes a very naive speech or for someone who presents himself with an innocent and casual air after having caused a big mess, or having made others worry and so on. A variation of the expression is fresco come una rosa di Maggio

There is no rose without a thorn

As we can easily notice, this expression has the same form in all five languages. In English it has been proverbial since the mid 15th century, the earliest recorded instance being in a work of John Lydgate (1430-1440): “there is no rose….in garden, but there be sum thorne” (Oxford Dict of Idioms, p. 247). In French, it appears for the first time in 1690 in a work of Furetiere, a more ancient version being “nulle rose sans epines (1611, Cotcave) (Cfr. Le Robert, p. 705). Its meaning is that beautiful things can hide problems that are not initially seen. Just as roses despite their beauty have a prickly side, so all beautiful things also hide a negative side. The Italian website sapere.Virgilio.it considers that is originates from the poem "remedia amoris" (Ovid): “urticae proxima saepe rosa est” (The rose often grows near nettles).

Be no bed of roses

A situation or activity that is comfortable or easy is considered to be a bed of roses by the Oxford dictionary (p.19). In France it first appeared at La Fontaine (17th century), being recorded in British literature one century before. Today, the phrase is usually used in a negative sense.

Said under the rose

The German expression is extrapolated from the Latin phrase: sub rosa dicta velata est. In ancient times, the rose was the flower dedicated to Horus, god of silence for the Greeks and Romans. Therefore, when a rose was placed on a table, those present were obliged not to divulge what had been said or heard. Since then the expression sub rosa indicates something that is carried out in secret, confidentially. Interestingly enough, the English dictionary (p.247) considers the origin of this expression to be a German one as evidence of a similar expression being also found in early modern Dutch. For instance, a 1546 State Paper of Henry VIII includes the phrase "under the rosse," accompanied by a gloss that

implies it was a novel or unfamiliar expression at the time. The metaphorical notion of the Latin counterpart "sub rosa" has been widely utilized in English since the mid-17th century. All languages have the same expression, the exception being the Romanian, which has a direct expression, “in taina”.

Peculiarities

There are some expressions related to rose which are particular for every language. In Romanian it is present the one: Ai fost floare trandafir, dar acum ești borș cu știr, which is said about mockingly, about not a very beautiful woman.It is recorded for the first time at Negruzzi(cfr.Dex Online- DLRLC). In English we find the expression roses, roses, all the way, found for the first time in a poem of R. Browning – The Patriot (1855) where it is described a moment in which heroes that pass on streets are met with roses. In French we found the expression cueillir la rose, having the meaning of taking the virginity of a girl, and being also connected to other phrasal verbs – perdre/garder sa rose, avoir la rose de.. The German expression Rose Monday even if generally considered to be the name of the penultimate day of the carnival, it might in fact come from the verb "rasen" or the participle "rasend," as indicated by the Lower Rhenish pronunciation with a muffled "a" sound. In the Kölnisch dialect, "rose" is used to convey the meaning of acting nonsensically.

Conclusions

There are two groups of idiomatic expressions related to the word rose: one that refers to the colour, one that reflects the plant/ flower. The group connected to colour has few expressions and the counterparts of the other languages come up as verbs related to colour. The group centered around the plant has similarities in all five languages, many expressions being identical. Each language has its own particular expression, not connected to the others

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CONCEPTUAL ASPECTS OF SUSTAINABLE ROAD INFRASTRUCTURE MANAGEMENT

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Abstract. The road infrastructure is closely correlated with the economic development of a country. Critical factors such as transportation facilitation, cost reduction, regional development stimulation, investment attraction, tourism promotion, increased economic productivity through reduced travel time, and improved logistics depend on the quality of road infrastructure management. In this study, the author theoretically grounded the concept of road infrastructure management from the perspective of sustainability and outlined a vision of road infrastructure management as an integrated system. The methods employed included monographic analysis, synthesis, deduction, comparative analysis, and other qualitative methods.
The relevance of this study lies in the synthesis of the theoretical conceptual model of sustainable road infrastructure management. The author reviewed the main characteristics of sustainable road infrastructure management, highlighted the key criteria evaluating the quality of sustainable infrastructure, and provided a comprehensive overview of the subject.
Keywords: management, infrastructure, sustainable roads, sustainability
JEL: H 41, M00, M10,

Introduction

The road infrastructure plays a crucial role in the development of a society and in facilitating various aspects of daily life. Firstly, road infrastructure is essential for the connectivity and accessibility of communities. A well-developed network of roads ensures the efficient mobility of people and goods, facilitating transportation from one place to another. This contributes to the economic development of countries and promotes increased trade between different areas, regions, and states. Additionally, developed infrastructure provides opportunities for the growth of tourism and other related economic sectors.

Secondly, road infrastructure has a significant impact on improving the quality of life. Well-maintained and safe roads reduce travel time, providing people with the opportunity to move quickly and efficiently. This contributes to the reduction of congestion, pollution, and traffic-related stress. Additionally, modern and safe roads are essential for preventing road accidents and ensuring the safety of traffic participants.

Currently, it is demonstrated that road infrastructure is an essential pillar of social and economic development, and the management of road infrastructure is a crucial component in ensuring the efficient and sustainable operation of the road network. Only through proper management, involving elements such as strategic planning, adequate maintenance, the adoption of modern technologies, and collaboration between entities, can an efficient, safe, and society-adapted road network be ensured.

In this study, we will focus on modern theoretical concepts and models applicable to sustainable road infrastructure management.

Research Methodology

The research was conducted considering the existing theoretical literature, exploring their context to meet the research objective. The study is primarily a literature review and aims to develop a conceptual framework for establishing a national model of sustainable road infrastructure management. This is elucidated through an in-depth discussion of the sustainable road infrastructure development concept.

The characteristics of the conceptual framework for sustainable road infrastructure

The characteristics of the conceptual framework for sustainable road infrastructure are crucial in the context of the Sustainable Development Goals (SDGs), and recent literature increasingly addresses the notion of roads through the lens of resilience and sustainability. Establishing resilience is closely tied to a precise assessment of the current state of the road network, and the accurate identification of vulnerable elements is highly important. Vulnerability analysis is conducted to pinpoint weaknesses in the network and assess the impact of its operational failures.

A conceptual framework for sustainable road infrastructure includes the following characteristics:

1. Robustness and Resilience: Road infrastructure must be robust and exhibit resilience to various shocks and disruptions, such as extreme weather events or natural disasters.
2. Energy Efficiency: Road transport systems should adopt technologies and practices that reduce energy consumption and minimize environmental impact during construction, maintenance, and usage.
3. Material Durability:The use of durable materials and innovative technologies in road construction and maintenance contributes to extending their lifespan and reducing the impact on natural resources.
4. Social Inclusion: The development of road infrastructure should consider the needs and accessibility for all social groups, ensuring connectivity and inclusive mobility for marginalized communities.
5. Smart Traffic Management: The use of modern technologies, such as traffic management systems and real-time information, contributes to optimizing traffic flows and reducing congestion.
6. Strategic Planning: An essential aspect of sustainable road infrastructure is strategic planning, involving anticipating future needs, identifying and correcting existing deficiencies, and ensuring the network's efficiency in response to socio-economic and environmental changes.

By integrating these characteristics into the conceptual framework of sustainable road infrastructure, the aim is to achieve sustainable development goals, contributing to economic prosperity, environmental protection, and the improvement of community life quality.

In the vision of Cozar A., robustness is the property that allows a road structure to withstand traffic surges resulting from unforeseen actions to maintain the functionalities and continuity of the road network, making it robust in terms of road structures. In the same vision, robustness addresses the issue from the perspective of the network's ability to function at its normal capacity, while road reliability represents the ability of roads to operate under the conditions for which a particular road was designed. Thus, road networks may face two categories of events that can jeopardize the smooth flow of traffic, namely: (i) irregular and exceptional events – natural disasters (earthquakes, hurricanes, floods,

landslides, etc.); and artificial events – serious road accidents, major roadworks, social events (football matches, large fairs, etc.); (ii) regular and expected events – traffic fluctuations during a day, week, or season, as well as regular road maintenance works. (Andrei et, 2014)

The concept of Sustainable Road Infrastructure Development (SRID) covers a broader scope, increasingly involving more companies in voluntary commitments for ecological transition in transport infrastructures. This concept takes into account various dimensions and can be defined by the design, construction, operation, maintenance, and deconstruction of road infrastructure elements in a manner that balances societal, economic, and environmental concerns necessary to support human justice, diversity, and the functionality of the natural environment, representing a multidimensional framework.

Characteristics of the conceptual framework for sustainable road infrastructure include:

1. Environmental Considerations: Integration of eco-friendly practices in the planning, construction, and maintenance of road infrastructure to minimize environmental impact, promote biodiversity, and reduce carbon footprint.
2. Social Equity: Ensuring that road development projects consider the needs of all societal groups, provide inclusive accessibility, and minimize negative social impacts.
3. Economic Viability: Balancing economic feasibility with long-term sustainability, considering cost-effective construction methods, and assessing the economic benefits over the infrastructure's lifecycle.
4. Safety and Resilience: Prioritizing road safety measures and designing infrastructure to withstand and recover from various disruptions, including natural disasters and accidents.
5. Innovation and Technology: Utilizing modern technologies and innovative solutions for construction, traffic management, and maintenance to enhance efficiency and minimize resource use.
6. Multi-Modal Connectivity: Designing road networks that integrate seamlessly with other modes of transportation, promoting a well-connected and efficient overall transportation system.
7. Lifecycle Approach: Considering the entire lifecycle of road infrastructure, from planning and construction to maintenance and eventual deconstruction, to optimize resource use and minimize environmental impact.
8. Community Engagement: Involving local communities in the decision-making process, addressing their concerns, and ensuring that road projects contribute positively to the overall well-being of the community.
9. Climate Resilience: Designing road infrastructure to be resilient to the impacts of climate change, considering factors such as extreme weather events, rising sea levels, and changing precipitation patterns.
10. Adaptability: Creating flexible road designs that can adapt to evolving transportation needs, technological advancements, and changes in socio-economic and environmental conditions over time.

These characteristics collectively form a comprehensive framework for sustainable road infrastructure, addressing the complex interplay between environmental, social, and economic factors to ensure long-term viability and positive societal impact.

These criteria represent essential aspects in the evaluation and development of sustainable road infrastructure:

1. Socio-cultural Sustainability: Ensuring that road infrastructure respects and supports cultural diversity, the local community, and promotes social inclusion.
2. Economic Sustainability: Evaluating the long-term economic impact of road infrastructure, ensuring cost efficiency, and contributing to sustainable economic development.
3. Environmental Sustainability: Integrating ecological practices to minimize environmental impact, conserve natural resources, and reduce carbon emissions.
4. Institutional Sustainability: Ensuring the existence of adequate institutional structures and processes for the long-term planning, construction, and management of road infrastructure.
5. Health and Safety: Prioritizing road safety measures and ensuring a road environment that minimizes risks to public health.
6. Project Management: Implementing an efficient project management process, ensuring adherence to timelines, proper resource allocation, and achieving established objectives.
7. Resource Use and Management: Optimizing resource use, including materials, energy, and land, to minimize environmental impact and maximize efficiency.
8. Engineering Performance: Ensuring the quality and durability of construction, implementing high engineering standards for road infrastructure.
9. Climate Change Response: Adapting road infrastructure to climate change, including managing risks associated with extreme weather events.
10. Public Participation: Involving the community and citizens in the decision-making process regarding road infrastructure to ensure an inclusive and transparent approach.
11. Stakeholder Management: Efficiently managing relationships with all stakeholders involved in road infrastructure projects, ensuring open communication and effective collaboration.

Therefore, it is observed that stemming from the necessity of infrastructure development, infrastructure management emerges, involving planning, designing, developing, producing, modifying, or maintaining the built infrastructure. It encompasses entities such as producers, contractors, and end-users of the final product. It is worth mentioning that sustainable development, as one of the Sustainable Development Goals (SDGs), applied to the concept of infrastructure, can be defined as a subsection of sustainable development that includes aspects related to procurement, planning, and organization of road infrastructure projects, material selection, waste reuse, and reduction.

In multiple sources, we identify a common description that defines sustainable infrastructure development as "the responsible construction and management of a built environment based on the judicious use of resources and environmental values" (Kibert, 1994). There are numerous additional descriptions, for example, from the American Society of Civil Engineers (ASCE) and the United States Environmental Protection Agency (USEPA), which focus on the ecological aspect of sustainability (Ametepey et, 2019).

Regarding the concept of sustainable road infrastructure development and its fundamental elements or variables, it is noteworthy that researchers hold diverse opinions, leading to a lack of consensus on the implementation process and an insufficient understanding of criteria and indicators (Lim, 2009, Oltean-Dumbrava, 2014, Ugwu et., 2007). While extensive research (CEEQUAL, 2007) on sustainability characteristics used to measure the implementation of sustainable road infrastructure, there is continued disagreement in the

scientific literature regarding different features and indicator systems of road infrastructure management, such as FIDIC's Project Sustainability Management (PSM) Guidelines (FIDIC, 2004), BE ST-In-Highways (Tinjum, 2013), CEEQUAL (2007), Envision, Green Guide for Roads, GreenLITES, GreenPave, Green Roads (Ametepey et, 2019).

After analyzing these frameworks, it is important to highlight that the CEEQUAL scheme (The Civil Engineering Environmental Quality Assessment and Awards Scheme), which translates to the Environmental Quality Assessment and Awards Scheme in Civil Engineering, is the most comprehensive framework. It considers the following 11 criteria: 1. Project Management, 2. Land Use, 3. Landscape, 4. Ecology & Biodiversity, 5. Historic Environment, 6. Energy & Carbon, 7. Material Use, 8. Waste Management, 9. Transport, 10. Effects on Neighbors, 11. Relations with the Local Community and Other Stakeholders. Expert Lim S.K. (Lim, 2009) identified 23 critical sustainability factors specific to road infrastructure projects. These factors are grouped into 10 categories: environmental, economic, social, engineering, community involvement, relationship management, project management, institutional sustainability, health and safety, and resource use and management.

In this context, in the French perspective (CEREMA), sustainability of road infrastructure is highlighted as heritage, with the best economic and environmental cost, as well as adaptation to climate change and activities representing the core managerial function. This can be grouped according to the following axes: (a) infrastructure asset management and (b) techniques, methods, and infrastructure monitoring. To date, there have been varied insights into sustainability regarding management due to the involvement of multiple stakeholders with their own concerns, main priorities, and interests, leading to different objectives. The same diversity exists in the development of road infrastructure due to the multidimensional perspectives of sustainability.

Although there are tools for assessing sustainable roads, such as those developed by VicRoads, GREENROADS, and Envision, the adoption of these tools is quite limited and unclear. This is because they do not address the identification and resolution of issues that impact the gap between sustainability efforts and actual outcomes (Table 2). Additionally, the literature indicates the existence of initiatives attempting to develop indicators and assessment tools for infrastructure sustainability (Ugwu et., 2007), (Mârza, 2006), (FIDIC, 2004), (Brent et., 2004). However, these initiatives do not specifically focus on a certain type of infrastructure, such as roads.

The framework for sustainable road infrastructure development involves the integration of a set of principles and practices to ensure a balance between economic, social, and environmental aspects for long-term benefits. An effective framework for sustainable road infrastructure development may include the following elements (Table 1.).

Table 1. The framework for sustainable road infrastructure development

The indicator system of road infrastructure management proposed by:	Characteristics
CEEQUAL	Project management, land use, ecology and biodiversity; environment, energy, resource use, waste management, etc.

Sustainable project management" FIDIC	Equity, health, human rights, education, security, population, culture, integrity, atmosphere, oceans/seas, water, biodiversity, economic structure, consumption, and product characteristics, etc.
BE2-ST-In-Highways	Hazardous waste, carbon savings, traffic noise, waste reduction, etc.
Envision	Climate, natural environment, resource allocation, energy and atmosphere, innovation, and design.
Montgomery, Schirmer, Hirsch (2014)	Quality of life, project leadership, natural environment, natural resource management, resource use, etc.
Lim (2009)	Environment, economy, social, engineering; resource use, management.

Source: developed based on Ametepey et, 2019, Ugwu et., 2007, Mârza, 2006, FIDIC, 2004, Brent et., 2004

Another empirical study on risk assessment for public road infrastructure construction projects, conducted by P.Z. Razi, M.I. Ali, N.I. Ramli (Razi, 2020) indicated the existence of 13 sub-factors and 4 delay factors, evaluated quantitatively. Using the Analytic Hierarchy Process (AHP) technique to prioritize delay factors, the authors identified the following hierarchized risks: project risk (0.348), land acquisition issues (0.555), followed by environmental issues (0.233), which, in turn, is caused by weather uncertainty (0.733), operational risk (0.309) caused by delayed submission of the approved construction drawing, leading to project submission delays (0.396), and technical risk (0.110).

Road infrastructure management as a system

Road infrastructure management, analyzed as a system, aims primarily at the efficient utilization of roads by the community. The concept of management (Road Management Systems, 2022) involves handling in the most rational way to minimize any negative impact on the primary purpose. In this context, the objectives of road infrastructure management include:

1. Minimizing damage to roads and their infrastructure.
2. Ensuring the prompt completion of any necessary works for the provision of non-road infrastructure.
3. Minimizing disruptions for road users.
4. Minimizing risks to the safety and property of road users and the general public.
5. Facilitating the design and installation of infrastructure that minimizes risks to road user safety.
6. Restoring the road and any other infrastructure as close as possible to the existing state before the execution of works.
7. Protecting and conserving significant vegetation along the road and biological sites within the road reserve.

These objectives reflect an integrated and responsible approach to road infrastructure management to ensure sustainable benefits for the community and the surrounding environment.

According to the analysis of specialized literature, we identify that the concept of a system represents a scientific determinant used over time. The DEX (Dictionary of the Romanian Language) defines a system as "a set of elements (principles, rules, forces, etc.) dependent on each other and forming an organized whole, which brings order to a theoretical field of thinking, regulates the classification of material in a domain of natural sciences, or makes a practical activity function according to its intended purpose". The concept of a "system" has emerged and developed over the years as a result of highlighting common features and

behaviors for a series of processes and phenomena in different fields. This has allowed for their treatment from a structural-functional perspective in a unified, systemic manner.
The vision of the system appears in an incipient form in ancient Greek philosophy. Aristotle introduces the notion of a system, stating that the whole is more than the sum of its parts. The German biologist Ludwig von Bertalanffy, in the years 1928-1950, reformulated the classical concept of the system, determining it as "a category by which relationships between objects and phenomena are known" (Păun, 2014).
Currently, it is acknowledged that the management system represents a set, a totality of interconnected elements through which the actual management process is executed to achieve defined goals. Therefore, to define a system in any field, we must identify the elements that are a component of the type of activity, and at the same time, we need to determine the connections or, more precisely, the existing links between the elements of the process. Simultaneously, we should not forget to determine its objectives.
Surdu A (2011) in the work "General Systems Theory", provides a detailed analysis of the evolution of the notion of a system, stating that, "although it seems challenging to argue that there are historically significant elements in a general theory of systems, there are, nonetheless, interesting issues that have been debated since antiquity and are directly related to the topic at hand. Starting with this theory, the concept of a system began to be used in management. Thus, with the development of the management concept, the system is initially treated as a working method, a way of organizing a process, an operation."
In this context, Professor Păun M (2007)., in the work "Foundations of Systems Analysis," mentions: "In the general theory of systems, there is a law, formulated by Churchman, according to which any system can be considered under different conditions as a subsystem, highlighting the relative nature of these two basic concepts in systems analysis".
Furthermore, it should be noted that for a complete definition of the concept of a system, it is necessary to elucidate the fact that a system can be structured in various ways. Thus, Nicolescu O. and Verboncu I., as early as 1997, analyzed and defined management systems. In their view, a management system represents the totality of elements with organizational, informational, decisional, and methodological characteristics, interconnected and interdependent, ensuring the functionality of management processes and relationships to achieve objectives.
Also, in this work, the authors mention that the main subsystems in the management system are:
- Organizational subsystem;
- Decisional subsystem;
- Informational subsystem;
- Methodological subsystem (methods and techniques of management);
- Other elements of the management system.

Nicolescu Ov. and Verboncu I (Nicolescu et, 1997) consider that the organizational subsystem represents the most concrete component of the management system and, at the same time, it constitutes the backbone of the organization, influencing significantly the content and effectiveness of the activities carried out within it. The decisional subsystem represents the so-called command system, managing all the involved activities, through which all management functions are executed. The informational subsystem has the role of providing necessary information to all components of the organization. The

methodological-managerial subsystem contributes to the exercise of each of the five management functions. It enhances the efficiency of each management process, as it represents a set of techniques, methods, and procedures, "just as knowledge substantially enhances human capacity to decide and act, the methodological-managerial subsystem significantly amplifies the functionality and performance of the organization.".
This description of the management system, developed by Nicolescu and Verboncu, is well-known and studied. Therefore, in our research, we conducted an investigation into a more modern approach to the concept of the management system. Taking into account the statement by Professors Cimpoieș D. and Simciuc E (Cimpoieș et, 2016): "There is no universally accepted theoretical model regarding the criteria/indicators for evaluating organizational performance," we intend to develop our own model that will characterize the management system of road infrastructure. We also considered the ISO Certification Dictionary: "A management system is a network of elements that are related to each other. These elements include responsibilities, authorities, relationships, functions, processes, practices, procedures, and resources. A management system uses these elements to develop policies and objectives and to develop ways to implement these policies and achieve these objectives".
The management of road infrastructure, as a unified process based on systems theory, road engineering, and economic evaluation, emerged after 1960 (Dicu, 2010). Subsequently, the interest of scientists and administrators has grown explosively. In this context, a road infrastructure management system has been integrated into road asset management systems. These are often described by the following elements: (Table 2).

Table 2. Road infrastructure management system elements

Road components	Operational functions	System objectives
1. Road pavement	1. Planning	1. Operation
2. Bridges	2. Design	2. Condition
3. Roadside area	3. Construction	3. Safety
4. Traffic control devices	4. Condition assessment	4. Cost
	5. Maintenance	5. Socio-economic factors
	6. Development	6. Energy
		7. Data management

Sourse: elaborated by author based on the References

The term "asset management system" includes: the procedures, tools, data, and policies necessary for achieving efficient asset management. Each management institution has its own vision of what constitutes assets in the road management field. Typical elements of assets may include: physical infrastructure such as pavements, bridges, etc.; human resources (personnel and knowledge); equipment and materials; other components such as road area, data, information system, methods, technologies, partners, etc. (Dicu, 2010).
Usually, road administrations engage in three generic activities: road asset management, traffic management, and road safety management.

Road asset management

Road asset management includes all activities related to the restoration or maintenance of road infrastructure in the desired condition, providing services to road users through the road infrastructure. The result of this activity is a road network with specific conditions or parameters that provide services to road users (TEM, 2021). At the same time, the concept of integrated road management is introduced in practical terms, often combined with the research cluster concept, for example, in the Korean perspective. This involves developing advanced technological solutions for roads and road infrastructure, aiming to ensure the safety and convenience of road infrastructure through systematic management and improved technology support. It also involves integrating activities in the areas of cooperation and support for road infrastructure at the local governance level. In the author's opinion, the concept of a system underlies the scientific nature of management, serving as a method that highlights the interaction of all factors, establishing a connection between effect and cause. For a system to operate efficiently, it is crucial that roles within it are well-placed and carried out at all levels: from strategic planning and investment coordination (what we do) to financing (with what resources), public procurement (with whom we collaborate), design and execution (how we do it), operation and maintenance (how we utilize and preserve what we have done), and evaluation (why we did it).

In specialized literature, it is mentioned that the road infrastructure management system, as well as transport networks, plays a significant role in the economic and social development of the community, specifically by bridging the gap between production and consumption. In the author's perspective, any road infrastructure management system comprises three main elements, strongly interdependent: asset management, traffic management, and the managerial toolkit used.

The elements of the asset management system should be treated as a set of tools, including policies, plans, processes, procedures, and IT systems (information management system). When an organization establishes its asset management system, it needs to consider both its internal and external contexts. The external context includes social, cultural, economic, and physical environments, as well as regulatory, financial, or other constraints. The internal context encompasses the organization's culture, mission, vision, and values. Inputs and expectations of stakeholders are also part of the organization's context.

Infrastructure operators can adopt 3 parallel implementation strategies:

1. Increasing Infrastructure Utility: This strategy aims to maximize asset utilization and improve the quality for road users.
2. Reducing Total Costs: By lowering operation and maintenance (O&M) costs and mitigating externalizations, the goal is to achieve a more economically efficient infrastructure.
3. Enhancing Long-Term Value: This strategy involves extending the lifespan of assets (roads) and reinvesting throughout the entire lifecycle, considering critical factors outlined in Table 3.

These strategies are designed to ensure sustainable and efficient management of road infrastructure, addressing aspects such as optimal resource utilization, cost reduction, and long-term quality maintenance.

Table 3. Critical success factors for the operation and maintenance of road infrastructure

Increasing utility	Maximizing asset utilization	Improving peak capacity and effective performance	Applying demand management	Optimizing availability/reducing downtime
	Improving quality for users	Adopting a customer-centric operating model	Improving end-to-end user experience	Utilizing smart technology to refine user performance
Reducing total cost	Cost reduction	Implementing simplified and automated processes	Optimizing procurement and outsourcing costs	Right-sizing management and support functions
	Mitigating externalities	Ensuring comprehensive sustainability: health, safety, environment	Integrating sustainability: health, safety, routine environment	Collaborating with relevant stakeholders
Increasing value over the lifespan	Extending asset lifespan	Investing in preventive maintenance	Controlling excessive asset consumption and stress	Strengthening resilience
	Reinvestment with a life cycle-based vision	Prioritizing project options through whole-life cost-benefit analysis	Selecting the contracting mode for the best value	Preparing for efficient project delivery
Enabling best practices in operation and maintenance	Securing funding	Allocating usage fees through maintenance funds	Implementing inclusive usage fees	Capturing ancillary business
	Developing capabilities	Introducing asset management planning	Applying benchmarks and data tools	Conducting training courses and talent development
	Governance reform	Corporatization and professionalization of public agencies	Promoting collaboration between agencies	Considering private sector involvement and competition

Sourse: elaborated by author based on the References

Traffic management

Traffic management is the second main activity of road agencies and encompasses all activities aimed at controlling traffic parameters by actively modifying the use of road infrastructure. Similar to road maintenance, traffic management contributes to creating value for road users by influencing the performance parameters of road infrastructure. However, while road maintenance indirectly provides services through road infrastructure meeting certain parameters, road agencies directly engage in traffic management measures. These measures include providing information about the current traffic situation, suggesting alternative routes in case of traffic jams, lane closures, or advising on appropriate driving behavior.

As road agencies adapt their traffic management measures to current traffic patterns, which are to some extent a response to previous road events, road agencies and road users interact, undertaking similar actions that mutually influence the management process. (Hartman et, 2016).

Road Safety Management

In recent years, road infrastructure design has been carried out in accordance with various concepts. For example, the "access management" concept focuses on ensuring traffic efficiency and safety by managing traffic access, utilizing data on maneuverability capacity and traffic volume. Another concept is the "forgiving road side design," which applies knowledge about human psychophysiological behavior limits to ensure road infrastructure safety. This concept has been complemented by the "positive guidance" approach, involving the systematization and processing of information intended for road users (Konovalova et., 2022).

The concept of "zero mortality" remains the most ethical design and management concept for road infrastructure, considering the overall road transport system with its components: roads, vehicles, and pedestrians, which, in cooperation, guarantee safety. One of the most progressive concepts that dictates the need for adjusting management tools is the concept of digital road infrastructure (Intelligent Traffic Infrastructure, ITI). The methodological assurance of adjusting management tools for the application of these concepts requires defining goals and objectives in the field of traffic safety, a road safety observer - a road safety audit system, a road safety inspection, a road safety assessment system based on the IRAP methodology (International Road Assessment Programme), with the determination of the costs of life and human trauma resulting from road accidents to assess the effectiveness of traffic organization measures and safety improvement. At the same time, the analysis of the most well-known urban management models, where urbanization, in the general scientific sense, means the process of connecting primary elements under the influence of external factors and interactions in a higher-order hierarchical structure, shows that there are still no comprehensive solutions in this field that would take into account both the network and the road infrastructure.

Conclusions

Therefore, a national transport system represents a fundamental component of society through at least two dimensions: economic and social. The development of a transport system that meets the needs of the economy is a strategic priority and must be correlated with the need for regional and national integration of communities. The components of the national transport system must be addressed with an integrated vision that supports the mobility of people and goods and is correlated with the country's development strategy, sectoral strategies, urban development strategies, European strategies, and international actions to mitigate environmental effects.

The road transport mode represents a fundamental component of the national transport system due to the significance of road transportation and the challenges it poses. The two constituent elements of this mode, infrastructure and vehicles, need to be addressed in an integrated manner, and the development of this mode should be achieved through a unified approach to the infrastructure-vehicle system. Road transport is primarily intended for the transportation of semi-finished and finished products, focusing on high-value goods. An advantage of road transport is its availability or accessibility; practically, any point of origin or destination is accessible due to the road network. Transit time is a notable advantage of road transport, as well as the safety of products. The transportation of goods depends on the size of shipments relative to the number of loading or unloading points and the nature of the transported goods. Travelers are transported locally, within urban regions,

interurban areas, and suburbs, as well as across national borders, including transportation between neighboring countries or transit transportation. The means of transport used for goods transportation are divided into essential means, used on main routes, and terminal means, used at the initial and final stages, utilizing space and time as coordinates. The performance of road infrastructure is dependent on the institutional capacity to implement efficient actions through appropriate management.

By the nature of the tasks involved in carrying out infrastructure management and their mode of implementation, the functions are characterized by the following:

1. Forecasting: This function integrates three aspects – forecasting, programming, and planning, forming the basis for activities focused on the strengths and weaknesses of transportation network infrastructure. The aim is to understand which external conditions pose a threat or are favorable for the implementation of necessary works in the field.
2. Organization: This function enhances the organizational structure of the infrastructure domain, addressing all incompatibilities that may arise.
3. Coordination: Through this function, decisions and actions in the development of road infrastructure are harmonized. The existence of adequate communication at all levels of the transport network management system is essential for ensuring effective and efficient coordination.
4. Training/motivation: This function involves the gradual motivation for performing activities in the field, establishing a value system oriented towards the modernization of road infrastructure.
5. Evaluation and control: Through the managerial function of evaluation and control, the achievements in meeting the proposed objectives for the economic development of the infrastructure domain are measured.

The formation of the institutional framework regarding the planning, administration, and management of resources for the modernization and maintenance of transportation networks involves multiple actors. These actors represent central public authorities and specialized institutions. The accomplishment of the mentioned functions establishes the objectives and strategies of the transportation network system, integrating the development of all activity components.

From the analysis conducted, we conclude that the management of road infrastructure is constantly evolving. At the same time, there are various approaches and development models for it.

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FOOD WASTE PREVENTION SOLUTIONS IN THE NON-FINANCIAL REPORTS OF ROMANIAN FOOD RETAILERS

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Abstract: The research delves into the non-financial reports of Romanian food retailers, shedding light on the solutions adopted to prevent food waste. The research is focused on six of the biggest food retailers in Romania and their last two public sustainability reports from 2020 and 2021. By analyzing the reports, the research uncovers the most important strategies, measures and innovations implemented to help reduce wastage in the food retail sector in Romania. The findings of the study point towards a growing awareness and commitment among Romanian food retailers towards sustainable business strategies and food waste management strategies.
Keywords: food waste, prevention, waste management, food retail, sustainability.
JEL Classification: Q13, Q18, M14, L81.

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Introduction

In today's society, sustainability, social responsibility and ethical consumerism are driving forces behind business transformation and the issue of food waste is climbing up the social agenda. The food retail sector is a crucial juncture in the food supply chain, being situated between the supplier and the consumer. In the light of the legislation, the non-financial reporting has become imperative, this transparency being communicated through "sustainability reports" or "CSR reports" which food retailers make public. This article delves into the proactive measures and solutions presented in the non-financial reports of Romanian food retailers, analysing their strategies, commitments and other implications of the food waste prevention. The European Commission reports that in the European Union "around 59 million tons of wasted food, which accounts for almost 131 kilograms per capita, is generated annually at Union level, which is estimated financially at 132 billion euro" (Eurostat, 2023). The problem is of particular importance, being clear that it should concern us not only from a social and environmental perspective, but also from an economic perspective, the amounts of food reported as wasted being significant. According to public databases, the largest quantities of wasted food are found in Germany, France,

and Italy (Eurostat, 2023). It is concerning that Romania did not even report the quantities of wasted food by sectors of activity, deeper research being required in this area.
Eurostat statistics also estimate that around 10% of the food which is available to European consumers is wasted, which is worrying taking into consideration that at the same time, about 36.2 million people are not having the opportunity to afford a quality meal every other day. (European Commission, 2023).
The European Union is highly dedicated to the goal of sustainable development no. 12, namely "Setting sustainable consumption and production patterns" which aims to halve the level of food waste at the consumer, and at the retailer level by 2030. It is important to also note that reduction of food waste is not only beneficial in terms of achieving the sustainable development goals, but can also make a beneficial contribution to the fight against climate change as food waste has a great impact on the environment, being responsible for around 7%of the greenhouse gas emissions in the European Union (European Commission, 2023).
In 2010, in the United States of America, approximately "43 billion pounds were wasted in food retail stores" (Buzby, Hyman, Stewart, & Wells, 2011), which is particularly problematic since in 2016, about 12% of the households were "food-insured" (Economic Research Service, 2017). Most losses in retail operations relate to "perishable products such as pastries, meat, seafood or ready-made foods" (Gunders, 2017). Practices leading to food waste in food retailers include: "over-supply of showcases with products, high expectations regarding the appearance of fruits and vegetables, packages/packaging with too large quantities, short deadlines of -sale up to- on products, damaged products, specific items for a given season, little staff in stores and others" (Gunders, 2017).
The European Union Code of Conduct on Responsible Food and Marketing Practices also entered into force in July 2021, resulting from the "Farm to Fork" program, the code aimed at improving the sustainability performance of economic operators (including food retailers). The code was developed by EU food industry associations and businesses, with other actors such as associations, trade unions and NGOs contributing. In addition to the statistics mentioned above, a multitude of studies have placed consumers and producers as among the most responsible to produce food waste (Schanes, Dobernig, & Gözet, 2018), however, food retailers occupy a particularly important position, being placed between producers and consumers, having the power to influence food waste (Ribeiro, Sobral, Peças, & Henriques, 2018). To help reduce food waste, they adopt practices and policies aimed at sustainability as part of their strategy of "CSR-Corporate Social Responsibility" which they usually, reports them through sustainability reports or CSR reports. The social responsibility of enterprises / organizations was defined as consisting of "organizational actions and policies that highlight stakeholders, but also economic, social and environmental aspects" (Aguinis & Glavas, 2012). Although they include food waste issues in their organizational strategy, this remains an important issue that requires more interest from researchers.
Previous works have identified the main causes of food waste in supermarkets, including: "high quality standards, product range size, delivery problems, packaging problems; storing products in the store and customer behavior in the store, customer demand patterns and their high expectations" (Teller, Holweg, Reiner, & Kotzab, 2018). However, the literature suggests that "among the reasons why CSR strategies are not well implemented can be called the lack of understanding of managers on the implementation of sustainable strategies in daily work" (Moser, 2020) . This shows that more attention should be paid to

CSR micro-processes and associated practices (Aguinis & Glavas, 2012). Micro-processes are translations into daily actions of high-level actions and may consist of several types of activities such as "sharing of knowledge or communication" (Aguinis & Glavas, 2012). A study conducted in the UK and Spain showed that "one of the root causes of food waste is lack of knowledge sharing" (Mena, Adenso-Diaz, & Yurt, The causes of food waste in the supplier-retailer interface: Evidences from the UK and Spain., 2011) , but studies on the role of food retail managers in reducing food waste are lacking.

There are a multitude of studies done on consumers in terms of waste, but there are very few and those that exist are superficial. In one study it was identified that "management actions lead to the production of food waste" (Mena, Terry, Williams, & Ellram, 2014). Even if this aspect has been identified, the actions and practices discovered are part of a macro-organizational strategy.

This present study is dedicated to understanding the strategies used by the biggest food retailers in Romania to fight food waste at the level of stores. In the following sections it is presented the methodology used for the research, followed by the findings of the research. The paper ends with a series of recommendations and conclusions.

Methodology

This methodology describes the qualitative approach employed to analyze the non-financial reports of Romanian food retailers in order to uncover the food waste prevention solutions used by food retailers. The non-financial reports of major Romanian food retailers were selected based on the reputation and availability of the reports. The reports from the past two financial years were selected, the last two reports published, in order to provide a contemporary view of the waste prevention practices. In this research the following sustainability reports were analyzed: Kaufland, Auchan, Carrefour, Penny, Profi and LIDL from 2020 and 2021.

The scope of our study is to analyze if the mentioned companies adopted effective food waste prevention strategies and actions. Therefore, we came up with the following hypotheses:

H1. The Romanian companies provided sustainability reports for 2021 and 2021.

H2. The companies analyzed adopted appropriate measures to prevent and reduce food waste.

To select the companies, some criteria were used:

- The companies must be food retailers.
- The companies are located in Romania.
- The companies report according to GRI standards.
- The companies have public sustainability reports for 2020 and 2021.

As a result of the sampling process, we analyzed twelve sustainability reports or non-financial reports published by Kaufland Romania, LIDL Romania, Penny Market Romania, Profi Romania, Auchan Romania and Carrefour Romania.

The non-financial reports were obtained directly from the companies' official websites. A thematic analysis was used. This involved coding and categorizing the content of the reports to identify key themes related to food waste prevention. The following themes were identified: „actions taken by companies", „innovative solutions" and „consumer education".

Findings of the research

As a starting point of our research, we began by introducing the sustainability reports in the Atlas.ti software and counted the apparition of some keywords most related to food waste: "waste" and other forms of the word, "donations" and other forms of the word and "sustainability" and other forms of the word. The word count (Table 1) is extremely important for our research as it shows us the evolution of term appearance from 2020 to 2021. Moreover, it shows us which retailer uses some of the words more often than others, as a token of their dedication to the cause of sustainability.

Table 1. Word count selection from the sustainability reports

Report	Waste (and other forms)	Donations (and other forms)	Sustainability (and other forms)
Auchan 2020	27	19	99
Auchan 2021	38	23	212
Carrefour 2020	8	12	21
Carrefour 2021	12	17	15
Kaufland 2020	68	18	143
Kaufland 2021	96	12	148
LIDL 2020	19	23	166
LIDL 2021	25	14	212
Mega 2020	11	41	31
Penny 2020	23	6	669
Penny 2021	39	8	852

(Source: Own elaboration of the author)

Specific actions taken by companies

Auchan Romania takes a lot of actions in order to combat food waste. Their "Zero Waste" campaign saved 4.3 million products from waste during 2021. Another specific action taken by Auchan consists of optimizing orders so that the right quantities are distributed in Auchan stores. In 2021 they signed a long-term partnership with the Food Bank (Auchan Retail Romania, 2020). To provide healthy food, they invested 100.000 euro to promote healthy food and to change the recipes for their own production (less salt, less oil, less sugar). Overall, the whole value chain is taken into consideration, from the products department to the stores, special attention is paid to product management to avoid exceeding usage dates. Carrefour Romania has a dedication to collaborations with NGOs, through which they donate products with short expiry dates and accelerate sales of products with short expiry dates (Carrefour Romania, 2020). Kaufland Romania has a great concern for food waste. They invest material and financial resources to minimize the amount of waste along the food chain (from suppliers, to warehouses, stores and customers). Internally, they focus on "improving internal systems, monitoring and managing stocks, developing and implementing systems that monitor and manage resource production in a sustainable manner, promoting responsible consumption" (Kaufland Romania, 2022). They also use automatic orders, one or maximum two days stocks, they use shortest supply trip and continuous monitoring and checking of expiry dates. In February 2021, together with the "Your Chance Association" they launched the first social canteen dedicated to the supporting disadvantaged people and started donating social tickets. The tickets donated in 2020 had a total value of 500.000 lei and as a part of the social canteen action they donated 18 tons of food products to the Food Bank with a total value of 35.000 euro.

LIDL Romania takes measures in support of the fight against food waste. Some of the actions taken are a 30% price reduction which is applied to packaged bread, vegetables and fruits and refrigerated items approaching expiry date; close monitoring of losses vs. turnover of items; campaigns on the website and social media pages to let the consumers know how important it is not to waste.
Penny Market Romania uses effective stock management in stores and warehouses, in store discount schemes, collaborations with food banks and trying to identify alternatives to prevent food that is no longer fit for human consumption from going to landfill. Their strategy is based on the following pillars: "maximizing the redistribution of surplus food to food banks; creating in-store initiatives such as accelerated sales; optimizing the inventory process and using AI-based solutions such as automatically generated orders; suing surplus food as feed or energy source; developed a system to improve visibility of cause/area of food waste generation and not least food waste reporting" (Penny , 2020).
The quality and long-lasting of food is ensured by equipping the display cases with doors, using IFCO crates and appropriate transport logistics. In 2020, Profi wasted 4,753 tons of food. A specific action taken by this food retailer is training the employees on the implementation of the FIFO (first in, first out) system (Profi, 2020). They also implemented actions for accelerated sale and donation of products close to their expiry date.

Innovative solutions
Various innovative solutions are being used to combat food waste in the largest food retailers from Romania. In the Auchan 2020 report it is highlighted the "Zero Waste" programme. This is an organized system through which they sell products closer to their expiry date at lower prices than usual. The "zero-waste areas" which are stocked with products close to the expiry date, the retailer also encourages consumers to avoid food waste, while also saving money. Such actions are being noticed in all the major food retailers in Romania. Auchan reported in the 2021 sustainability report that they integrated "artificial intelligence algorithms into the project for all 47 stores in Romania" (Auchan Retail Romania, 2021).
Another solution from LIDL Romania is the "Ideas club initiative" through which the stock management department accepts proposals for solutions to reduce food waste (LIDL Romania, 2021). This initiative is valuable because it encourages brainstorming which can lead to new and great ideas for solving a pressing issue such as food waste.
In the reports of Penny Market Romania, we identified some of the best innovative solutions for fighting against food waste. First of all, the retailer stated in the 2020 report that they started working on creating a database that will help them get a better insight into where and how quantities of food can become waste. Second of all, in the 2021 report they introduced the partnership with "Bonapp.eco", which is a mobile app aiming to combat food waste by connecting consumers with retailers whose food is close to the expiry date.
Another great solution identified in the Penny Market 2021 report was to recover the food that was no longer fit for human consumption by transforming them in biogas (Penny, 2021). For this, the fruit and vegetables that could no longer be sold in stores were collected separately on site and then handed over to an authorized collector for delivery of biogas. The project was implemented in 5 stores where they delivered 104 tons of fruit and vegetables for disposal.

The reports of Kaufland Romania from 2020 and 2021 highlight the stock management strategies in order to reduce the food waste. Based on the sales history, the system used makes daily order proposal for all items in the stores. The system is also operated manually by operators who inform it about the "contingency factor" such as season, weather, holidays etc.

Consumer education

Auchan developed numerous communication tools that support awareness raising on food waste. They post frequently zero-waste recipes on the social media pages, encouraging cooking with leftovers, using the hashtag "#zerowaste". Carrefour Romania is also dedicated to educating consumers. In the 2020 report, they mentioned that together with the "Angels Smile Association" they made, for the third year in a row, an event under the umbrella of "Start Healthy Habits, stop waste!". In 2021, Carrefour hosted a live webinar entitled "Christmas 2.0. No waste but inspired" on their Facebook page (Carrefour Romania, 2021). At this event they invited a reputable Romanian chef who helped people to reinvent the leftovers in a fresh style. LIDL Romania has an initiative entitled "The Responsible Recipe" which aims to offer customers ideas and solutions for food storage, consumption and also reuse of foods (LIDL Romania, 2020). They are also extremely active on social media, especially Instagram, educating consumers on how to be more responsible. Penny Market Romania focuses on raising awareness by launching diverse campaigns and activities dedicated to reducing food waste. In 2021 they also published the "Anti-waste Code of Manners" especially aiming to educate consumers (Penny, 2021). This initiative is extremely interesting and should be implemented by all the food retailers to make an impact.

Conclusions

The research conducted revealed valuable information about the food waste prevention strategies used by the food retailers analysed. The food retailers analysed have displayed an increasing consciousness towards the gravity of food wastage as a societal and environmental challenge. It is important to highlight that their non-financial reports reflect a commitment to aligning with global sustainability standards and a dedication to responsible business practices. The reports highlight diverse solutions, from supply chain management to in-store initiatives and community partnerships. It is important to point out that this multipronged approach reflects the complexity of the food waste issue. While many retailers are making great progress, there is a need for industry-wide collaboration and a need for greater investment in innovative solutions. Moreover, even though there are consumer education campaigns, we consider that there is still room for improvement. In conclusion, the non-financial reports of Romanian food retailers present a clear narrative: the industry is moving forward towards a more sustainable future, driven by both consumer demand and genuine commitment to ethical responsibility. However, the journey ahead is complex, requiring the combined efforts of retailers, consumers, policymakers and the broader food industry in order to find solutions for the food waste problem.

Limitations

The study considered only a limited number of Romanian food retailers, therefore may not capture the full spectrum of practices across the entire industry. Another limitation regards

the data collection. Being based on secondary data, the study is dependent on the transparency and accuracy of these reports, which might not give a complete picture of the actual efforts undertaken. Moreover, self-reported data is often subjected to bias and might not represent the actual situation. Another limitation regards the fact that the study considered reports from a specific timeframe. Another limitation is that being qualitative analysis, the findings might lack generalizability and are not able to pinpoint specific statistical trends.

Research ethics statement

The author declares no conflict of interest associated with this research. Neither the author or the institution represented have received funding or support from the entities under study or any competing interests. The study relies on public available information and the data sourced from the non-financial reports of Romanian food retailers was treated with the utmost respect for its integrity. No data was intentionally altered, omitted or manipulated to present a misleading narrative or conclusion. Every effort was made to ensure that the results presented are accurate, unaltered and represent the genuine findings of the analysis of non-financial reports of Romanian food retailers.

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RECENT PERSPECTIVES CONCERNING EDUCATION AND TRAINING FUNDING IN ROMANIA. THE ROLE OF EUROPEAN STRUCTURAL AND INVESTMENT FUNDS

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Abstract: In the European Union (EU), member countries organise and develop education and lifelong training systems. While this responsibility rests with individual states, the EU supports members' actions by supplementing their capacity through political cooperation and various funding instruments. Therefore, this paper assesses the impact of structural funds' (ESIFs) absorption in the general European framework, with a particular focus on Romania. More precisely, we are interested in observing the implementation of operational programmes intended to finance education and training in different programming periods. For the theoretical component, this research stresses the role of several social actions granted from non-reimbursable sources that contribute to achieving the objectives of the Cohesion Policy, i.e., maximising human capital performance according to the development needs of the citizens. Hence, this study presents the absorption degree of the most relevant ESIF interventions in Romania, following the specifics of the national education system. In the empirical plan, based on a comparative analysis of the main socioeconomic strategies oriented towards stimulating human capital accumulation, we analyse some key medium- and long-term outcomes from capitalising on the potential of qualitative education. By efficiently implementing these actions, we hope Romania may accomplish (or at least get closer to) the regional targets of high labour force competitiveness, social integration at European standards, and sustainable economic growth.
Keywords: education policy, European Union, structural funds, human capital, labour competitiveness, Romania

Introduction

The EU remains a crucial actor and decision-maker in the field of education, mainly due to globalisation and the continuous evolution of member states' national policies. Moreover, regional policymakers consider the constant progress of education and training profoundly important. Facilitating access to qualitative educational programmes represents an engine of economic growth, social cohesion, research and innovation. It implicitly contributes to expanding European citizens' range of personal development perspectives (Cankaya et al., 2015). In the light of adopting an efficient educational system oriented towards the acquirement of key competencies and based on the assumption that the first years of study are essential because they greatly influence people's perspectives regarding career, employment and further integration into society, high-quality services in this area remain a vital component for improving educational outcomes, especially for vulnerable households (Bachtler & Gorzelak, 2007).

Therefore, this paper addresses the importance of human capital competitiveness in education and training. On the one hand, several studies argue that a critical analysis of

existing research on competitiveness is needed (Fredriksson, 2003; Balkyte & Tvaronavičiene, 2010). According to the latter authors, there is an increasing demand to promote research initiatives whose scope is to expand the new concept of "sustainable competitiveness" in the context of globalisation and current trends focusing on competitiveness-sustainability interaction. At the Union level, the structuring of the national educational system is the responsibility of the member states, the role of the EU being to supplement their capacity through political cooperation and funding instruments. Thus, if we analyse the effect of these long-term socioeconomic implications, we see that it is in the interest of all members to make full use of every potential action devoted to education and culture as vital drivers for job creation, social inclusion and durable growth. First, the literature raises the issue of poor allocation of resources to sectors like education and R&D, stressing the need to grant special arrangements for the efficient management of financial tools. Empirical findings also suggest that some EU states demonstrate relatively high expertise in implementing their educational system (e.g. Hungary, Estonia and Slovenia), while others still face significant challenges (Aristovnik, 2012; Alexiadou & Lange, 2013).

In addition, according to the latest statistics, in 2019, total government spending on education amounted to 624 billion EUR, about 4.7% of the GDP. The highest shares as a percentage of GDP were recorded in Sweden (7.30%) and Denmark (6.90%), and the lowest in Romania (3.10%) (European Commission, 2020). From this perspective, the approached topic is very complex and provocative, the multidisciplinary character of this field being a challenge that requires a lot of research and dedication to achieve the proposed regional objectives: optimising national education systems by integrating the development needs of human resources. Second, suppose we refer to the financing possibilities of the educational sector offered at the EU level. In that case, this paper contributes to contemporary research by analysing particular indicators that measure the efficiency of educational policies among member states, focusing on Romania's case. Social funds allocation aimed at promoting economic and social cohesion and reducing disparities between regions have doubled in relative terms in recent years. Consequently, the regional development policies represent the second main objective of the actual European strategies (Ertl, 2006; Gillies & Mifsud, 2016).

Motivation, methodology and data

This study covers a thematic area highlighting the role of sustainable development and investment in education and training, pursuing to illustrate the impact of accessing and implementing structural funds. The theoretical foundation of this paper is built based on recent ideas and concepts belonging to specialised authors in the domain of education and research, being treated and analysed, in particular, the financial strategies allocated to increase the performance of the educational system in Romania. As a result, several research methods were used to carry out this work. The first stage consisted of documenting, selecting and systematising bibliographic sources, which were mainly the basis for the conceptual elaboration of the study. The next step was represented by data analysis and evaluation of key indicators such as government spending on education, school dropout rates, and the degree of structural funds absorption dedicated to human capital accumulation.

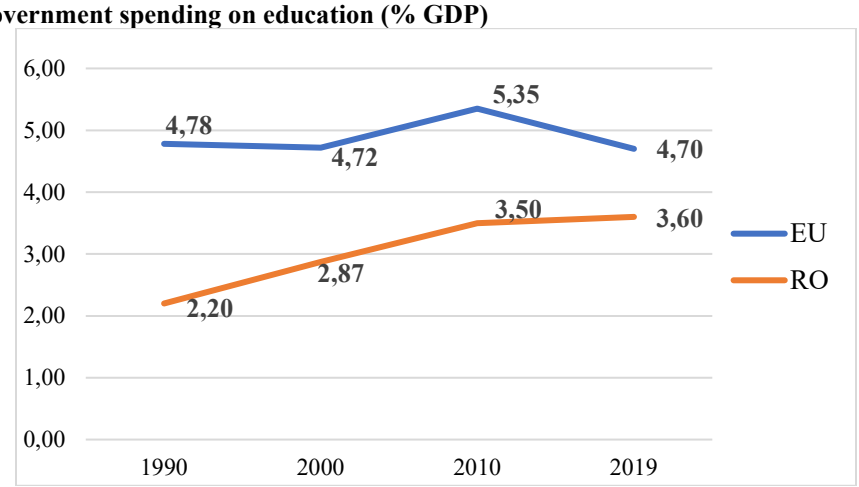
In this regard, we draw data from different sources and databases, including the European Commission (https://ec.europa.eu/eurostat/data/database), the World Bank (https://data.worldbank.org/), and the Ministry of European Projects and Investments of Romania-former Ministry of European Funds (https://mfe.gov.ro/programe/), among others.

Therefore, following the work of Walkenhorst (2008), we have developed the general framework of the EU's educational policy that has undergone significant transformations in terms of background and process in the past years. In short, there is a paradigmatic shift in policy objectives, revealing a new direction in the Union's education policy that reflects the necessity to stimulate human capital performance. To validate this hypothesis, we have studied the theories and models proposed by the European Commission regarding the distribution of early leavers from the training system at the member-state level. Statistics show that among early school leavers, a significant share is represented by those not employed or looking for a job; this proportion is higher among young men and almost twice among women (European Commission, 2020; Kuusipalo & Alastalo, 2020). In addition, in most countries, the share of young women not seeking a stable job was higher than the equivalent proportion of men (exceptions were recorded in Denmark, Cyprus, Finland, Belgium, Ireland and Lithuania).

Comparative analysis of the main indicators for assessing the educational system effectiveness

Regarding the evaluation of some key educational indicators, we consider it appropriate to offer a realistic overview of different financing modalities by implementing results-oriented national management policies. In this regard, one of the leading financial instruments is the annual government expenditure on education as a share of GDP (Figure 1).

Figure 1. Government spending on education (% GDP)



Source: Own calculations using https://data.worldbank.org/indicator/SE.XPD.TOTL.GD.ZS?locations=RO

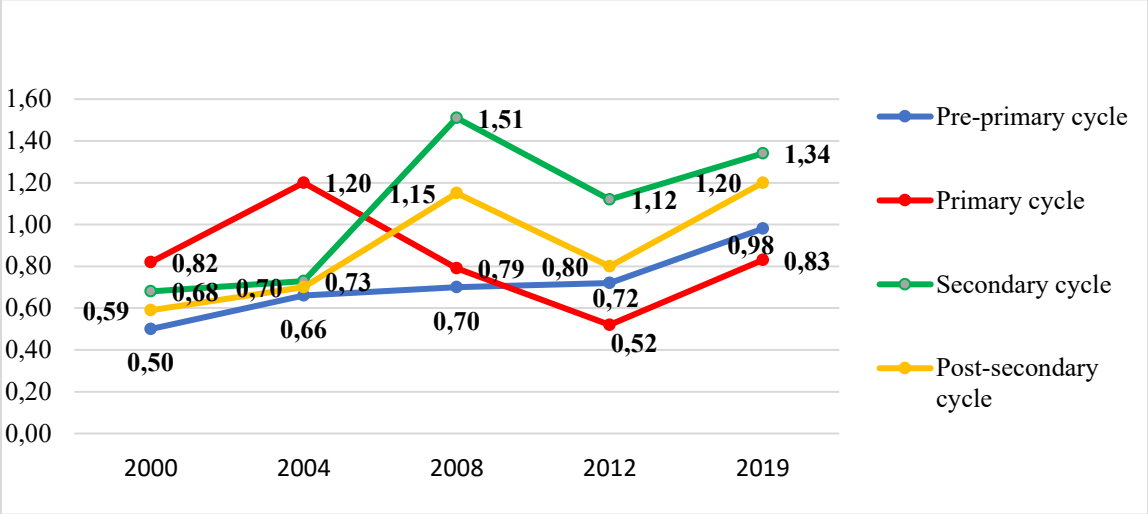
First, in 2019, the government spending on education in the EU amounted to 624 billion EUR, about 4.70% of GDP, marking a decrease compared to the baseline period. Of the total amount allocated, pre-primary and primary education levels accounted for 1.60% of GDP, while secondary education registered 1.70% (World Bank, version consulted on June

2020). Only 0.80% of GDP was reported for tertiary education in 2019. Moreover, the highest amounts were registered by Sweden (6.90%) and Denmark (6.40%), followed by Belgium (6.20%) and Latvia (5.80%). Education spending accounted for more than 15% of the total public expenditure for Estonia, Latvia, Iceland and Switzerland. The lowest shares were observed in Italy (8.20%), Greece (8.30%), France and Romania (9.10%).

In Romania, the share of government expenditure for the educational system increased between 1990 and 2019 from 2.20% to 3.20% (European Commission, 2021). However, the current situation is not satisfactory. Allocating only 3.20% of GDP to education, Romania ranks last at the European level, according to comparative data published by Eurostat.

On the other hand, as shown in Figure 2, public spending has increased for all study levels since the last decade. The highest amount is recorded by secondary education, given the increased number of students compared to the other levels. The pre-primary cycle had a relatively constant trajectory throughout 2000-2012, with an increase of 36.11% in the previous year. The primary cycle, marked by a significant decrease between 2004 and 2012, reached a second peak of 0.83% of GDP in 2019. Thus, the primary education level remains considerably underfunded in Romania compared to other high-performing education systems in Europe. From another point of view, the underfunding of the Romanian educational sector may trigger a rise in the number of unskilled workers in the total number of employees, which further leads to lower economic performance.

Figure 2. Government spending on education in Romania - by study levels (% GDP)

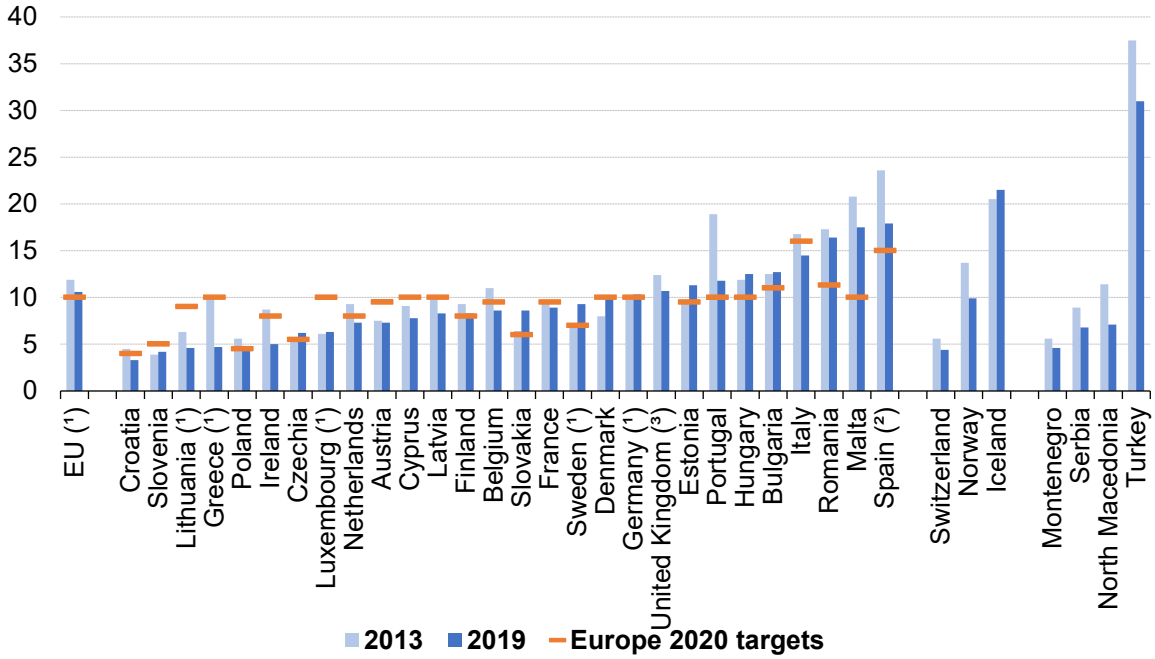


Source: Own calculations using https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do

Second, to illustrate another significant problem among pupils worldwide, we studied the consequences of early school dropout in several European countries (Figure 3). At first glance, we observe that there is a reduction in the share of the population dropping out of school between 2013 and 2019, given the implementation of various EU strategies in the area of education and training (European Commission, 2020). Among EU members, the proportion of early leavers in 2019 ranged from 3.30% in Croatia to 17.90% in Spain. The countries with the lowest number of school dropouts in the analysed sample are Croatia (3.20%), Slovenia (4.20%) and Lithuania (4.60%), while at the end of the ranking are states

such as Romania (16.40%), Malta (17.50%) and Spain (17.90%). A significant improvement was recorded by Portugal, from 18.90% in 2013 to 11.80% in 2019, but also by Spain and Greece, both reporting a decrease of 5% throughout the period. As part of the Europe 2020 Strategy, almost all EU states have adopted national targets for this indicator (European Commission, 2010). By 2019, the proportion of early leavers was already below the national target in 13 economies but remained above the national target for 14 of them. It is worth noting that the difference between the latest rate for early school leavers and the national 2020 target was particularly pronounced in Romania (where the 2019 rate was five percentage points higher than the target) and peaked in Malta, where the difference was above seven percentage points.

Figure 3. Early leavers from education and training (% of the population aged 10-24)



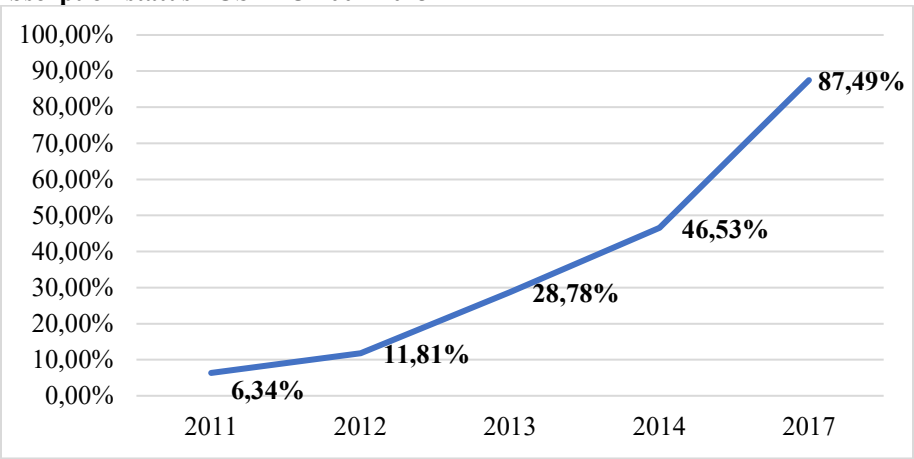
Source: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Early_leavers_from_education_and_training_statistics_ET2019

Implementation of programs oriented towards promoting human capital competitiveness

The financing opportunities addressing higher human capital competitiveness and adaptability at different socioeconomic risks implemented through EU's programs in Romania have made their impact felt starting with the 2007-2013 programming period.

On the one hand, the most essential instrument of the European Social Fund (ESF) intervention in Romania was represented by the Sectoral Operational Program for Human Resources Development (POSDRU) carried out from 2007 to 2013. The scope of this program was to enhance human capital performance by connecting lifelong learning with labour market requirements and ensuring participation in a modern, flexible and inclusive working environment for more than one million individuals (Romanian Ministry of European Funds, 2007).

Figure 4. Absorption status POSDRU 2007-2013

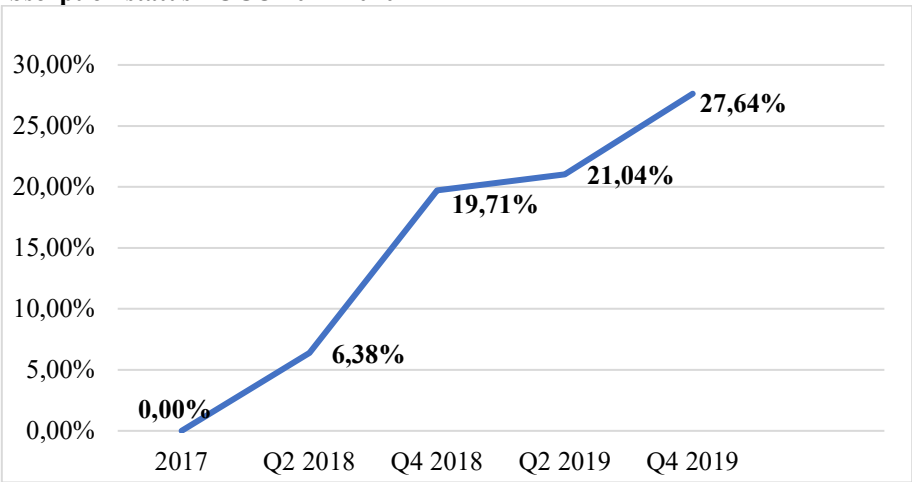


Source: Own calculations using https://www.fonduri-ue.ro/posdru-2007#prezentare

In this regard, Romania benefited from public spending of approximately 19 billion EUR during the analysed period, of which 3.20 billion EUR were allocated to POSDRU. Figure 4 shows that the evolution of funds' absorption rate remained below 50% between 2011 and 2014. However, in 2017, in the last notification sent to the European Commission regarding the final balance of the program, the effective absorption rate was estimated at 87.49%. According to the Romanian Ministry of European Funds (2017), the success rate, defined as the ratio between the total number of approved and submitted projects, was 31.78%. On the other hand, conceived and developed as a continuation of the action of human capital valorisation, the Human Capital Operational Program (POCU) 2014-2020 comes to support the community by broadening the scope of funding opportunities granted to applicants. The POCU strategy goal was to stimulate economic growth and social cohesion by capitalising on the workforce's potential and creating a smoother insertion into the labour market (Romanian Ministry of European Funds, 2017). The Romanian economy faces major workforce participation problems due to persistent technological progress and an ageing population, especially in certain economic branches or geographical areas (i.e. Southern and Eastern regions). Therefore, the challenges addressed by the program involved considerable investment in developing employees' skills, considering that their integration into a modern and compact technological framework is essential.

As regards the budget allocation for this initiative, it amounted to 4326.84 million EUR out of the 33 billion EUR granted to Romania in the 2014-2020 financial period (Romanian Ministry of European Funds, 2014), the largest proportion being destined to Priority Axis 6 ''Education and skills'' (27%), responsible for carrying out innovative activities, especially for children coming from rural areas or disadvantaged communities, but also for stimulating several priority sectors with growth potential. According to Figure 5, the POCU absorption rate has patterned an upward trend since mid-2018, registering a threshold of 6.38%, although a worrying rate of 0% marked its onset. This phenomenon was mainly caused by firms' failure to submit projects in the launched calls or to complete the contracting process of the approved financing applications. Compared to the starting point, the end of 2019 marked an absorption rate of only 27.64% despite the significant funding opportunities offered by this program.

Figure 1. Absorption status POCU 2014-2020



Source: Own calculations using http://mfe.gov.ro/stadiul-absorbtiei-fondurilor-ue/

Conclusions

In line with the objectives of the Europe 2020 Strategy for the educational sector, Romania has assumed through the National Reform Plan as national objectives until 2020 a rate of 11.30% of early school dropout, a rate of 26.70% of the population with tertiary education and a rate of 10% of participation in lifelong learning activities for the population aged 25-64 (Romanian Ministry of Foreign Affairs, 2020). However, Romania's performance in education remains unsatisfactory, with outcomes below European averages in compulsory study cycles, high rates of early school leavers, particularly among vulnerable groups, and low participation in tertiary education. The poor performance of the educational system includes many causes, such as modest financial resources allocated to this area, less investment in infrastructure, inappropriate teaching, learning, and assessment methods for a better adaptation to social life, etc. Consequently, the central distortions of the educational sector remain the significant deficiencies in correlating young graduates with the actual demands of the labour market and discontinuities in the implementation of internal reforms; this cumulation leads to deepening disparities at national and regional levels.

In conclusion, policymakers should orientate to optimising the entire training process through different initiatives and projects, like investing in advanced technologies to improve class learning activities. Also, another financial proposal available to both public and private applicants is represented by the ESIFs that continuously support citizens' personal and professional development according to prevailing European standards.

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EXPLORING FINANCIAL STABILITY: THE DICHOTOMY BETWEEN THE GREEK AND THE CZECH MODEL

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Abstract: The European Union, as a whole construct, inevitably has some notable structural differences in its various geographical areas. In this respect, we cannot overlook the fact that the financial stability of European citizens differs from one European country to another, with some European citizens having greater financial stability in their own households and others being more exposed to financial risks. Whatever our view of financial stability is, we must consider that it must be quantified, and in this way, we will see two completely opposite models in the European area: the Czech model and the Greek model, or rather one based on the minimal state and the other based on a welfare state. Our aim is, therefore, first to establish an aggregate indicator to quantify financial stability in the various countries of the European Union, and then to understand why there are such differences at European level, especially between Greece and the Czech Republic.
Keywords: financial stability, Welfare State, development, unemployment, European Union
JEL Classification: E60, H10, P16

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Introduction

Financial stability is certainly a "hot" topic in the European public opinion, especially if we take into account the social and economic developments due to the Coronavirus pandemic. This pandemic crisis, like the financial crisis of 2008, has shaken the economic and social status quo of the European Union to its foundations, often making European governments incapable of properly managing such unforeseen problems. Therefore, if a crisis can have disastrous effects on the macroeconomic level itself, we must also consider that on the microeconomic level an unforeseen economic situation can have consequences and repercussions that many citizens are unable to bear financially. For this reason, attempting to define financial stability from both a microeconomic and a macroeconomic approach is a necessary effort, in order to be able to analyse in depth this issue that often concerns European citizens and others.

We cannot deny that the European Union would not have responded promptly to the Coronavirus pandemic, especially if we think of the stipulation of the famous NRRP (The National Recovery and Resilience Plan). However, we must add that even if the European

Union tried to draw a unified response, it inevitably had to take into account the cultural and political differences of European countries. In this analysis, as we shall see, we will look at the two extremes of financial stability in the European Union: the Czech Republic and Greece, and then we will try to understand why such differences exist and what the historical causes of them have been. We will note that the economic structure of European countries has played and still plays a very important role, as some European countries have managed to limit the economic effects of the pandemic as much as possible, while others have suffered enormous repercussions. To discuss the pandemic, however, we first need to understand why the status quo pre-Coronavirus had such enormous differences.

Defining financial stability in contemporary times

First of all, in order to avoid possible problems that may arise from definitions of financial stability, we will have to provide a new definition of financial stability, taking into account the existing literature in this area. For example, Professor Indranarain Ramlall states that in order to define financial stability, we will have to take into account the following aspects (Ramlall 2018):

- Financial stability is closely linked to the output of the economic system. This link implies that economic output will in turn determine the development of the different sectors of the national economy.
- If disruptive conditions arise in the financial system, but the authorities are able to mitigate them in such a way that they do not affect the national economy, then we could say that financial stability has been secured.
- Risks to financial stability cannot be eliminated permanently, but they can be controlled.
- Considering the previous points, financial stability can be defined as an example of how problems in the financial system can affect the economy as a whole.
- Financial stability does not occur in isolation but encompasses the entire financial system.
- Financial stability is constantly being targeted by dilemmas over monetary policies.
- Financial stability is multidimensional.

Other authors, such as Garry J. Schinasi, argue that the premises for defining financial stability would be as follows (2004):

- Financial stability is a broad concept, encompassing different aspects of finance (and the financial system) - infrastructure, institutions and markets. Both private and public individuals participate in financial markets [...] Given the close links between all these components of the financial system, disruptions in any of the individual components can undermine overall stability, which requires a systemic perspective. At any point in time, stability or instability could be the result of either private action, official action, or both, simultaneously and/or iteratively.
- Financial stability is often seen as a vital part of monetary policy
- The notion of financial stability refers not only to the absence of actual financial crises, but also to the ability of the financial system to limit, contain and cope with the emergence of imbalances before they pose a threat to the economic system.
- Financial stability must be formulated in terms of potential and actual consequences for the economic system. Not every sudden change in the economic system should be seen a priori as a negative action, as the economy has the capacity to self-correct.
- Financial stability should be seen as a continuously developing process, marked by a high degree of dynamism.

The author proposes the following definition to summarize the full meaning of financial stability: 'A financial system is in a zone of stability whenever it is able to facilitate (rather than hinder) the performance of an economy and to dissipate financial imbalances that arise endogenously or as a result of significant and unanticipated adverse events' (Schinasi 2004).

Thus, we can retain two main theoretical directions on defining financial stability: that of Ramlall and that of Schinasi. Both can be compared in the following table:

Table 1. Comparison between Ramlall and Schinasi's definition of financial stability

Dimension	Ramlall	Schinasi
Economic	Financial stability can be defined as an example of how problems in the financial system can affect the economy as a whole.	Financial stability must be formulated in terms of potential and actual consequences for the economic system. Not every sudden change in the economic system should be seen a priori as a negative action, as the economy has the capacity to self-correct.
Structural	Financial stability is multidimensional. Risks to financial stability cannot be eliminated permanently, but they can be controlled.	Financial stability is a broad concept, encompassing different aspects of finance (and the financial system) - infrastructure, institutions and markets. Financial stability should be seen as a continuously developing process, marked by a high degree of dynamism.
Political	If disruptive conditions arise in the financial system, but the authorities are able to mitigate them in such a way that they do not affect the national economy, then we could say that financial stability has been secured. Financial stability is constantly being targeted by dilemmas over monetary policies.	Financial stability is often seen as a vital part of monetary policy.

(Sources: Ramlall, 2018; Schinasi, 2004)

Other authors who have discussed the issue of financial stability are Smythe (Smythe, 1968), according to whom the financial stability of a household mainly comprises the relationship between income, expenditures, and the ability to make provisions for handling sudden changes in the household's financial situation, or Lusardi and Mitchell (Lusardi & Mitchell, 2011) that considered financial stability as households' confidence in their ability to handle an unexpected expense of USD 2,000 within one month. On the other hand, for describing financial stability, we must also consider the definition of financial instability, as Scherf relates (Scherf, 2012): "Financial instability in the form of crisis is a very rare 'black swan'-type of event, but when it occurs it has a devastating effect on financial systems and economies at large. Because of this very rare and usually delayed occurrence of crises, financial stability policy also is subject to a very own political economy dynamic. As was shown in the prelude for the financial crisis of 2007-2009, financial instability often derives from murky policy choices over an extended time of exuberance that are and blurred in hindsight". A more comprehensive definition of financial instability, however, would be the following: "Financial instability refers to conditions in financial markets that harm, or threaten to harm, an economy's performance through their impact on the working of the financial system. It can arise from shocks that originate within the financial system

being transmitted through that system, or from the transmission of shocks that originate elsewhere by way of the financial system. Such instability harms the working of the economy in various ways. It can impair the financial condition of non-financial units such as households, enterprises, and governments to the degree that the flow of finance to them becomes restricted. It can also disrupt the operations of particular financial institutions and markets so that they are less able to continue financing the rest of the economy" (Chant, et al., 2003).
Whichever approach we prefer, we will also have to provide our own definition of financial stability, which we describe as follows:
"The financial stability of individuals is that ability to achieve an economic status, in their own household, which allows them, firstly, the access to minimum living conditions and, secondly, to financially survive at unforeseen economic circumstances".

Quantifying Financial Stability
The next step in this regard will be to draw up ourselves a quantitative analysis of the financial stability of the citizens of the European Union today, in order to determine exactly which European country has more "stability" and which less. Therefore, in the following lines we will stipulate an aggregate indicator for calculating financial stability, composed of different elements (the variables are provided by Eurostat).

Financial stability = Inability to face unexpected financial expenses + Unemployment rate + Persons at risk of poverty or social exclusion rate

Once we have these data for the period 2019-2022 (we have chosen 2019 because it is the year before the pandemic) we will have to weight each variable that will constitute the aggregate indicator, and in doing so we will have:

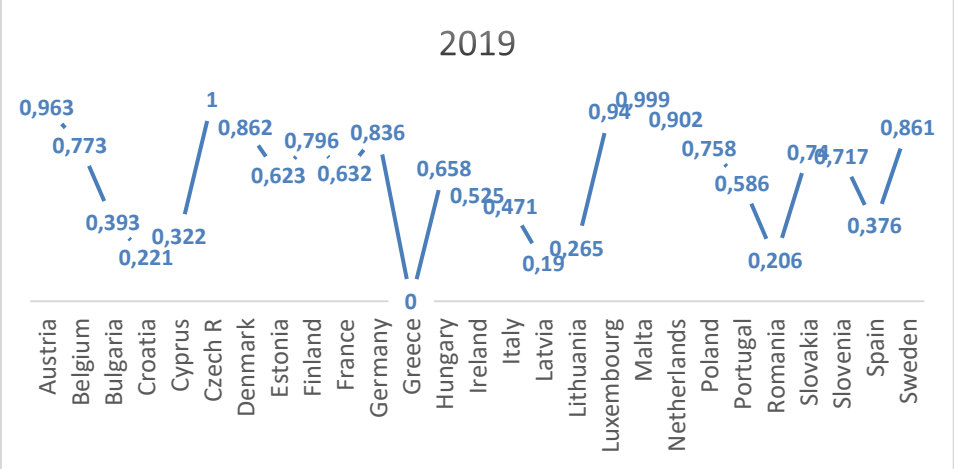
*Financial stability = 0,4*Inability to face unexpected financial expenses + 0,35*Unemployment rate + 0,25*Persons at risk of poverty or social exclusion rate*

We make such a weighting because we consider the inability to face unexpected financial expenses the most appropriate variable to describe the financial stability of citizens, with the unemployment being almost equally important (because job opportunities create income and income is the basis of financial stability). We have also devoted a quarter of the indicator to people at risk of poverty or social exclusion, to emphasise that the social structure of the state is also important in describing financial stability. Once we create the aggregate indicator, we standardize it, using the formula:

$$Y = X - Min/(Max - Min)$$

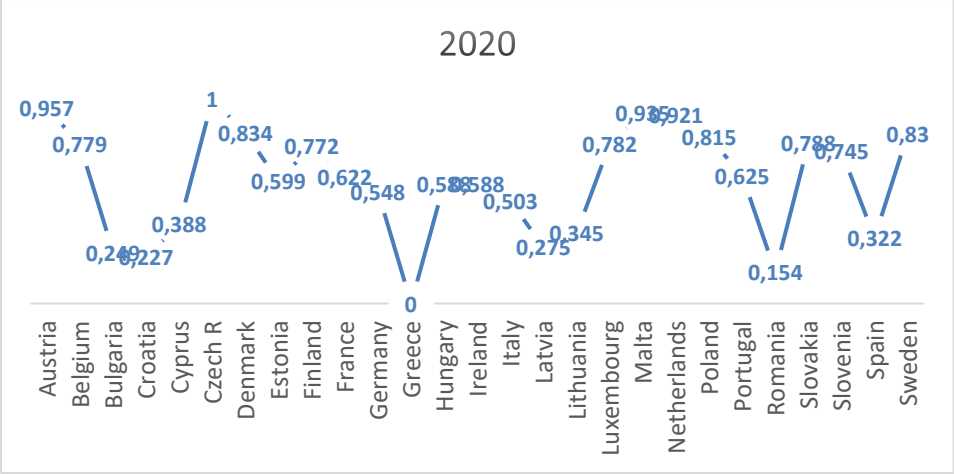
Using such a standardisation formula (also known as empirical standardisation), the country with the highest financial stability score will have a value of 1, while the country with the lowest financial stability score will have a value around 0 (this after reversing the results using 1-Y, since a high initial score of our aggregate indicator would de facto reveal financial instability).
For the period 2019-2022 we will get the following results:

Figure 1. Financial stability score for the year 2019



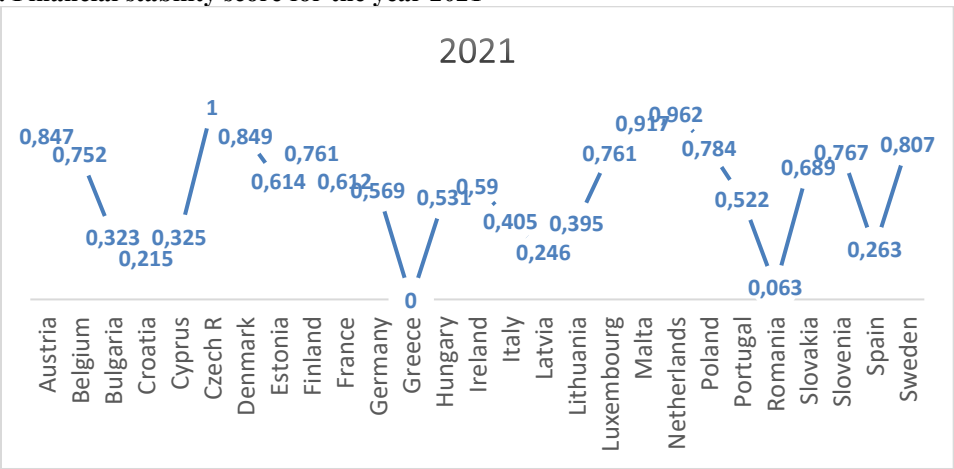
(Source: own elaboration using Eurostat data)

Figure 2. Financial stability score for the year 2020



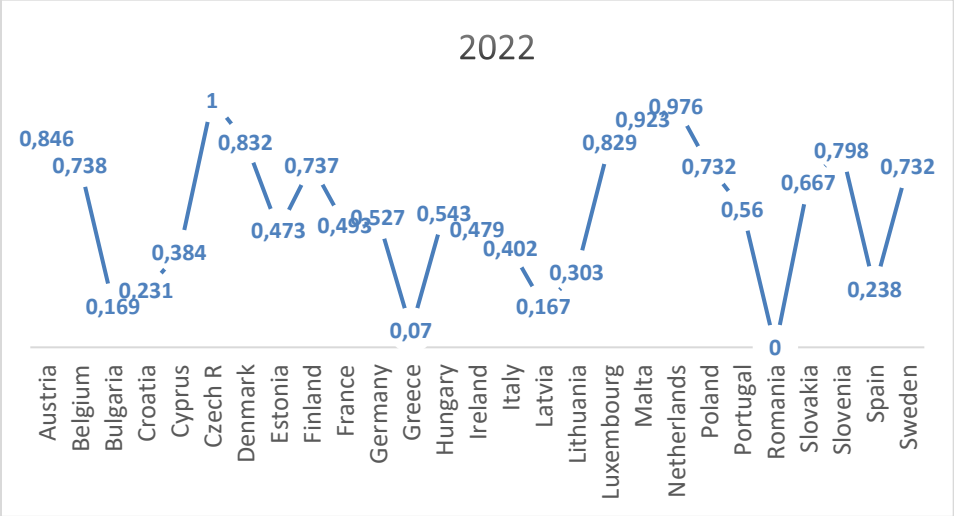
(Source: own elaboration using Eurostat data)

Figure 3. Financial stability score for the year 2021



(Source: own elaboration using Eurostat data)

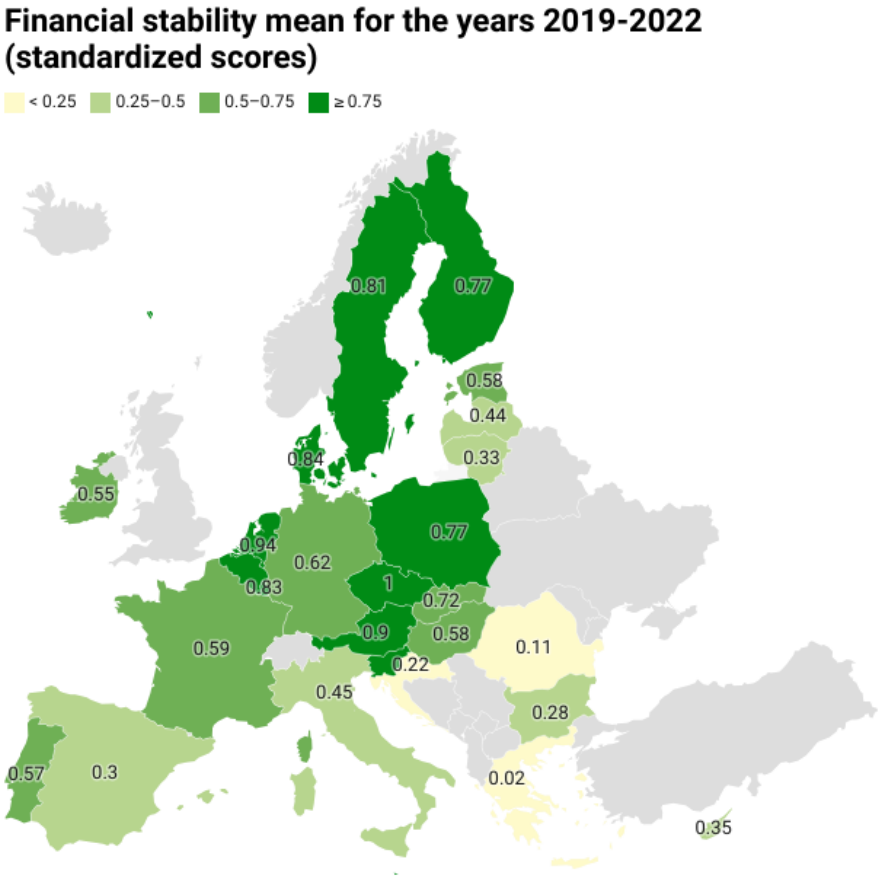
Figure 4. Financial stability score for the year 2022



(Source: own elaboration using Eurostat data)

Considering that these are the standardised results for each of the 4 years analysed of each European country, if we average the results for each country, we have the following chart:

Figure 5. Chart representing the financial stability mean for the period 2019-2022



(Source: own elaboration)

We can therefore observe an important dichotomy between the Czech Republic and Greece, where we can note that the Czech Republic ranked first in this ranking in each of the 4 years analysed (for this reason it appears on the map with score 1), while Greece ranked last in 2019, 2020 and 2021 (in 2022 Romania was the country with the most negative score on financial stability). The map has also been divided into 4 quartiles:
Between 0 and 0.25: countries where citizens are at serious risk of financial instability
Between 0.25 and 0.50: countries where citizens are at risk of financial instability
Between 0.50 and 0.75: countries with a good degree of financial stability
Between 0.75 and 1: countries with a very good degree of financial stability
So, considering this huge dichotomy between Greece and the Czech Republic, we will try to understand the main reasons why two countries, which are part of the same European family, show such huge differences. In order to do so, the countries will be compared on three different levels of analysis: pre-accession to the European Union, adaptation to the European Union and the response to the economic crisis of 2008-2009.

Greece and Czech Republic: two different paths in shaping their own economic system

Greece and the Czech Republic have had different paths towards joining the European Union and integrating into such an economic system, but nevertheless, we must remember that there are certain commonalities, such as a dictatorial period, a democratic stabilisation process and, finally, the European integration. Starting, therefore, with the pre-accession period to the European Union, we will note how the Greek state is a state that avoided several decades of communist dictatorship thanks to the will of Winston Churchill and also of Joseph Stalin at the Yalta Conference in 1945, to which we must also add the importance that the Marshall and Truman plans had on the development of Greek history. However, this state has not been spared its problems, on the contrary, it has accumulated them, leading to its implosion during the financial crisis of 2008-2009. A quick review of Greek history after the Second World War shows how the country's politics were marked by great political instability of post-war democratic governments, culminating in the seizure of power by a military junta led by Georgios Papadopoulos in 1967, which was to rule the country until 1974. The period we are interested in, however, is post-1974.
On the other hand, we will note how the Czech Republic (Czechoslovakia before 1992) found itself on the eastern side of the Iron Curtain after the Second World War. The years of communism under Soviet influence, however, certainly shaped the character of the Czech population, which after the collapse of the communist regime in Czechoslovakia showed, by and large, a tendency towards liberalism, as early as the years when Václav Havel was elected President of the country. Moreover, in those years, when Václav Havel was publicly campaigning for social freedom for Czechoslovak citizens, another very interesting figure was campaigning for their economic freedom instead. We are talking here about Václav Klaus, who also became President of the Czech Republic after Havel. Important to note about Klaus, as Josef Šíma and Tomáš Nikodym report, is: 'By 1990, Klaus had become not only a symbol of radical economic reform and privatisation, but also the most important spokesman for liberalism. It was he who vehemently introduced free market theorists such as Hayek and Milton Friedman to the general public and made their

names part of the history of Czech economics. Klaus attracted many students to liberal ideas in both economics and higher social sciences. He continued to write for popular and academic audiences, established and maintained formal links with Czech universities, and had quite an impact on the international liberal scene [...] Czech economic reformers were later to benefit from another set of activities that sparked interest in liberalism as an alternative to socialism, namely "think thanks" [...] It was these newly established think thanks that paved the way for providing the missing classical works. The Liberal Institute (Liberální Institut), the first free market think tank in the country, created some of the first translations of liberal books" (Šíma & Nikodym, 2015). From what has been presented so far, we can see a prominent ideologization of economic freedom among the Czech political class after 1990, an ideologization that has also played a key role in the country's subsequent developments (in 2000, the Czech Republic was already among the most "liberal" countries in Europe, thanks to the wave of privatisation and the emphasis on economic freedom).

Aiming at adaptation to the European Union, however, we note how: 'Accession to the European Economic Community became Greece's main foreign policy objective during the democratic transition from the military junta of 1967-1974, and accession came in 1981, helping to consolidate a still fragile democracy. Negotiations were short-lived because members of the European Economic Community had accepted the country's accession in advance, expecting Greece to implement the acquis Communautaire after accession rather than before, as was later demanded of the newcomers [...] From 1981 to the mid-1990s, the Greek economy experienced a prolonged period of stagnation and slow growth. Real gross domestic product grew by an average of 0.7% per year, only a third of the EU average. Lack of transparency, labour market rigidities and cumbersome bureaucracy hindered private foreign and domestic investment [...]. Lacking foreign investment and expertise, Greek firms have found it difficult to access the capital and management skills needed to improve their competitiveness in the export market. This resulted in the share of exports in GDP falling from 24% to 18% in the 1980s" (Andersen, 2020).

What we can see in the Greek case, compared to previous cases, is a lack of consolidated democracy at the time of accession to the European Economic Community, and the fact that European bureaucrats allowed a pre-accession of Greece (without the Communautaire acquis therefore) was certainly a wrong decision, which allowed the corruption-prone and non-transparent mentality present in the Greek welfare state to persist and, moreover, to spread like a rhizome. Implosion, in this sense, was only a matter of time, and in 2008 it was to shake Greek society and economy. By that crucial moment, however, it must be said that Greece's accession to the European Union had also had tangible positive effects, particularly visible in the period 2000-2007. We note how "Gross Domestic Product growth reached an annual average of 4% between 2000 and 2007, the highest in the euro area [...]. Low mortgage rates, credit securitisation, financial liberalisation and easy credit have contributed to a tripling of real estate investment between 1999 and 2007. Supported by capital inflows from other European countries, the share of the housing market in Gross Domestic Product increased from 6% to 12.5%, and the share of the housing market in the availability of cheap credit led households to stimulate consumption, using credit cards and consumer credit" (Neubäumer, 2015). This shows how Greece's accession to the European Community has ensured that some measures have been put in place to favour economic freedom in relation to public policies.

The Czech Republic, on the other hand, was among the countries that managed to take advantage of the European Union's "Great Eastern Enlargement" in 2004, joining the European structures without too much fuss. Accession to the European Union, and in this sense access to the European single market, has meant that economic freedom in the Czech Republic has increased, giving Czechs new economic opportunities and the freedom to engage in trade relations that had previously been difficult. To be more precise, we will note the following: "In the first years after joining the European Union, the Czech economy experienced unprecedented growth. This growth was accompanied by an increase in the labour force and the strengthening of the Czech koruna [...] The Czech Republic followed two major trends in the internal market in the years after accession: the first was support for liberalisation within the internal market and the second concerned opposition to new regulatory initiatives under the EU standards, especially in the area of taxation or employment policy. Czech politicians have consistently vetoed EU initiatives for greater tax harmonisation (symbolically enough, the first Czech veto was applied in the debate on an increase in the consumption tax on beer)" (Šlosarčík, 2011). However, the country has not been spared from financial problems and for this reason, Václav Klaus' liberal party, the ODS, undertook some austerity measures once in power in 2006. Of course, such measures provoked the anger of the trade unions, but tensions soon subsided, considering that these measures had been initiated by the Social Democrats themselves, the Liberal predecessors in government (Cisar, 2017).

The Czech people's inclination towards economic freedom also increased after accession to the European Union, and in the parliamentary elections of 2017 and 2021 we could see how the social democrats and socialists became practically irrelevant on the Czech political scene (Kudrnac & Petrusek, 2022). So, the political scene of the last few years in the Czech Republic has been shaped either by populists such as Andrej Babiš, conservatives or even "pirates" (promoting a certain social liberalism).

Finally, on the response to the 2008-2009 economic crisis, the Greek case shows the following premises: "The share of public expenditure in GDP increased by more than seven percentage points between 2000 and 2009. The high spending that supported economic growth took place while Athens was preparing for the 2004 Olympic Games, and while the European Union's Structural Funds and the Cohesion Fund financed various projects. The revenue ratio fell from 42% of GDP to 39%, due to widespread tax evasion and the inability to collect outstanding tax payments from large corporations. Researchers estimated that Greece's shadow revenues were somewhere between 20% and 30% of GDP. The budget deficit rose to 15% of gross domestic product in 2009 from just 4% in 2000" (Andersen, 2020). We note, therefore, how the Greek economy, in addition to having some economic freedom, had also been severely compromised by corruption and tax evasion, which would contribute to the post-2008 implosion. In this regard, we note how the International Monetary Fund and eurozone states approved the first economic aid package for Greece in May 2010, consisting of €110 billion (Andersen, 2020).

At the same time, as a "reward", the Greek government had to adopt some unpopular economic measures in order to save what was left of the Greek economy. This kind of economic measures, reforming the Greek welfare state and implementing economic freedom in public policies, had been necessary even before the 2008-2009 crisis, and its late implementation proved not to be very effective due to the disastrous situation the country was in in the post-crisis years. These radical changes in the Greek welfare state

resulted in an unemployment rate of 25% (well above the International Monetary Fund's prediction of 15%) and a youth unemployment rate that reached 50% for men and 60% for women, and those who were employed would lose part of their salary anyway, either due to budget cuts or the elimination of the '13th wage' (Andersen, 2020).

This "defiance" of the Greek welfare state inevitably did not go unnoticed among Greek citizens, the main targets of austerity. It provoked a historic victory in the 2015 parliamentary elections for the radical socialist Syriza party, which was to nominate Alexis Tsipras as prime minister. Tsipras wins the support of the Greeks by promising to renegotiate the austerity measures imposed by the European Union and the International Monetary Fund, but under the Tsipras government the austerity imposed on Greece remains as severe as ever, even though the Prime Minister had tried to counterbalance it with new social measures to fight poverty, measures which inevitably led to an increase in taxation. The expectations of Greek citizens had indeed not been met, causing a huge failure of the Syriza party in the 2019 parliamentary elections and the formation of a centre-right government led by Kyriakos Mitsotakis. Greece's current government, therefore the one led by Kyriakos Mitsotakis, has placed great emphasis on economic freedom in public policy-making, implementing privatisations in various important economic sectors. These measures have been more than necessary, even if it meant implementing a plan that provided for major privatisations of several of the country's ports or even Hellinikon airport (Dimitriadou, 2019). The need for such measures stems both from economic reasons and from the legitimacy Kyriakos Mitsotakis needs among the Greek people.

In conclusion, the following can be taken from the Greek case:

1. Difficulties related to the transition period and an "abrupt" accession to the European Economic Community (without the obligation of the acquis Communautaire therefore) certainly played a tangible role in maintaining, perpetuating and underestimating corruption in the creation of the Greek welfare state.
2. Corruption, disregard for the adverse effects of the market economy and the glorification of the Welfare State were fundamental to the post-2009 Greek implosion.
3. Economic freedom has made its way into Greek public policy with some difficulty. It has had times when it was adopted spontaneously but also times when it was imposed by force, necessary for the restoration of a functioning economy. Today, it can shape the future of this country, even if it requires some radical measures.

In the Czech case, on the other hand, we note how the impact of the 2008-2011 crisis was relatively limited. The main reason is the conservative approach of Czech banks in the run-up to the crisis. Therefore, no government bailout package for banks was necessary. In addition, the vast majority of Czech private (household) debt was denominated in Czech koruna, which made household financial situations less vulnerable to currency fluctuations, preventing problems that Hungary, for example, has faced since 2008 (Šlosarčík, 2011)". Moreover, the financial crisis of 2008 caused increased scepticism among both Czech citizens and the Czech political class towards the Eurozone (and the adoption of the Euro as such). We can see from the above how the Czech state managed to "immunise" itself well from the 2008 crisis, and increased its desire for monetary sovereignty. The last years of Czech politics, however, have been marked by the figure of Andrej Babiš, a billionaire of Slovak origin, often defined as an extravagant populist, who became prime minister following the 2017 parliamentary elections. Calling on his entrepreneurial success in agriculture, Babiš promised Czech citizens a government based on competence, capable of

"de-bureaucratising" the country and, above all, willing to fight corruption. However, Babiš has not been spared accusations that he has used his political power and media trusts to cover up some of the corruption he is allegedly involved in (Hartnett, 2022). However, the Czech Republic has maintained its appreciation of the importance of economic freedom in the creation of public policy, even under a populist with Eurosceptic tendencies like Andrej Babiš. Conclusions about the Czech Republic can be drawn on the premise that, in principle, what gives importance to economic freedom in this country is the Czech people themselves, who are not necessarily inclined towards conservative values (only 29% of Czechs consider themselves Christians), but towards the values of economic freedom for sure.

What differentiates Greece from the Czech Republic, then, is not only the history of these two countries, but also the peoples and political classes themselves. On the one hand, we have a country that has come to know the importance of democracy after a short period of military rule, but not fully understanding how fundamental opposition to corruption is to democratic consolidation. On the other hand, we find a state which, after years of harsh communist dictatorship, has embraced the values of freedom, both social and economic, and has decided to build its future on them. The results, as we have seen in the previous lines, have provoked two completely different realities.

Conclusions

The whole process of this article has presented us with two completely opposite realities, even though they are both under the aegis of the European Union. However, as we have seen, even though Greece and the Czech Republic had some historical points in common, the response of the authorities to the management of the state-individual relationship was diverse, which is exactly the basis of the scenario where the Czech Republic (according to the indicator stipulated in this article) is the country where the citizens would have the highest degree of financial stability, while Greece (like the other Mediterranean countries, on the other hand) is a country where its own citizens would have major difficulties in economic "survival" in the face of unforeseen financial situations.

Of course, variables that are not necessarily economic in nature, such as human capital or opportunities arising from the geographical location of these countries, also play a key role in drawing such conclusions. However, we believe that the aggregate indicator stipulated above is not necessarily an infallible indicator, but can rather be seen as a starting point for further analysis with the central aim of identifying the best means of increasing the financial stability of European (and other) citizens.

In conclusion, we will state that the comparative analysis undertaken in the present research is a useful one, firstly because it demonstrates the wide cultural, social and economic differences present within the European Union and, secondly, because it allows us to draw some directions for further research that take these differences into account. We believe that the subject of financial stability is a highly topical one in contemporary times, which is constantly evolving and often difficult for ordinary citizens to define, which allows us to attach particular importance to studying the development of such a phenomenon.

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QUALITY ASSESSMENT IN HIGHER EDUCATION USING A COMPOSITE INDEX. EMPIRICAL EVIDENCE FOR CENTRAL AND EASTERN EU COUNTRIES

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Abstract: Post-secondary education requires a complex organisational structure of higher education institutions, staff and infrastructure. The construction of a comprehensive quality index is necessary to assess the quality of higher education and to improve the higher education system in a country. It is imperative that administrators remain informed about the current state of the system through regular and realistic assessments. Therefore, this study has constructed a composite index to assess the quality of higher education. The quality of higher education in Central and Eastern Europe is analysed using 13 indicators from 11 countries with higher education institutions. Extraction of factor coefficient score matrices was performed by downgrading these indicators using principal component analysis (PCA). Using PCA, two principal components were extracted for analysis and the PCA weighting method was used to determine the importance of each indicator by dual-indicator. Each institution's research activity and the internationalization of higher education were included in this method to determine the efforts made by these institutions. Through the study we observed the differences between the eleven countries in terms of higher education and the importance of each measurement dimension used. These findings can be used to compare the current situation in each country and to find directions for development.
Keywords: higher education; quality evaluation; composite index

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Introduction

Assessing the quality of the higher education system is important for all developed and developing countries. The higher education system is composed of the organizational structure of educational institutions, teachers and non-teachers staff to educate post-secondary students. It has value as a progression of primary and secondary education, not only as an industry in itself, but also as an important source of educated and highly educated citizens in the country. This is the reason why developed countries are keen to improve the quality of the higher education system, which requires a clear and accurate evaluation of the system in order to find progress in its development, especially after Covid-19 has brought many changes in this sector. At the 70th session of the United Nations General Assembly in September 2015, the 2030 Agenda for Sustainable Development also

highlighted the importance of lifelong learning (UNESCO, 2016). Unfortunately, strong evidence suggests that countries can achieve excellent returns by investing limited financial resources in primary and secondary education rather than in universities or technical training (McCowan, 2016), so countries prefer to invest in these instead.

A developed higher education system has value as an industry and also as a source of competent and skilled citizens for the socio-economic development of a nation. It also plays a crucial part in terms of overall sustainable development (Franco et al., 2019). Measuring the quality of higher education systems is more complex because primary and secondary education can visually reflect the quality of education through the level of students. In contrast, higher education carries the complex parts of research missions, academic integrity and transnational exchange. Thus, a qualitative higher education evaluation system is difficult, but indispensable.

The aim of the research is to assess the quality of higher education in Central and Eastern European countries. The literature review on the evaluation of higher education has included some factors that are inevitably taken into account, they directly reflect the quality of higher education and are undoubtedly elements of the quality of the higher education system in this study, such as the H-index and the financial support provided. After compiling the literature research, a number of these indicators were selected to measure the quality of the higher education through two important dimensions of the tertiary education system, indicators which included financial aid received as a percentage of total public expenditure, international students and the proportion of tertiary enrolment rates. These indicators were analyzed in the empirical study for the 11 countries selected from Central and Eastern Europe, Bulgaria, Czech Republic, Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovenia and Slovakia. In the following sections, the related literature will be reviewed, then the dimensions of measuring the quality of higher education will be presented and then the research methodology will be discussed. Subsequently, the results of the study will be reported. Finally, we will present the limitations and conclusions of the study.

Literature review

Higher education evaluation work has multiplied over the last hundred years and is now veritably active (Wiethe-Körprich and Bley, 2017). In recent decades, the number of higher education institutions has increased significantly and higher education evaluation has been increasingly studied (Van Mol et al., 2021). Currently, the higher education system in each country is integrated into the public system, generally funded by the state and serving public needs (Reymert et al., 2021). Despite the increasing internationalization of academic careers, they are still formed in national contexts. In addition, national research systems differ in terms of research priorities and evaluation systems. Universities also have different levels of control over resources (Sivertsen, 2017). Assessment activities began many years ago and can be traced (Guba and Lincoln, 1981). In the mid-1960s, evaluation began to develop as a scientific field in the United Kingdom and the United States (Worthen and Sanders, 1987). Appraisal activities are widely applied and are generally defined as the recognition, clarification and application of essential criteria to define the value of an object in terms of these criteria (Fitzpatrick et al., 2004). Using the same set of criteria or models for different regional higher education systems makes it easier to identify

differences and look for relative strengths and weaknesses. Through evaluation activities, we can explore directions for the development of higher education.

As higher education continues to change and assessment activities evolve, several important methods and metrics are commonly used in the field, including feedback, formative assessment, and peer assessment (Leihy and Salazar, 2017). These methods have universally good and can be applied to assess the quality of teaching and learning in higher education in various contexts, as well as in primary and secondary education.

Rational use of data and evaluation methods can better ensure the independence of evaluation methods, increase the reliability of research and reduce randomness.

As higher education evaluation activities have evolved in the data era, academics have gradually identified more indicators that can assess the quality of higher education (Gupta et al., 2015), such as graduate employment rate, number of research papers and gender ratio. It is therefore important to consider these classic elements, which remain important measures of higher education quality, when studying new changes that may impact higher education. Green (2016) reviewed existing literature using SEM to study higher education and found that this model is often used to test alternative models, reliability, validity, theoretical support models, and data screening in higher education research models. Big data and data mining techniques have also been applied to evaluations in higher education. Thanassoulis et al. (2017) examined the role of student evaluation in higher education assessment, using a combination of analytic hierarchy process (AHP) and data envelopment analysis (DEA) to help faculty understand the direction of improvement in teaching and learning activities.

In addition, many researchers have developed studies of higher education systems using structural equation modeling (SEM), which can be used to test alternative models, reliability, validity, theoretical support models, and data filtering. Data science research methods, including time-varying cluster sampling algorithms, data mining and relational decision-making algorithms, big data, have all been applied to higher education-related data research and have been used to help develop methodologies and promote better quality teaching and learning methods (Feng, 2021; Liu and Song, 2021). When evaluating higher education, researchers often return to the first hypothesis about the impact of certain factors on the quality of higher education or the relationship between certain academic output data and higher education. These data are then examined by analytical methods such as weight-TOPSIS entropy and logistic modeling (Zhang et al., 2021).

After an evaluation, the quality of the research method or design must be tested, and this process focuses on the reliability and validity of the evaluation. In recent years, big data technologies have often been applied to monitoring and analyzing the quality of higher education. Effective data analysis methods must be used to assess the relevance of indicators, applicability of methods, and representativeness of subject assessment within the study to understand the quality of the evaluation. Xu et al. (2022) assessed the sustainability level of Japanese higher education using factor analysis and principal component analysis. Subsequently, structural validity tests were used to test the rationality of the model, quantitatively assessing the effectiveness of the policy and its impact on reality. Xu et al. (2022) assessed the level of sustainability of Japanese higher education using factor analysis and principal component analysis. Subsequently, structural validity tests were used to test the rationality of the model, quantitatively assessing the effectiveness of the policy and its impact on reality.

Dimensions of measuring the quality of higher education system

Over time it has been observed that summative assessments and quantitative indicators have become preferred elements of quality control and have led to a focus on easily quantifiable objectives of higher education, despite the disadvantages associated with such an approach. (De Weert, 1990). Two dimensions were considered through which higher education could be analyzed: scientific research dimension; institutional dimension.

The scientific research dimension which analyses the interest of universities, through the work carried out by their teaching staff, students and researchers, in terms of innovation and contribution to the development of knowledge in the fields in which they work. The institutional dimension is concerned with the efforts made by universities to attract as many students as possible and to make the transition from high school to university easier.

Scientific research dimension

For this dimension there are differences between countries, indicating different perspectives on countries' priorities for scientific research.

The assessment of scientific output is carried out from two perspectives: some countries focus on the country's scientific position in the world, while others use bibliometric indicators.

The variables analyzed are:

- Number of papers published
- Number of citable papers
- Number of papers cited
- Number of self-cited papers
- H index
- Academic reputation
- Employer reputation

The complexity of the higher education system makes it more challenging to focus on assessment activities, especially when we need to explore their quality. While we can accurately judge and compare a university by its student performance and research outcomes, when looking at the entire higher education system, we have to focus on academic integrity and financial commitment. The literature’s frequency of citations can reflect the Research Value of the higher education system; accordingly, an excessive self-citation rate is associated with speculative behavior. The average number of citations of papers within a country indicates the value of higher education research output, which affects higher education sustainability. The high self-citation rate is a well-known phenomenon of academic speculation, illustrating academic dishonesty as detrimental to higher education’s quality.

Institutional dimension

This dimension monitors various aspects of higher education institutions and its composition varies significantly between the countries analyzed. The main indicators identified can be grouped into the following categories: teaching staff, internationalization of higher education and funding of teaching, research or other related activities.

The variables analyzed are: Financial aid granted - as a percentage of total public expenditure; Faculty/Student ratio; Internationalization of universities; Tertiary education enrolment (% gross)

Government attention is measured by the ratio of financial investment in education to GDP, total expenditure per student, and GDP per capita. They are all financial indicators of the level of higher education. The government's investment in higher education is conducive to quality and higher education development. High government investment in students contributes to building talent within higher education institutions, improving organizational quality, and to sustain the output of higher education talent.

I measure a country's level of international exchange by the percentage of its international students. The cross-border mobility of students can profoundly impact the development of higher education and is a reflection of its good reputation and quality (Abdullah et al., 2017). Therefore, a higher percentage of international students reflects a high level of internationalization in local higher education and a higher quality level. Barriers to educational entry can be measured by the enrolment rate of higher education. Reflecting on how many people have access to higher education in a country or region, high levels of access reflect that the country's higher education system is of higher quality and has the potential to grow and be sustainable. Enrolment rates visually represent how many young people of the right age in a country can enter the higher education system. Higher education enrolment rates are generally higher in developed countries than in developing countries. However, considering that we are assessing the level of higher education within a certain region, these data cannot be compared directly but are divided by the corresponding base, such as the total population of the region, economic base indicators, and the total number of higher education institutions within the region.

Data and methodology

In recent years, several researchers have studied the quality of higher education in some countries. Moreover, inter-university collaboration, partnerships with government and civil societies are key factors influencing the effectiveness of higher education (Wu and Shen, 2016). It is also influenced by economic and social factors, such as funding and investment, and the creation of community partnerships (Barlett and Chase, 2004). Although not all institutions engage in all of these activities, the core initiatives of higher education effectiveness can be identified: academic, operational and administrative (Owens, 2017).

The objective of this paper is to construct a composite index determined by appropriate sub-indices to assess the quality of higher education. Composite indices can significantly improve the performance of database queries. Understanding and using them effectively is essential for researchers using databases.

Indicators are useful for identifying trends and drawing attention to particular problems.

They can also be useful for setting policy priorities and for benchmarking or monitoring performance. A composite indicator is formed when individual indicators are compiled into a single index based on an underlying model. The composite indicator measures multidimensional concepts that cannot be captured by a single indicator. For this study, several variables were selected, that are related to the quality of higher education. This was done through a literature review and an analysis of existing theories. Datasets were collected for Central and Eastern Europe, Bulgaria, the Czech Republic, Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovenia, Slovakia and the Czech Republic

by consulting databases such as the Organization for Economic Co-operation and Development (OECD) database, EUROSTAT and Scimago Journal & Country Rank.
The selection includes 13 variables, which are drawn for the year 2022 and are related to the quality of higher education, as shown in Tabel 1, where the results of descriptive statistics are reported.

Table 1. Variables included in the empirical study

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Number of papers published	11	2999.00	58179.00	15012.1818	15878.58249
Number of citable papers	11	2838.00	54711.00	14153.7273	14933.44471
Number of papers cited	11	3078.00	58833.00	15388.3636	16109.71599
Number of self-cites	11	496.00	15061.00	3282.8182	4230.44699
Number of citations per document	11	.77	1.32	1.0382	.15439
H index	11	208.00	687.00	405.7273	144.12848
Financial aid granted - as a percentage of total public expenditure	11	1.60	17.50	8.2364	4.64742
Academic reputation	11	3.30	46.50	20.2455	13.63190
Employer reputation	11	1.30	53.90	17.1364	15.34857
Faculty/Student ratio	11	4.10	80.30	39.7545	22.61302
Citations by faculty	11	2.00	12.60	6.5455	3.51749
Internationalisation of universities	11	.00	19.10	5.2909	5.53560
Tertiary enrolment (% gross)	11	47.62	94.51	68.8638	13.20087
Valid N (listwise)	11				

*Source: Authors' production using SPSS software

Results

Principal component analysis (PCA) was used to analyze the 13 variables and to extract the factor coefficient score matrices. Of these, two principal components were used for further analysis. Principal component analysis was applied using Varimax rotation of the axes. Factors for which eigenvalues are greater than 1 were selected. Each sub-indicator was assigned weights using the PCA weighting method to obtain a composite index for each country. The model includes indicators such as 'academic integrity' and is applied experimentally to national data to analyze the strengths and weaknesses of the higher education system.
The application of PCA aims both to calculate the weight of the variables' importance in explaining the factors and the importance of the factors in the total variation.
Standardization of the variables leads to new variables with mean equal to zero and variance equal to one. The variance of the statistical variables, before and after component extraction, is shown in Tabel 2.

Table 2. The importance of the variables in explaining the factors

Component Matrix[a]		
	Component	
	1	2
Number of papers published	.984	-.051
Number of citable papers	.984	-.052
Number of papers cited	.983	-.005
Number of self-cites	.957	-.019
Number of citations per document	-.033	.739
H index	.890	-.073
Financial aid granted - as a percentage of total public expenditure	-.021	-.581
Academic reputation	.893	.115
Employer reputation	.897	.108
Faculty/Student ratio	.058	-.631
Citations by faculty	.137	.899
Internationalisation of universities	-.032	.851
Tertiary enrolment (% gross)	.096	-.599
Extraction Method: Principal Component Analysis.		
a. 2 components extracted.		

*Source: Authors' calculations using SPSS software

The eigenvalues of the correlation matrix are shown in the Total Variance Explained output, Initial Eigenvalues column. Following the analysis, the first component explains 48.053% of the total variance of the cloud. The first two components (factor axes), for which the eigenvalues are greater than 1, together explain 72.739% of the total variance, as shown in Tabel 3.

Table 3. Component variances

Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.247	48.053	48.053	6.247	48.053	48.053
2	3.209	24.686	72.739	3.209	24.686	72.739
3	1.108	8.519	81.258			
4	1.017	7.827	89.084			
5	.679	5.226	94.310			
6	.382	2.942	97.252			
7	.203	1.558	98.810			
8	.105	.810	99.620			
9	.029	.226	99.847			
10	.020	.153	100.000			
11	2.133E-16	1.641E-15	100.000			
12	1.189E-16	9.148E-16	100.000			
13	-1.352E-16	-1.040E-15	100.000			
Extraction Method: Principal Component Analysis.						

*Source: Authors' calculations using SPSS software

Calculation of the weight of the importance of variables

After processing the data in SPSS, the factor loadings are obtained and are shown in Table 4. Those values greater than 0.5 were selected to calculate the importance weights of each variable analyzed.

Table 4. Factor loadings

Component Matrix[a]

	Component	
	1	2
Number of papers published	.984	
Number of citable papers	.984	
Number of papers cited	.983	
Number of self-cites	.957	
Number of citations per document		.739
H index	.890	
Financial aid granted - as a percentage of total public expenditure		-.581
Academic reputation	.893	.115
Employer reputation	.897	.108
Faculty/Student ratio		-.631
Citations by faculty	.137	.899
Internationalisation of universities		.851
Tertiary enrolment (% gross)		-.599

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

*Source: Authors' calculations using SPSS software

The values obtained represent the weight of the importance of the variables in explaining a factor as shown in Tabel 5. Each sub-indicator has been assigned weights using the PCA weighting method to obtain a composite index for each country.

Table 5. Weights of importance in explaining each factor

Weights	
F1	F2
0.168158321	0.000009814
0.168238486	0.000010522
0.167949508	0.000000072
0.150835511	0.000000642
0.000000045	0.159715984
0.112311826	0.000029457

0.000000146	0.060513765
0.115183759	0.000056932
0.117218111	0.000042532
0.000001032	0.085112510
0.000092694	0.345392007
0.000000025	0.279750134
0.000010538	0.069365629

*Source: Authors' calculations

The equations for each chosen factor are written with only the variables that explain the factor formation (for which factor loadings are greater than 0.5):
F1 = 0.168158321 * Number of papers published + 0.168238486 *Number of citable papers + 0.167949508 * Number of papers cited + 0.150835511 * Number of self-cites + 0.112311825659246 * H index + 0.115183759288061 * Academic reputation + 0.117218111 * Employer reputation
F2 = 0.159715983904384 * Number of citations per document + 0.0605137647224805 * Financial aid granted - as a percentage of total public expenditure + 0.0851125101915831 * Faculty/Student ratio + 0.345392006699545 * Citations by faculty + 0.279750134485181 * Internationalization of universities + 0.0693656285855632 * Tertiary enrolment (% gross)
The factor values calculated for each country are shown in the Table 6:

Table 6. Factor values for each country

Country	F1	F2
Bulgaria	-0.48531	-0.776475
Czech Republic	0.891903	0.5519729
Croatia	-0.53293	-0.7404276
Estonia	-0.52992	1.4562498
Latvia	-0.73087	0.0811364
Lithuania	-0.44294	-0.1121366
Hungary	0.082505	0.1436624
Poland	2.508724	-0.1813793
Romania	0.100547	0.0817218
Slovenia	-0.38016	0.0637657
Slovakia	-0.48155	-0.5680879

*Source: Authors' calculations

The values presented above (Weighting the importance of the factors with the value of the sub-indices by factors) are multiplied by the sub-indices presented in the table Calculating sub-indices by factors and the values of the indices for each country are shown in Tabel 7:

Table 7. Sub-index values for each country

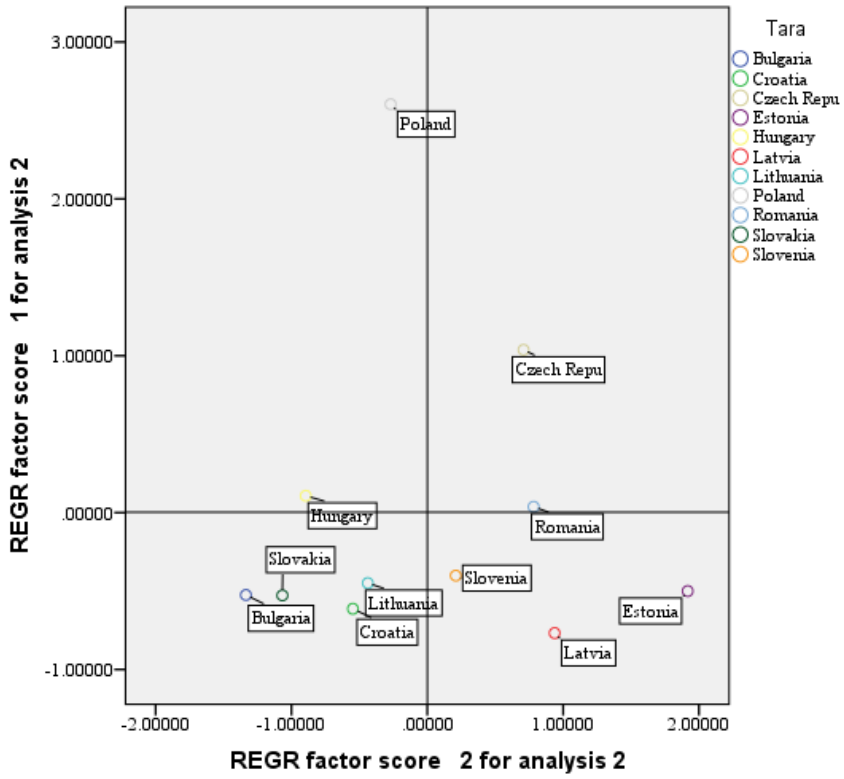
Country	Sub-index values
Bulgaria	-0.584147722
Czech Republic	0.776514212

Croatia	-0.603361774
Estonia	0.144283117
Latvia	-0.455237952
Lithuania	-0.330647647
Hungary	0.103265007
Poland	1.595574272
Romania	0.094157019
Slovenia	-0.229471508
Slovakia	-0.510924639

*Source: Authors' calculations

In Figure 1 shown below we can deduce that higher education in Poland ranks significantly higher than all other countries. Poland has the highest value of factor 1, comprising the scientific research dimension, with the most published articles, citations and the highest H-index.

Figure 1. Component Matrix output



*Source: Authors' calculations using SPSS software

Limitations

The collection of certain statistics is difficult, so there is room for improvement in the selection of indicators. Data was selected from 2022 to construct the composite index, which may have introduced some modelling errors, even though the cumulative variance rate for PCA was reasonable. The current research model has innovatively incorporated academic misconduct and speculative behaviour into assessing the quality of a country or region's higher education system and has validated the model's applicability in eleven countries. Future development of the study could focus on countries with poor statistics on relevant indicators.

Conclusions

The multidimensional approach to the quality of higher education was achieved by considering two dimensions that were analyzed: the institutional dimension and the scientific research dimension. For each dimension, the most relevant variables were selected, according to the literature, data availability and the specificity of the countries taken into analyze. As a result of the principal component analysis, it was possible to determine the factor loadings, with the help of which the weights of each variable contributing to the composite index values were calculated, thus it was possible to determine an index for each of the countries analyzed. With the help of these results it was possible to make a comparative analysis and ranking of the quality of higher education among Central and Eastern European countries. In order to improve the quality of higher education, each member of the higher education system can start from the perspective of what they can do. This is a complex system and many indicators can be used to measure its quality. Thus, all 13 variables in the analysis can have a significant impact on the overall quality of the higher education system. Strengths in individual elements of the dimensions that make up higher education do not lead to an increase in overall levels. For example, Romania publishes quite a lot of articles and is the country with the most cited articles after Poland and the Czech Republic, but the overall quality of higher education is assessed at a lower level.

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78. http://www.aracis.ro/
79. https://www.anofm.ro/
80. https://enqa.eu/
81.https://www.scimagojr.com/countryrank.php?year=2022&region=Eastern%20Europe
82. https://data.europa.eu/data/datasets/tqblssyzcfilfvi6rboew?locale=en
83. https://www.topuniversities.com/
84. https://data.oecd.org/eduatt/population-with-tertiary-education.htm

CULTIVATING DATA OBSERVABILITY AS THE NEXT FRONTIER OF DATA ENGINEERING: A PATH TO ENHANCED DATA QUALITY, TRANSPARENCY, AND DATA GOVERNANCE IN THE DIGITAL AGE

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Abstract: In the age of increasing process automation and data-driven decision-making, ensuring the reliability, transparency and usability of data is of paramount importance. In this context, the concept of "data observability" has aroused the interest of practitioners and there is also a lot of grey content on it. On the other hand, there is a lack of academic effort to define and build on the concept.
This conference paper will therefore examine the importance of "data observability" in modern data ecosystems. The focus is on the definition and characterisation of the concept, the differentiation from other concepts (e.g. data quality, data monitoring, data discovery, data operations) and why this concept appears to be so important in an increasingly data-driven world. In addition, the concept of "data observability" is categorised in the dynamically developing research field of data governance.
For this purpose, a multivocal literature review (MLR) was conducted, a form of systematic literature review (SLR) which, in addition to the published (formal) literature (e.g. journal and conference papers), also includes and brings together the grey literature (e.g. blog posts, videos and white papers).
The results show that the concept of "data observability" has the potential to revolutionise the way companies manage, analyse and derive insights from their data, ultimately leading to more informed and confident decision-making. Nevertheless, there is still plenty of room for further research into the specific contribution to better data and therefore better business processes and decisions.
Keywords: Digitalisation, data-driven company, data management
JEL Classification: L15, M15, O33

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Introduction

With advancing digitalisation and the increasing introduction and use of information and communication systems (ICT), companies are collecting and sto-ring data. As organisations collect seemingly endless streams of data from more and more sources, an ecosystem of data stores, pipelines and potential end users emerges. With each additional layer of complexity, the opportunities for data downtime - moments when data is incomplete, incorrect, unavailable or otherwise inaccurate - multiply. Such events tie up

resources to resolve data quality issues (Moses, 2020; Forrester, 2018), prevent the introduction of artificial intelligence solutions (Mehrabi et al, 2019; Asay, 2017; Vartak, 2023; Coegil, 2023) or lead to the loss of customers (Violino, 2019). Twenty years ago, it was considered normal for business applications to fail or be unavailable. Today, enterprise applications have become business-critical, outages can be expensive and companies are investing accordingly to avoid service interruptions. This development in application technology must also apply to data technology if companies (want to and must) increasingly rely on data. To achieve this, companies must reach a new level of data reliability over the next few years, in which data engineers adapt the knowledge and experience of application engineers and apply it to their data processes. The more companies prioritise “data observability”, the more they will enter the new frontier of data engineering: the prevention of data downtime.

Methodology and material

A systematic literature review (SLR) approach in the form of a multivocal literature review (MLR) was used to answer the research questions and investigate the concept of "data observability" as a particular method of data engineering.

Research approach: This study is part of qualitative research.

Research method: We agree with Fink (2019) that SLR is "a systematic, explicit, and reproducible method for identifying, evaluating, and synthesising the existing body of completed and recorded work produced by researchers, scholars, and practitioners". However, many research topics today originate from practice (e.g. software industry), so it is only logical to include these voices. MLRs therefore recognise the need for "multiple" voices, rather than extracting evidence only from knowledge found in academic settings (formal literature). This is underlined by Ogawa and Malen (1991), in which they define MLR as follows: "Multivocal literatures are comprised of all accessible writings on a common, often contemporary topic. The writings embody the views or voices of diverse sets of authors (academics, practitioners, journalists, policy centres, state offices of education, local school districts, independent research and development firms, and others).". In addition to the published (formal) literature (e.g. journal and conference papers), the MLR also includes and brings together grey literature (e.g. blog posts, videos and white papers) (Garousi et al., 2019; Baysal et al., 2022; Gramlich et al., 2023; Janes et al., 2023; Trendowicz et al., 2023). To ensure the validity of our research design, i.e. the consistency between the defined and the conducted review process, we designed our study based on best practice guidelines defined in the relevant literature. These include in particular Garousi et al. (2019) for the overall design of the MLR and Kitchenham and Charters (2007) for parts of the formal literature and Adams et al. (2017) for the parts of the grey literature.

Research question(s): The current study provides answers to the following research questions: (Q1) What does the concept of "data observability" entail? (Q2) How does "data observability" differ from other concepts, e.g. "data quality", "data monitoring" or "data lineage"? (Q3) What are the benefits of “data observability”? (Q4) What challenges are discussed in the context of “data observability”? (Q5) How can “data observability” be categorised in the dynamically developing research field of Data Governance?

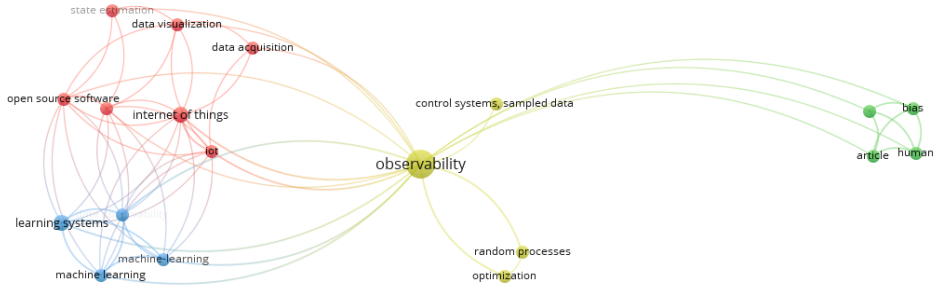
Source(s) of information: As part of the MLR, we considered various sources of formal and grey literature. The focus of the formal literature was on peer-reviewed publications of

primary studies in the databases Scopus, SpringerLink, Wiley, ACM Digital Library and Google Scholar. For the review of grey literature, we used Google Search, an established search engine for such a search (Adams et al., 2016; McGrath et al., 2006).
Inclusion and exclusion criteria: Inclusion and exclusion criteria were also applied. The documents selected on the basis of content comparison and relevance to the defined objectives of the current analysis were read, critically analysed and relevant information on the questions posed was extracted. The results are presented in the following section to facilitate the identification of findings and future directions in the literature reviewed.
Overall, the chosen review methodology provides an up-to-date and comprehensive insight into the concept that is attractive to practitioners and encourages further academic endeavours to define, develop and evaluate the concept in practice.

Results and discussion

Key bibliometric factors
To gain a general understanding of the topic of "data observability", we conducted a search in the Scopus database at the end of October 2023. We used the search term "data observability" to analyse the occurrence of keywords in this research. Fig. 1 shows the co-occurrence of various keywords, including "data acquisition", "data visualisation", "state estimation" and "bias", to name but a few. "Observability" is placed in the centre as a central concept, applied to the object "data".

Fig. 1 Occurrence of the term "data observability" (VOSviewer, Version 1.6.19)



(Source(s): Contribution of the author)

The coincidence was determined on the basis of a minimum threshold of two occurrences for each keyword, as the underlying list contained few data records.

Fig. 2: Thematic development (biblioshiny, an application for bibliometrix)

(Source(s): Contribution of the author)

Learning systems, i.e. machine learning (Feinberg et al., 2022), are the drivers in this field of research (Fig. 2). “data observability” uses machine learning to identify data problems, find the causes and assess the effects. Another topic is the visualisation of data. For example, Wang & Schneeweis (2022) propose a simple visualisation of data type and observability using solid and dotted lines and 2-colour palette to capture the differences between electronic health records and other registry data, which may have limited data continuity, and insurance claims data, which have enrolment files.

The concept (Q1)

The term "data observability" consists of two terms: "data" and "observability", where "observability" refers to the object "data" (has an effect on).

Data: According to DAMA UK (2023), data is "... a re-interpretable representation of information in a formalised manner suitable for communication, interpretation or processing". Data has special characteristics (Merkus et al., 2019), including versatility of format, volatility, fluidity or replicability (Zygmuntowski et al., 2021), which is why it must be treated in a special way.

Observability: The term "observability" was first coined in the 1960s as a method related to the measurement of a system based on its performance (Kálmán, 1960; Kálmán, 1963). Today, more than six decades later, “observability” has split into several specialised segments - from “application observability” to “security observability” and everything in between. “observability” is a measure of how well the internal states of an object (or system) can be deduced from knowledge of its external outputs. If the current state of an object (or system) can be assessed purely by information from the output values, “observability” is considered to be given (Pavlek and Kalpic, 2008).

Data observability: The concept of " data observability " is an approach inspired by "Development and Operations" (DevOps) to ensure data quality (Moses, 2023) and is defined differently in the literature, as is very often the case with concepts that have derived from practice. According to Mohler and Hwang (1988), "data observability" refers to the ability to reconstruct a process state x(t) from measured data y(t) in a selected time period t E [to, t1]. This very mathematical description does not appear to be very clear. The

definition by Moses (2023) from 2019 is better, according to which "data observability" is the ability of an organisation to fully understand the state of the data in its systems in order to reduce the frequency and impact of data outages. "data observability" thus focuses on reducing error rates in the data (Strod, 2021). Moses and Strod recognise the concept of "data observability" as a human-task-technology system (Heinrich, 1993, p. 173), which essentially comprises a series of activities (better: processes, practices) as well as people and technologies whose (socio-technical) combination enables you to identify, correct and solve data problems in near real time (Databand, 2023). The concept is based on five pillars (Moses, 2023): (a) data freshness (How fresh is your data?), (b) data schema (How is your data organised?), (c) data scope (How complete is your data?), (d) data quality (How reliable is your data?) and (e) data provenance (How are the data assets in your data pool connected upstream and downstream and how are responsibilities defined?). Together, these components provide a valuable insight into the quality and reliability of your data.

Delimitations (Q2)

In the following section, the concept of "data observability" is differentiated from other concepts.

Data observability vs. data quality: "data quality" is a measure of the quality of data for its intended use in operational and analytical applications and refers to the accuracy, completeness, consistency and timeliness of the data (LightsOnData, 2023; Walker, 2022; Reno, 2023; Atlan, 2023a). On the other hand, "data observability" enables the monitoring and investigation of systems and data pipelines to develop an understanding of the state and performance of the data. Both concepts overlap but work synergistically together to ensure confidence in the data (Atlan, 2023a).

Data observability vs. data monitoring: Both terms are often used interchangeably in practice because they fulfil similar functions to help identify data problems; however, they differ fundamentally in their definition (Travkin, 2022; Krishnamoorthy, 2021; Rakibe, 2023). "data monitoring" can only alert a data specialist to data problems, but not necessarily tell them how to fix them. "data observability", on the other hand, can uncover the cause of the problem and provide details. In "data monitoring", problems or irregularities are usually anticipated on the basis of defined criteria in order to measure the perceived problems. "data observability", on the other hand, involves collecting metrics across the entire IT landscape in order to proactively detect potential anomalies. "data observability" measures all expenditure across multiple applications and systems, which "data monitoring" cannot do.

Data observability vs. data lineage: Both concepts are related, but serve different purposes in terms of data management and analysis (Atlan, 2023b; Bergh, 2023). "data lineage" focuses on understanding the historical movement of data between source and destination, while "data observability" is about real-time monitoring as the data flows through the systems. "data lineage" provides a detailed, step-by-step view of the data flow and the data transformations taking place within it, while "data observability" looks at aggregated metrics and insights about data systems and processes to identify patterns and trends. "data lineage" is represented by data flow diagrams, the metadata of which is usually stored in a separate system from the data itself, while "data observability" is represented by KPIs and alerts in dashboards.

Data observability vs. data detection: Both concepts are about the visibility of and information about data in real time (Immuta, 2023). “data detection” is about identifying anomalies, specific incidents or risks at a specific point in time, while “data observability” is about the same goal, but measured over time in order to recognise patterns and trends. “data detection” is therefore an upstream prerequisite for “data observability”.
Data observability vs. data discovery: The concept of "data discovery" is primarily used to accommodate data documentation and knowledge sharing in one place, i.e. to provide a single "source of truth" (Kim, 2023). This is done primarily through discovery-oriented data catalogues, which are to be distinguished from control-oriented catalogues, as are common in companies that have to manage exactly who has access to which data and for how long (de Leyritz, 2023). These catalogues are part of metadata management (Cittadin, 2022) and contain information that is in turn taken into account in “data observability” (e.g. value descriptions, data type descriptions).
Data observability vs. data operations (data ops): "data observability" serves as the monitoring basis for "data ops", an established discipline for building and managing data flows. "data ops” applies the principles of Dev Ops, agile software development and total quality management to data and data flows to deliver timely, accurate data to the organisation. "data ops” includes testing, continuous integration and delivery (CI/CD) and orchestration. "data observability" provides insights that make each of these elements more effective.
Data observability vs. data tests: both concepts complement each other (Atlan, 2023c). "data tests” are used to validate the content, structure and integrity of data with the aim of ensuring that the data is processed correctly at all stages of the data pipeline and is therefore accurate and reliable. “data observability” is about gaining insights into the health and performance of the entire data system in order to understand, diagnose and resolve problems in real time. "data tests” are reactive and are only carried out at specifically defined points in time (at regular intervals), while data observability is proactive, permanent and continuous. "data tests” focus on defined use cases and test conditions, while “data observability” does not address such framework conditions. "data tests” provide binary results ("test passed" or "test failed"), while “data observability” provides multidimensional insights.
Data observability vs. data cleansing: Both concepts are about ensuring the integrity and reliability of a data ecosystem (Atlan, 2023d). While “data cleansing” is about identifying and correcting inaccuracies, inconsistencies and duplicates within a data set, “data observability” focuses on monitoring and gaining insights into the behaviour, performance and quality of data as it flows through processes, pipelines and systems in real time. “data observability” is permanent and continuous, while “data cleansing” takes place during the data analysis process.
Data observability vs. data availability: "data availability" means that a company ensures that all business-relevant data is available to its employees, partners and other end users at any time of day (24/7) and at any location. This applies to both the accessibility and continuity of information. Data that cannot be accessed quickly can prevent the provision of services, which costs a company time and revenue. "data observability" presupposes "data availability", because "data observability" focusses on the object "data"; data that is not available cannot be observed.

Data observability vs. observability data: Both "observability data" and "data observability" deal with different aspects of the data lifecycle and complement each other (Cribl, 2023). For example, the lifecycle of "data observability" deals with the collection, storage, analysis and visualisation of company data, while "observability data" manages the forwarding of data to different locations in different versions. "data observability" is analytical, while "observability data" is more focussed on operations.
Overall, this list of concepts and their distinction from the concept of "data observability" shows that the boundaries are often fluid, i.e. not clearly defined.

Advantages (Q3)
In addition to the benefits already mentioned in the previous section, we have extracted the following potential benefits of "data observability" from the formal and grey literature (Table 1):

Table 1: Advantages of "data observability"

Advantages	Supported by ...
Increasing confidence in the data by identifying inconsistencies or data errors so that organisations can make more confident data-driven decisions.	Kutay (2023)
Ensuring the quality, reliability and consistency of data in the data pipelines by providing a 360-degree view of the data ecosystem.	Kutay (2023)
Tracking relationships that organisations didn't know they should be looking for and discovering data issues before they impact the business.	Kutay (2023); Magnusson (2023)
Increasing the maturity level of company data by simplifying root cause analyses.	Kutay (2023); Magnusson (2023)
Automation of safety management in the company (real-time identification of problems, automation of the triage process.	Magnusson (2023)
Improving the reliability of process flows when capturing and processing your data (more robust data environment).	Zeenea, 2023
Tracking the status of interfaces and enabling rapid response to (un)expected changes	TDWI, 2023
Recognising any changes in data schema and data logic	TDWI, 2023
Insights into the size of data deliveries and the ability to react quickly to (un)expected or missing data deliveries	TDWI, 2023
Enabling the traceability of responsibilities for data in decentralised teams	TDWI, 2023

(Source(s): Contribution of the author)

"data observability" helps to build trust through transparency, reduce effort and therefore costs, and optimise the data infrastructure.

Challenges (Q4)
"data observability" poses a number of challenges. Below, an overview of the main challenges recognised in the formal and grey literature is provided (Table 2):

Table 2: Challenges of „data observability"

The challenges	Supported by ...
Existing data silos (compartmentalised and inaccessible data) make it difficult to integrate all systems into the monitoring solution.	Magnusson (2023)
Different data models complicate the implementation of "data observability".	Magnusson (2023)

The challenges	Supported by ...
Different types of data storage in the systems and regulatory constraints (e.g. retention guidelines) influence the scalability of "data observability" (and thus generate high costs).	Magnusson (2023)
"data observability" technologies overlap with monitoring and data quality technologies. This fact must be taken into account when selecting tools, as the tools available on the market differ considerably in terms of the underlying technologies, the depth of observability and the scope of coverage.	Feinberg et al (2022)
The concept of "data observability" does not guarantee the correctness of data. It only observes, i.e. provides information on whether the data is delivered as it should be delivered.	Feinberg et al (2022)
The tools available on the market are aimed at data engineers, but not business users. The latter may therefore not find their requirements reflected in them.	Feinberg et al (2022)
"data observability" requires a data culture within the company, i.e. management support and an organisation that is prepared to learn, implement and follow the prescribed procedures.	Bange, 2022
""data observability" does not replace or supersede other components of data management, such as data quality management and master data management (MDM).	Pratt, 2022

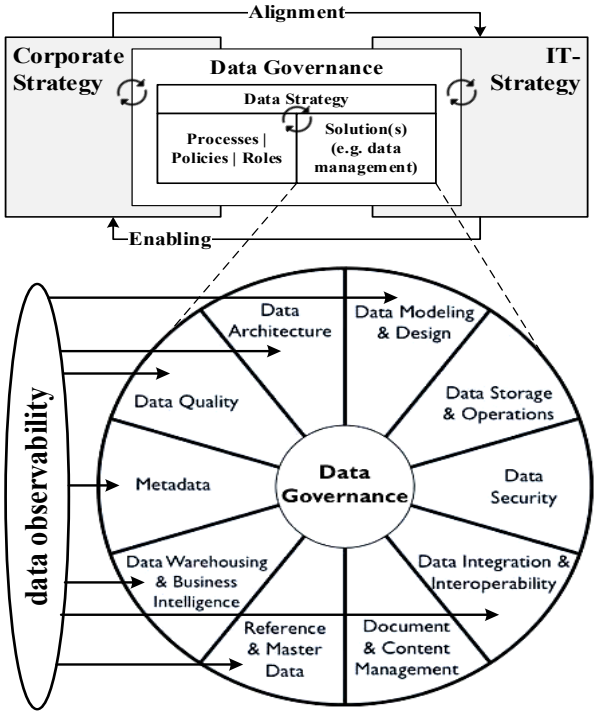
(Source(s): Contribution of the author)

Despite the challenges described above, "data observability" must become an essential component of a data-driven company.

Relationship to data governance (question 5)

"data observability" and Data Governance are two key concepts (Fig. 3) that play an important role in ensuring the accuracy, reliability and efficiency of data-driven (enterprise) systems and thus form the basis for data-driven organisations.

Fig. 2: "Data observability" in relation to data governance



(Source(s): Author's contribution, with application of Krcmar, 2005, p. 316 and DAMA, 2017)

The starting point is the mutual relationship between the "corporate strategy" and "IT strategy" tasks, a relationship known as "business-IT alignment" in the sense of a control loop. The object of the "corporate strategy" is the entire company, including its corporate processes and organisation. The results of the "corporate strategy" are specifications for all downstream levels (alignment). In contrast, the object of the "IT strategy" is the operational information system, consisting of a business process model and a configuration plan for the resources to be used in the information system. The latter requires a definition of the degree of automation of processes and technology utilisation. In this respect, technological options are developed that are to be utilised in the "corporate strategy" in order to improve the company's competitiveness in the long term (enabling).

Data Governance is the closed-loop process of managing the availability, usability, integrity and security of the data used in an organisation (Wende & Otto, 2007; Otto, 2012; Weber et al, 2009; Newman & Logan, 2006; Gregory, 2011). Based on a “data strategy” that supports the "corporate strategy" in a closed-loop manner by identifying the business objectives and key drivers related to data as an operational asset, “processes”, “policies” and “roles and resposnibilities” are defined and “solutions” are selected to ensure that corporate data is collected, stored, processed and shared in a secure and compliant manner in a closed-loop manner to ensure that corporate data is accurate and trustworthy for decision makers. One of these solutions is “data management”, which manages the entire lifecycle of an organisation's data by executing and activating the rules and policies described in data governance, thus answering the question "How do you manage corporate data?". To make the concept of “data management” more tangible, we use a well-known data management framework, the DAMA DMBOK (DAMA, 2017). One component of this framework is the "DAMA wheel", which concretises the knowledge area of "data management" with processes such as "data integration", "data warehousing & business intelligence" or "data architecture". In this environment, the concept of "data observability" has points of contact with different knowledge areas of "data management" and has a formative effect on them.

As a result, it can be stated that Data Governance is the framework concept and "data observability" is a solution process itself as well as a formative component of other solution processes in “data management”.

Summary

Through this study, we have succeeded in providing an insight and overview into the topic of "data observability" as a method of modern data engineering. With this in mind, we have applied the literature review as a research method to a number of papers identified in the formal and grey literature. In particular, we included the grey literature because the concept currently enjoys a great deal of attention in practice and a large number of sources can be found about it. This is also reflected in Gartner's assessment of "data observability" as hype in the "Hypecycle for Data Management" (Feinberg et al., 2022).

We were able to capture the concept, differentiate it from other concepts and identify the benefits and challenges. The research had a special focus on categorisation in the research field of data governance; in this respect, this study is unique.

The results of the study show that "data observability" can be a suitable means of increasing trust in company data. Future research will focus on the practical side of implementation and utilisation in specific corporate environments, particularly in the application of self-learning artificial intelligence systems. In particular, the value contribution of "data observability" solutions must be evaluated over time and whether the design and provisioning effort is worthwhile in relation to the goal of providing better data for better business processes and decisions.

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THE EFFECT OF GOOD GOVERNANCE ON CO2 EMISSIONS AND FDI INFLOWS

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Abstract: In the contemporary context, people's attention has turned to the relationship between foreign direct investment (FDI) and environmental concerns. And the good governance that wants to increase the level of FDI inflows and decrease the level of CO2 emissions has also aligned with this trend, to achieve a sustainable development. Thus, through the present research we want to analyse the effect of good governance on CO2 emissions and FDI inflows. The analysed period is between 2002-2021, and to carry out a more detailed analysis we introduced groups of countries. We used panel data methods to test relationships through multiple regression in Stata. In the analysis we considered the 2 factors, FDI and CO2, as dependent variables. We will measure good governance through the prism of 4 indicators, which we will consider as independent variables in our study, namely Trade, the sum of exports and imports of goods and services, Gross capital formation, Government effectiveness and Consumer price index. The results demonstrate a higher level of good governance in reducing CO2, respectively attracting FDI in the group of countries that are part of the EU zone, respectively of the euro zone.
Keywords: CO2 emissions, FDI inflows, good governance

Introduction

In recent years, climate change and global warming are topics of discussion worldwide. And the main cause of these disastrous situations for the environment and population is considered to be carbon emission. CO2 is a global pollutant and generally comes from burning fuel from vehicles, factories, or households.

The international model shows us that European countries have recorded an increase in CO2 emissions along with the economic expansion. At the same time, the economic expansion of these countries is also due to FDI flows. And the flow of FDI is considered to affect the environment (Zhang et al., 2023). Large amounts of CO2 contribute to climate change and have serious negative effects on the economy (Choi et al., 2023).

Figure 1 shows the level of CO2 emissions at the level of European countries in 2021.

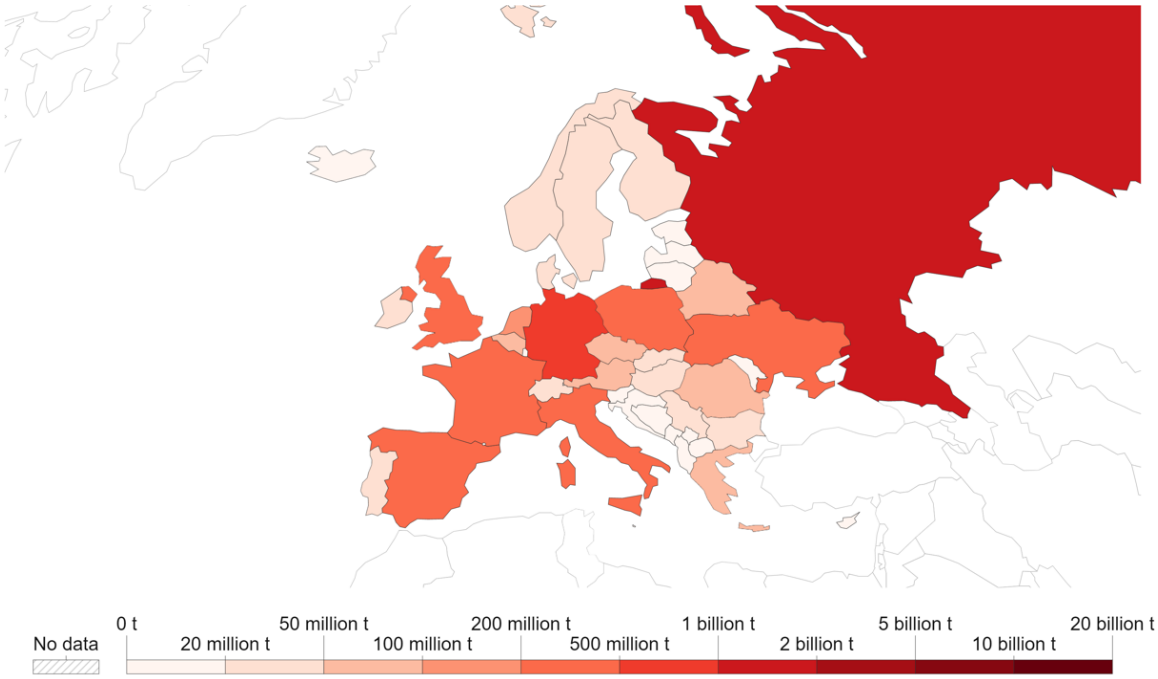

Figure 1: The level of CO2 emissions at the level of European countries in 2021
Source: Our World in Data, 2023

The Covid-19 pandemic negatively influenced energy demand in 2020. Thus, a 5.2% reduction in CO2 emissions was recorded in 2020 compared to 2019 (IEA, 2021). However, at the level of 2021, an extremely rapid economic recovery was achieved thanks to fiscal and monetary incentives, as well as the rapid release of vaccines. Also, the unfavorable weather conditions in 2021 accentuated the electricity crisis. And finally, this fact translated into the large-scale use of energy from the burning of coal. For this reason, in this reference year, emissions have increased by approximately 2.1 Gt compared to the previous year. In general, good governance is a process that can be seen through the transparency, accountability, and regulatory reforms of a state. We can also say that the present concept caters to the needs of the masses and not the select groups.

Literature review

Since the 1980s, there has been an upward trend in the flow of FDI globally. This is outlined by the benefits for both host countries and investors. And among the benefits brought to the host country by this type of investment, Jahanger (2021), mentions "the transfer of foreign capital, technology, skills and access to new markets to improve exports". However, the specialized literature in this field is divided into two schools of thought, namely the Pollution Haven Hypothesis and the Pollution Halo Hypothesis (Al-Nimer et al., 2022). The first type of thinking emphasizes the negative impact of FDI on the environment, and the second type emphasizes the constructive role of FDI in environmental protection (Adeel-Farooq et al., 2021).

Xiao (2015) studies the link between FDI and intra-host pollution in developing countries. The results of this study demonstrate that openness to FDI is beneficial for the environment. In general, locations for this type of investment must possess stricter environmental regulatory policies. And this fact is fulfilled if there is a good infrastructure as well as

technological equipment. At the same time, Millimet and Roy (2015) argue through their paper that developing economies are intentionally relaxing their environmental standards. In this way, foreign investors are attracted to support economic growth by creating new employment opportunities. Zhang (2011) argues that the environment is affected by CO2 emissions, energy use and economic growth. Likewise, other studies (Qayyum et al., 2021, Yang et al., 2022; Yuan et al., 2022) argue that transportation, international trade, fossil fuel burning, and foreign direct investment are other important variables that explain environmental damage. natural. And the study by Shabir, Rashid Gill and Ali (2022) claims that the major factors of energy consumption are represented by transport and foreign direct investment. And the increased level of FDI and transport activities play a vital role in propelling economic growth.

On the other hand, there are also studies that support a positive link between FDI and environmental quality. Thus, a study (Zhang and Zhou, 2016) supports the pollution halo hypothesis. Thus, foreign firms can export greener technologies from developed countries to developing countries and conduct business in an environmentally friendly way. Also, another study (Panayotou, 1997) argues that policies and institutions can significantly reduce environmental degradation to low levels. Thus, if economic development is achieved with sufficient funds, government institutions also give priority to environmental protection. And finally, the quality of the environment returns to normal. And the absorption of funds, implicitly by FDI, creates a point of competition, namely environmental protection instead of economic competition. Thus, investors will be encouraged to imitate pollution control methods.

Methodology and data

This study investigates the effect of good governance on CO2 emissions and FDI inflows. To observe this fact, we perform a comparative analysis on 3 samples, the first sample (I) being made up of EU member countries, the second sample (II) made up of countries that use the euro currency, and the third sample (III) is made up of countries that do not use the euro currency. We perform this segmentation because developed countries are considered to be less vulnerable to climate change due to their well-established economies, good governance, and timely and effective preparedness strategies (Saeed et al., 2023).

The analyzed period consists of the time interval 2002-2021.

Table 1. Description of the variables used in the empirical analysis

Symbol	Name	Measurement Unit	Source
Dependent variables			
CO2	CO2 emissions from solid fuel consumption	% of total	World Bank
FDI	Foreign direct investment, net inflows	% of GDP	World Bank
Independent variables			
T	Trade, the sum of exports and imports of goods and services	% of GDP	World Bank
GCF	Gross capital formation	% of GDP	World Bank
G_ef	Government effectiveness	Index	World Bank

CPI	Consumer price index	Index	World Bank

Source: authors' processing

We have introduced trade as an independent variable because, according to the theory of comparative advantage, it is considered that trade brings benefits to all parties involved. Thus, we can say that a result of international trade is represented by the increase in efficiency. At the same time, trade allows countries to benefit from foreign direct investment. Through FDI, foreign exchange and expertise are brought into a country, raising employment and skill levels locally (Ye and Zhao, 2023). Also, states are in constant need of capital goods because with their help they can replace old capital goods to produce goods and services. In the situation where capital goods cannot be replaced, then the respective state will experience a decrease in production decreases. In other words, if an economy experiences higher capital formation, then it can grow its aggregate income much faster. Thus, we introduce Gross capital formation as an independent variable.
Generally, a state turns to its policies to raise additional capital. For this reason, we also want to analyze the connection between our variables of interest and the quality of public policy. Thus, we introduce Government effectiveness as an independent variable. This variable is part of the Global Governance Indicators (WGI). The last variable included in our study is represented by the Consumer Price Index. We introduce this variable because this index is also used as a measure of inflation, followed closely by decision makers, financial markets, businesses, and consumers. In the analyzed period, the CO2 variable registers an average value of 27.23% which can fluctuate by 21.23%, and the FDI variable registers in the analyzed period an average value of 12.27% which can fluctuate by 39.91%, as can be seen in table 2.

Table 2. Descriptive statistic

	Min.	Max.	Mean	Std. dev.	Obs.
CO2	0	96.17	27.58885	21.23204	401
FDI	-57.53	449.08	12.2738	39.91086	540
T	45.42	388.12	121.5377	63.8289	540
GCF	11.89	54.95	23.05433	4.698171	540
G_ef	-.37	2.35	1.092944	.6000371	540
CPI	52.7	133.46	100.7451	12.35573	540

Source: authors' processing

To analyze the effect of good governance on CO2 emissions and FDI inflows, we used the panel data method. Below is the general formula for multiple linear regression:

$$y = \beta_0 + \beta_1 X_1 + \cdots + \beta_n X_n + \varepsilon \quad (1)$$

And the form of this type of regression used in this research is:

$$y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon \quad (2)$$

where,

$y =$ the predict value of the dependent variable

$\beta_0 =$ the value of y when all other parameters are set to 0

$\beta_1 X_1 =$ the regression coefficient (β_1) of the first independent variable (X_1)

$\beta_2 X_2 =$ the regression coefficient (β_2) of the 2nd independent variable (X_2)

$\beta_3 X_3 =$ the regression coefficient (β_3) of the 3rd independent variable (X_3)

$\beta_4 X_4 =$ the regression coefficient (β_4) of the 4th independent variable (X_4)
$\beta_5 X_5 =$ the regression coefficient (β_5) of the 5th independent variable (X_5)
$\varepsilon =$ model error
We also formulated two models alternating the two proposed dependent variables. The equations for the two models are described as follows:

$$CO_2 = \beta_0 + \beta_1 * FDI + \beta_2 * T + \beta_3 * GCF + \beta_4 * G_{ef} + \beta_5 * CPI + \varepsilon \quad (3)$$

and

$$FDI = \beta_0 + \beta_1 * CO_2 + \beta_2 * T + \beta_3 * GCF + \beta_4 * G_{ef} + \beta_5 * CPI + \varepsilon \quad (4)$$

Results

Table 3 contains the correlation matrix.

Table 3. Correlation matrix

	CO2	FDI	T	GCF	G_ef	CPI
CO2	1.000					
FDI	-0.2479	1.000				
T	-0.2189	0.2772	1.000			
GCF	0.2666	-0.0440	-0.0059	1.000		
G_ef	-0.2467	0.0471	0.1644	-0.0768	1.000	
CPI	-0.0450	-0.0495	0.2065	-0.2475	0.0810	1.000

Source: authors' processing

It is observed that there is a negative relationship between FDI and CO2 (-0.2479). The result obtained is also supported by other studies in the field (Al-Mulali and Tang, 2013; Gao et al., 2022) as FDI is considered to improve green energy and environmental performance. It is observed that there is still a negative relationship between CO2 and T (-0.2189). The relationship is also supported by other studies (Shapiro, 2016, Kim et. al., 2019). To avoid the problem of spurious results in regression analysis we will apply stationarity testing by applying Augmented Dickey-Fuller unit root tests. Table 4 contains the results of the ADF unit root tests.

Table 4: Results for the ADF unit root test

	Level	
	Statistics	Prob.
CO2	-11.978	0.0000
FDI	-17.108	0.0000
T	-24.052	0.0039
GCF	-7.245	0.0000
G_ef	-13.318	0.0000
CPI	-7.627	0.0000

Source: authors' processing

As we can see from Table 4, all the variables included in the model are stationary at the level through the Augmented Dickey-Fuller test. Table 5 contains the regression analysis analyzing the impact of good governance on the dependent variable CO2.

Table 5. The effect of good governance on CO2

Dependent Variable CO2	(I)	(II)	(III)
FDI	-0.0854*** (-3.67)	-0.0701** (-3.27)	-0.344 (-1.57)
T	-0.0477** (-2.78)	-0.0480** (-2.93)	0.00632 (0.09)
GCF	1.204*** (5.26)	1.334*** (5.54)	0.427 (0.78)
G_ef	-6.569*** (-4.05)	1.881 (0.89)	-11.20*** (-3.79)
CPI	0.232* (2.37)	0.384** (3.21)	0.0152 (0.10)
_cons	-8.551 (-0.69)	-40.64** (-2.73)	41.98* (2.06)
N	401	296	90
R2	0.185	0.173	0.172
Prob > F	0.0000***	0.0000***	0.0064**

t statistics in parentheses
* p < 0.05, ** p < 0.01, *** p < 0.001
Source: authors' processing

The final regression equation for the 27 EU Countries for CO2 is:

$$\mathbf{CO_2} = \mathbf{-0.69} + (\mathbf{-3.67}) * \boldsymbol{FDI} + (\mathbf{-2.78}) * \mathbf{T} + \mathbf{5.26} * \boldsymbol{GCF} + (\mathbf{-4.05}) * \boldsymbol{G_{ef}} + \mathbf{2.37} * \boldsymbol{CPI} \quad (5)$$

We observe that the GCF and CPI variables have a positive impact on the CO2 variable, while the rest of the independent variables have a negative effect. From the value of R2, we can say that 18.5% of the variation of the CO2 variable is explained by the rest of the variables included in the model.

The final regression equation for the Eurozone for CO2 is:

$$\mathbf{CO_2} = \mathbf{-2.73} + (\mathbf{-3.27}) * \boldsymbol{FDI} + (\mathbf{-2.93}) * \mathbf{T} + \mathbf{5.54} * \boldsymbol{GCF} + \mathbf{0.89} * \boldsymbol{G_{ef}} + \mathbf{3.21} * \boldsymbol{CPI} \quad (6)$$

We observe that the GCF, G_ef, and CPI variables have a positive impact on the CO2 variable, while the rest of the independent variables have a negative effect. From the value of R2, we can say that 17.3% of the variation of the CO2 variable is explained by the rest of the variables included in the model.

The final regression equation for the Non-Eurozone for CO2 is:

$$\mathbf{CO_2} = \mathbf{2.06} + (\mathbf{-1.57}) * \boldsymbol{FDI} + \mathbf{0.09} * \mathbf{T} + \mathbf{0.78} * \boldsymbol{GCF} + (\mathbf{-3.79}) * \boldsymbol{G_{ef}} + \mathbf{0.10} * \boldsymbol{CPI} \quad (7)$$

We observe that the T, GCF, and CPI variables have a positive impact on the CO2 variable, while the rest of the independent variables have a negative effect. From the value of R2, we can say that 17.2% of the variation of the CO2 variable is explained by the rest of the variables included in the model.

Table 6 contains the regression analysis analyzing the impact of good governance on the FDI variable.

Table 6. The effect of good governance on FDI inflows

Dependent Variable FDI	(I)	(II)	(III)
CO2	-0.386*** (-3.67)	-0.506** (-3.27)	-0.0824 (-1.57)
T	0.217*** (6.17)	0.210*** (4.89)	0.114*** (3.52)
GCF	-0.208 (-0.41)	-0.169 (-0.25)	0.394 (1.48)
G_ef	-2.115 (-0.60)	1.737 (0.30)	-1.923 (-1.24)
CPI	-0.263 (-1.26)	-0.223 (-0.68)	-0.198* (-2.63)
_cons	32.03 (1.22)	26.37 (0.65)	8.693 (0.85)
N	401	296	90
R2	0.144	0.141	0.227
Prob > F	0.0000***	0.0000***	0.0005***

t statistics in parentheses
* p < 0.05, ** p < 0.01, *** p < 0.001
Source: authors' processing

The final regression equation for the 27 EU Countries for FDI is:

$$\mathbf{FDI} = \mathbf{1.22} + (\mathbf{-3.67}) * \boldsymbol{CO_2} + \mathbf{6.17} * \mathbf{T} + (\mathbf{-0.41}) * \boldsymbol{GCF} + (\mathbf{-0.60}) * \boldsymbol{G_{ef}} + (\mathbf{-1.26}) * \boldsymbol{CPI} \quad (8)$$

We observe that only the T variable has a positive impact on the FDI variable, while the rest of the independent variables have a negative effect. From the value of R2, we can say that 14.4% of the variation of the FDI variable is explained by the rest of the variables included in the model.

The final regression equation for the Eurozone for FDI is:

$$\mathbf{FDI} = \mathbf{0.65} + (\mathbf{-3.27}) * \boldsymbol{CO_2} + \mathbf{4.89} * \mathbf{T} + (\mathbf{-0.25}) * \boldsymbol{GCF} + \mathbf{0.30} * \boldsymbol{G_{ef}} + (\mathbf{-0.68}) * \boldsymbol{CPI} \quad (9)$$

We observe that the T, and G_ef variables have a positive impact on the FDI variable, while the rest of the independent variables have a negative effect. From the value of R2, we can say that 14.1% of the variation of the FDI variable is explained by the rest of the variables included in the model.

The final regression equation for the Non-Eurozone for FDI is:

$$\mathbf{FDI} = \mathbf{0.85} + (\mathbf{-1.57}) * \boldsymbol{CO_2} + \mathbf{3.52} * \mathbf{T} + \mathbf{1.48} * \boldsymbol{GCF} + (\mathbf{-1.24}) * \boldsymbol{G_{ef}} + (\mathbf{-2.63}) * \boldsymbol{CPI} \quad (10)$$

We observe that the T, and GCF variables have a positive impact on the FDI variable, while the rest of the independent variables have a negative effect. From the value of R2, we can say that 22.7% of the variation of the FDI variable is explained by the rest of the variables included in the model.

Conclusions

In conclusion, good governance is an important component in creating sustainable development. Through this process, active measures can be taken to reduce CO2 levels. On the other hand, this political action can also increase the level of FDI inflows within a

country. In the present study we investigated the impact of good governance on the 2 current problems of the world, namely the level of CO2 and the level of FDI inflows. The contemporaneity of demonstrates that public policy measures are more harmonious with society and the environment if they are under the guidance of a guiding umbrella. The result of this study aligns with this statement. Thus, at the EU level, we observe that governance succeeds through the prism of FDI, T and G_ef variables to negatively influence the CO2 level. At the Eurozone level, good governance negatively influences the level of CO2 through the variables FDI, T, GCF and CPI. At the Non-Eurozone level, good governance negatively influences the level of CO2 emissions only through the variable G_ef. Therefore, it is observed that the environmental problem is being tried to be solved through several courses of action. Although the impact of CO2 on the environment is relatively explained by the variables introduced in the model (between 17.2-18.5%), it is observed that good governance really tries to reduce the problems on this level.
On the other hand, good governance influences the level of FDI inflows in the 3 clusters only through the variable T. The need to implement more effective actions in this area for good governance is observed.

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FORESIGHT IN THE GLOBALIZATION ERA ON RETAIL

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Abstract: The paper addresses the topic of Forecasting in the era of globalization on retail, influenced by Artificial Intelligence. Artificial Intelligence is defined as the science of creating machines with the ability to achieve goals in the world. Humanity is currently facing a great change. We will live in a world of technology, which brings with it many opportunities but also many unknowns and challenges. They are generated by the impact of globalization, technological progress and the changes generated by the presence of millennials. Retail stores should be open to AI but be careful to adopt those AI solutions that lend themselves to their specific context. For this scientific article we implemented a qualitative research. Among other things, following the research, we found out that Artificial Intelligence applied in retail is the solution to achieve higher performance in the field of retail, but without being used in an unethical way. The results obtained from the research provide an overview of Artificial Intelligence in the sphere of the web at the present time. Considering the direction in which technology is evolving and based on the arguments of specialists, it can be stated that Artificial Intelligence will represent an element of distinctiveness and competitive advantage in the era of globalization.
Keywords: globalization, forecasting, trends, artificial intelligence, retail, customers.
JEL Classification: M31

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Introduction

The global market has expanded exponentially since World War II due to the opening of the world economy, the relaxation of trade and tariff barriers, and the diversification of customer needs (Coe, 2004). Since the mid-1990s there has been a notable change in retailing, a process that not only relates to store operations, but also to supply networks, support operations, knowledge and technology transfers, and the export of products under own brand. Companies that are able to innovate and learn in interaction with other actors are able to exploit the opportunities and face the challenges that arise from globalization, but also to internationalize their activities. Institutional setup, cooperation between companies, government socio-economic policies and active support for companies enhance their capabilities in terms of innovation, learning and internationalization (Awuah, 2011). The term "globalization" should be applied to cases where the retailer has deliberately considered internationalization options as part of an overall market expansion strategy. The corporate culture of individual companies can have a significant influence on

internationalization strategies. The characteristics of international retail expansion are innovation, brand control and market adaptations (Shulyn, 2015).

Literature review

Retail has evolved into a global, high-tech industry that plays an important role in the global economy. This leads to a trend in the retail activities practiced by many of the retailers to look for expansion to new locations around the world to gain more profit and a larger market share. In recent years, the combination of economic growth and population growth in emerging and less developed markets has accelerated the progress of retail globalization and the globalization of retail. The challenges faced by global retailers, which are already present in various international markets, respectively seek to increase the degree of penetration of new mature and emerging international markets, can be greater compared to those faced by companies in other sectors of activity (automotive, manufacturing, steel industry) (Reinartz, 2011). As retail expands and more international trade networks turn to globalization, the challenges they face increase. Retail innovations (Dabija, 2015), are imperative to turn these challenges into opportunities and compete successfully, especially in mature and emerging markets. Globalization is not right for every business and every retailer. Retailers must always understand that the domestic market is the main element of globalization. It is important for retailers to understand local consumers for international expansion. Understanding local consumers and knowing what they will be looking for when making a purchase decision is necessary for retailers to enter a foreign market. Retailers need to think deeply about when they enter the foreign market. Retailers usually enter foreign markets too soon. Global marketing has various opportunities and challenges. Organizations need to focus on their strengths and opportunities while making conscious efforts to address weaknesses and threats from competitors. It is essential for each company to prioritize the countries they wish to enter and analyze the competitive advantage in each country (Reinartz, 2011).

The millennial generation represents the last generation of the 20th century. They were born between 1980 and 2000. Globally, the number of Millennials is over 2 billion. Retail companies try to understand their purchasing decisions (Petričević, 2017) and, as far as they can, determine their behavior, respectively attract them to stores (Dabija and Bejan, 2018). Born and raised in the era of booming technology and rapid societal change, millennials exhibit a different mindset than any other generation. The demands of millennials are special, they expect very fast results and rely quite a lot on technology, online communication and social media (Dabija et al., 2017). Organizations are thus faced with a changed situation, having to adapt to the new expectations and demands of this generation. The millennial generation expects a company to have ties to the community and especially to get involved in it, trying to support it, respectively to contribute to its protection (Dabija and Băbuț, 2019). They choose socially responsible companies that use technology and can offer fast and quality services (Genoese, 2016).

This generation has imposed itself on the entire retail industry, significantly changing the buyer's decision-making process and its behavior, thus stimulating retail companies to adapt to the new reality (Dabija and Bejan, 2018). It is possible that millennials will become the largest consumers in history, therefore, the interest in attracting this generation to shop and enhancing their preferences for store brands are important goals for retailers (Knezevic, 2017). Research dealing with millennials (Dabija et al., 2017); (Dabija et al., 2018),

indicates that they have a unique lifestyle, one quite different from those of previous generations. From a marketing perspective, classic advertising campaigns that use magazines and radio or television spots are no longer effective for millennials, but it is necessary for them to take place online. Millennials tend to believe more easily the real experiences of consumers from the Baby Boomers generation (Dabija et al., 2017) especially due to the fact that they often resort to quickly checking the information they receive on the Internet (Dabija et al., 2018). Millennials use gadgets such as smartphones, laptops or tablets while purchasing products (Dabija and Grant, 2016). Millennials are the first digitized generation. Retail chains must reorient themselves and define strategies and appropriate ways to approach this generation of consumers who are informed online. Thus, the retail sector must take into account demographic changes, properly analyzing, understanding the behavior of individuals and quickly adapting to them. In this way, retailers will be able to grow in the long term and achieve financial success. The number of millennials and their strong online presence is forcing retailers to adapt to the new reality as they increasingly depend on this customer base. For example, on Amazon Prime almost 40% of users are between 18 and 34 years old (Don, 2019). Millennials are interested/captivated by e-retailers such as Amazon and Alibaba (Don, 2019).

In the era of globalization, retail companies must be present more and more often on social networks. 34% of respondents preferred a brand active on social media. Nowadays, pro-active participation on social networks is a prerequisite for survival for every company. 60% of millennials would consider buying a product endorsed by a YouTuber, while a third consider blogs a valuable source when making a purchase decision. 92% of consumers rely on the recommendations of friends, acquaintances and relatives when making their consumption decision, rather than on the information provided by companies (Dabija, Pop and Săniuță, 2017). The influence exerted by influencers on blogs, forms and/or online video channels has become exceptional, with millennials having more trust in a certain person, even unknown, but who posts on social networks, than in the recommendations of companies (Dabija et al., 2017). Millennials are the largest generation in history, one that will soon rise to prominence as the largest customer sector. With their specific behavioral patterns, shaped by the global economic crisis, they influence the business practices of all economic entities, and the retail sector (Ram, 2017). Millennials are an interesting group, one that needs to be the focus of every retail company's attention. They are the ones who make the difference in the retail industry (Petričević et al., 2017).

To remain competitive and survive in a globalized market, retailers must become more agile (Oosthuizen, 2020) and innovate their value chain by adopting new technologies. In retail, today, retailers are taking multiple approaches to improve customer experiences, including state-of-the-art in-store technologies (Grewal et al., 2017). In the era of globalization, retailing is evolving at an accelerated pace due to changes made possible by technologies and evolving consumer behaviors (Grewal et al., 2017). Artificial Intelligence is greatly influencing the international business environment providing important benefits to both sellers and buyers in the retail trade. Its machine learning and predictive tools often provide relief to the buyer's efforts. Artificial Intelligence for Retailers enables retail to obtain clearer predictive tools that ensure clearer business decisions are made (Oosthuizen, 2020). Algorithms enhance the ability to visualize business implications and translate results such as higher sales and lower costs through customer service, product inventory and personnel. Customer service is an important aspect of any retail business as it drives

consumer loyalty and brand retention. Platforms like Facebook allow retailers to save on operational costs related to customer service by incorporating chatbots through Facebook Messenger. Artificial intelligence replaces the conventional customer service agent who answers questions by sending links, images and texts and uses human responders only if the problem is more complicated (Nadimpalli, 2017). If product inventory is mismanaged, it could trigger customer frustration and lost sales. Artificial Intelligence is a new trend of the 21st century, which makes it necessary for people to accept it and use it to receive benefits. It is important for the society to identify its benefits and threats so that they can give it the right place, be used appropriately (Nadimpalli, 2017).

In the era of globalization, the data companies collect about their customers is one of a company's greatest assets. More and more companies are using data mining to increase revenue and reduce costs. There are all kinds of valuable information that could make a difference to how any business organization runs their business and interacts with their current and potential customers, gaining the competitive edge over their competitors. The easiest way is through Data Mining. Data mining is a set of automated techniques used to extract information from large databases using various criteria, making it possible to discover patterns and relationships. This new derived information can be used in areas such as decision support, prediction, forecasting and estimation to make important, better decisions (Ramageri, 2013). Data mining software uses data as raw material, using a predefined algorithm to search through the large amounts of raw data and group the data according to the desired criteria, which can be useful for future target marketing. Data mining can also help businesses account for peak periods of consumption, freight flow and irregular transactions, which can also help reduce losses attributable to internal fraud, which is around 40-50% of inventory , suffered by retail companies. Data mining can also help resolve patterns involving refunds, discounts, price overrides, credit cards, store cards, debit cards, staff reductions, reversals, overages and shortages due to stock listed as damaged or defective , thus making retail fraud detection much easier, accurate, timely and economical. Data mining and electronic commerce provide numerous opportunities for technical communications and collaboration among professionals willing to acquire new skills and expertise (Apte, 2002).

Creating a picture of what's going on is based on the continuous collection, storage, processing and analysis of large amounts of data to provide the information a business will need. Sales transactions made by people generate terabytes of data, which is growing every day. Data mining tools predict future trends and behaviors, allowing companies to make knowledge-based decisions that will affect the company (Hebert, 2014). Data mining is typically used for the following purposes: to improve customer acquisition and retention, to reduce fraud, to identify internal inefficiencies and then restore operations. The main types of tools used in data mining are: artificial neural networks, genetic algorithms, rule induction, data visualization. Data mining uses discovery-based approaches where pattern matching and other algorithms are used to discover key relationships in the data, previously unknown to the user (Hormozi, 2006). It can be said that data mining applications can be used in a variety of sectors: retail, consumer goods sales, finance, manufacturing, banking, insurance and utilities. Thus, if a company has data about its customers, suppliers, products or sales, it can benefit from data mining, and it can be predicted that data mining will be one of the best tools to be used by retailers and in general by business communities in the next century (Han, 2006).

In retail, every time merchandise is handled, it costs the retailer. By incorporating data mining techniques, retailers can improve their inventory logistics and thus reduce their inventory handling costs. Through data mining, a retailer can identify the demographics of its customers, such as gender, marital status, number of children, etc. and the products they buy. This information can be extremely beneficial for stocking merchandise at new store locations. For national retailers, this information can have a tremendous positive impact on their operations by reducing inventory movement as well as placing inventory in locations where it is likely to sell (Bala, 2009).

Most retail businesses use Data Mining in one way or another, using simple software or third-party services. Wal-Mart is often described as a pioneering leader in data mining and data management: Wal-Mart captures point-of-sale transactions from more than 2,900 stores in six countries and continuously feeds this data to its massive 7.5 terabytes. Wal-Mart allows more than 3,500 suppliers to access data about their products and perform data analysis. These providers use this data to identify customer purchasing patterns at the store display level. They use this information to manage local store inventory and identify new merchandising opportunities. Small businesses can also use data analytics techniques to attract more customers or increase sales from their current customer base (Shaw, 2001).

Data Mining is also used in the emerging e-commerce industry to study and identify performance limitations, analyze data for patterns, detect fraud, and implement fraud reduction methods. Data Mining helps e-commerce to increase sales, do it 24/7 and eliminate political and physical borders. But at the same time, it is essential to pay due attention in its use in e-commerce, due to its global feature that has no national borders. As such, no country or organization can establish rules, safeguards to ensure its correct use and to certify the integrity of the result. Data mining presents challenges that go far beyond the technical. Data mining should be used with well-defined criteria, which should not be based on any kind of prejudice or stereotypical assumptions. Otherwise, the result of data analysis will not give the desired result (Hebert, 2014). Many data management challenges remain, both technical and social. Large online databases raise serious social issues. A prominent social issue is electronic data exchange and data mining software that makes it relatively easy for an organization to track all of its customers' financial transactions. By doing so, one can build a very detailed profile of the consumer's interests and finances (Wu, 2002). Data mining is a very powerful tool that should be used with utmost care to increase customer satisfaction by providing better, safe and useful products at reasonable and economical prices. This should be used to make retail more competitive and profitable. Data mining should be used in such a way as to preserve the privacy and individuality of the human being. It should not be used in any way that may cause undue hardship, financial loss or emotional setbacks (Ahmed, 2004).

Research methodology

The methodology followed by the article is a content analysis of forecasts in the era of globalization in the retail field. This method is widely used in the specialized literature. In this article, the first phase involves a literature review and consists of selecting relevant articles from ResearchGate, Science Direct, Scopus and Springer. The articles found were identified using the keywords "globalization", "retail", "artificial intelligence", etc. and we identified a set of about 30 items. In the second phase, the selected articles are analyzed to

identify the following aspects: the impact of globalization in the retail sphere, how artificial intelligence changes the landscape of retail in the context of globalization, etc.

Results and discussion

In the age of globalization the more "intelligent" technologies become, the more autonomous they become and make their own decisions. This means that a new relationship is developing between man and machine that must be guided by law and regulation. Important to note is that society is introduced to new technology. This will inevitably lead to adaptations to existing laws and the development of new legislation and regulations where gaps exist (Holder, 2016). Robotic technologies will have a major impact on the retail industry and society, and will therefore affect how the law develops. Robots are functional objects that physically interact with the material world. As a result, the main intellectual property rights that concern robots are patents and copyrights, the latter arising from the software that controls the operation of robots. The Technical Board of Appeal of the EPO (European Patent Office) tried to provide a definition of what would be contrary to ethics or morality. The Council considered that the concept of ethics covered the protection of public safety and the physical integrity of individuals as part of society, as well as the protection of the environment. Therefore, inventions the exploitation of which could violate public peace or social order, or seriously harm the environment, should be excluded from patentability (Clark, 2020).

Nowadays, customer experience has become the main point of competition for most organizations (Beranek, 2018). Retailers recognize that better customer understanding can enhance customer satisfaction and retail store performance (Puccinelli, 2009). What customers really care about is finding an answer to their current needs or wants in a way that's convenient, enjoyable and gives them good value, both in terms of their money and the use of their time. Today's customers have access to a wider range of technologies than previous generations, with many customer segments growing or being heavily influenced by technology. Changing lifestyles mean that customers want to undertake the purchase process at a time and place that suits their needs, using technology that is in their hand or in front of them (Cook, 2014). Customers want a buying process on their terms and at their convenience. Retailers need to adapt to this and provide customers with such a pleasant experience that customers want to keep coming back. (Cook, 2014).

Artificial Intelligence is changing the customer experience in the era of globalization (Hilton, 2020). The omni-channel consumer experience exhibits a different set of behaviors than the traditional retail consumer experience. Omni-channel customers are better informed, use technology more. When they find a retailer that provides the experience they want, those customers become very loyal and profitable, provided the overall experience is maintained. Serving the omni-channel customer requires the retailer to use smart technology so that information and data are available not only to customers but also to the staff serving those customers (Cook, 2014). In order to understand retailing and consumer experiences, it must be understood that consumers are trying to achieve a specific goal by purchasing and using a specific product or service (Puccinelli, 2009).

Conclusion

New technologies such as the Internet of Things (IoT), augmented reality (AR), virtual reality (VR), mixed reality (MR), virtual assistants, chatbots and bots, which are typically

powered by artificial intelligence (AI) , dramatically changes the customer experience. In the future, customers will have radically new experiences thanks to new technologies (Hoyer, 2020). Thanks to IoT, AR, VR, MR technologies and virtual assistants, chatbots and robots, customers will have a new retail experience - the way shoppers experience the world, the way they relate to others and the way they perceive objects in this world. AR, VR, MR add additional informational capabilities and experiences to existing real-life experiences. AR does this by creating an additional and interactive experience of a real-world environment through computer-generated displays, thereby creating more interactive, vivid and rich experiences for consumers. For consumers, digital technologies increase shopping convenience and offer new purchasing channels. AR will enable retailers and brands to virtually display products and accessories - allowing consumers to imagine what they would look like before purchase (Pantano, 2012). There is no doubt that technology is having a strong impact on the retail landscape (Grewal et al., 2017), with innovation becoming especially important to the customer experience in highly competitive industries such as retail (Romano, 2020).

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THE POTENTIAL OF WEB3 REGARDING DECENTRALIZED FINANCE - DEFI

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Abstract: In this article, we discuss the potential of Web3 in the context of decentralized finance (DeFi). Web3, as the new generation of the internet and new approaches, comes with a decentralized architecture and increased security through the use of blockchain technology. These characteristics make Web3 a suitable environment for DeFi, which is a decentralized financial system based on blockchain technology and smart contracts to provide financial services. DeFi eliminates the need for intermediaries in financial transactions and can provide access to financial services globally, even for those who do not use traditional financial instruments. We address the various aspects of DeFi that are possible through the use of Web3, such as payments, loans, and digital asset exchanges. We also aim to address how Web3 can solve some of the current issues facing DeFi, such as scalability and interoperability. Additionally, we discuss the regulatory perspective, how these new financial systems bring and create new risks, and what the management tools for these risks can be from two perspectives: financial stability and the protection of consumers/investors, and financial education as a proactive element of self-management of increasingly complex new financial concepts. DeFi is one of the most innovative and exciting applications of blockchain technology that can transform and improve the global financial system. However, DeFi is still in its early stages and faces certain challenges, such as scalability and interoperability between different DeFi platforms. Web3 can play a significant role in addressing these challenges by creating a decentralized environment that can facilitate value transfer and interconnectivity between different DeFi platforms. Web3 can also enhance the security and transparency of DeFi platforms by leveraging blockchain technology and smart contracts. The emergence of DeFi also brings new risks and challenges, particularly in terms of regulation and consumer protection. Financial authorities must adopt a proactive approach to regulate these new financial systems and ensure their stability and security, while also promoting financial education and awareness among consumers and investors.
Keywords: DeFi, Web3, blockchain, financial markets
JEL Classification: G22, G23, G52

What does the concept of Web 3 represent?

Web 3.0 is an evolution of the internet that focuses on building a decentralized network based on blockchain that allows people to interact in a more secure, private, and intermediary-free way. In Web 3.0, information and assets are stored and managed through decentralized technologies like blockchain and can be accessed by users without central intermediaries. This evolution of the internet could have a significant impact on the financial market by changing the way financial transactions are managed and creating new

business models. Currently, the financial market is dominated by centralized intermediaries like banks and currency exchange houses, which often impose high fees and commissions and can limit access to financial services.

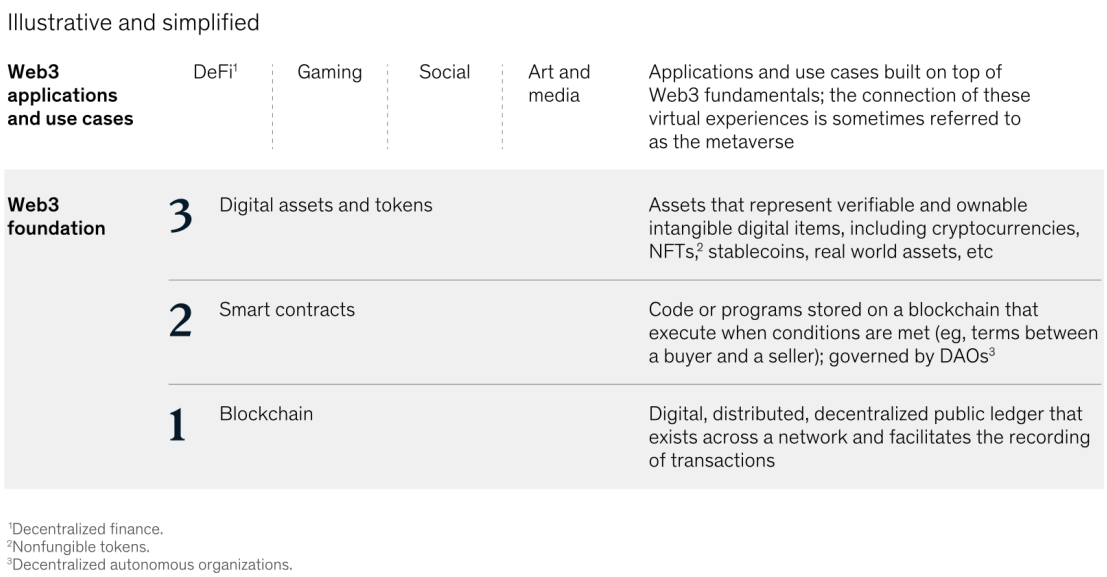
Web 3.0 can offer a cheaper, more efficient, and more transparent alternative to centralized intermediaries by using blockchain technologies. These technologies allow people to make financial transactions directly with each other without the need for central intermediaries. They also allow for the secure and decentralized storage and transfer of digital assets like cryptocurrencies. Additionally, Web 3.0 can facilitate the development of new business and financing models, such as crowdfunding and decentralized financing (DeFi). (https://www.mckinsey.com/industries/financial-services/our-insights/web3-beyond-the-hype)These new business models allow people to finance their projects and ideas without the need for central intermediaries and to benefit from greater transparency and accessibility to funding. In the same time, Web 3.0 can bring significant changes to the financial market by eliminating centralized intermediaries, creating new business models, and improving the security and transparency of financial transactions. However, there are also risks and challenges associated with using blockchain technologies in finance, such as cryptocurrency volatility and vulnerability to cyberattacks, which must be addressed before Web 3.0 becomes a reality in the financial world. Web 3.0 is expected to be more privacy-focused, giving users more control over their personal data. This is achieved through technologies like zero-knowledge proofs, which allow users to prove their identity or data without revealing any sensitive information.

Web 3.0 is also expected to enable greater interoperability between different blockchain networks and decentralized applications, allowing for seamless integration and communication between them. In the era of Web 3, when we talk about decentralization and decentralized finance, the emergence of new innovative products and services clearly indicates a shift, including new business models, access to products, and so on. The volumes traded through decentralized platforms exceeded $10 billion at their peak. (The Chainalysis state of Web 3 Report, 2022, https://go.chainalysis.com/2022-web3-report.html). Decentralization can manifest in multiple sectors of activity, from art, real estate, to sports, and other domains.

Web 3 - Premises and Functioning

Web 3 should be approached from multiple perspectives, especially when we associate this concept with the financial market. Blockchain is the technology that intervenes in the execution of operations, and smart contracts practically eliminate human intervention and reflect a consensus. We are talking about digital assets that are traded through smart contracts. All these concepts are integrated into the new paradigm that is increasingly making its presence felt in the financial market. (www.mckinsey.com).

Fig. 1 - Web 3 applications



Source: (www.mckinsey.com)

Decentralized Finance, or DeFi for short, is a new paradigm in the financial industry that leverages blockchain technology to create a decentralized and open financial system. Unlike traditional finance, where intermediaries such as banks and other financial institutions facilitate transactions, DeFi enables users to transact with each other directly without the need for intermediaries. This creates a more accessible, transparent, and inclusive financial system, where anyone with an internet connection can participate in various financial activities. On the other hand, a definition of what DeFi means can be found in the presentations of Fabian Schar, a blockchain professor at the University of Basel. He regards DeFi as: „Decentralized finance (DeFi) is a blockchain-based financial infrastructure that has recently gained a lot of traction. The term generally refers to an open, permissionless, and highly interoperable protocol stack built on public smart contract platforms, such as the Ethereum blockchain. It replicates existing financial services in a more open and transparent way. In particular, DeFi does not rely on intermediaries and centralized institutions. Instead, it is based on open protocols and decentralized applications (DApps). Agreements are enforced by code, transactions are executed in a secure and verifiable way, and legitimate state changes persist on a public blockchain. Thus, this architecture can create an immutable and highly interoperable financial system with unprecedented transparency, equal access rights, and little need for custodians, central clearing houses, or escrow services, as most of these roles can be assumed by smart contracts." (Decentralized Finance: On Blockchain- and Smart Contract-Based Financial Markets, Fabian Schar, 2021)

"In another approach, Web3 is based on the use of blockchain technology to create a more equitable internet, and decentralized finance is the Web3 version of a more transparent financial system. In this regard, DeFi is rapidly becoming a new paradigm that enables new forms of value and utility that are unseen in the traditional financial system. The emergence of DeFi can be traced back to the launch of Ethereum in 2015, which introduced smart

contract functionality to the blockchain. Smart contracts are self-executing agreements that can be programmed to perform specific tasks automatically when certain conditions are met. This made it possible to create decentralized applications that could perform various financial functions, such as lending, borrowing, trading, and investing, without the need for intermediaries." (https://www.gemini.com/cryptopedia/defi-and-web3-explained-defi-crypto-options-web3-crypto)

One of the key characteristics of DeFi is that it operates on an open and permissionless blockchain, which means that anyone can access and use the system without needing permission from any central authority. This makes DeFi more accessible than traditional finance, which often requires extensive KYC (Know Your Customer) and AML (Anti-Money Laundering) checks to comply with regulations. Another characteristic of DeFi is that it is transparent and immutable. All transactions and data are stored on the blockchain, which means that they are publicly accessible and cannot be altered once they are recorded. This creates a high level of transparency and accountability, which can help to reduce fraud and corruption in the financial system. DeFi also provides users with more control over their funds. Instead of relying on a centralized custodian to hold their assets, users can hold their assets in a decentralized wallet that they control. This eliminates the risk of losing funds due to the insolvency of a custodian or the risk of having their assets frozen or confiscated by a central authority. One of the most popular use cases of DeFi is decentralized lending and borrowing. This involves lending and borrowing assets without the need for a centralized intermediary. Instead, borrowers can use their assets as collateral to borrow other assets from lenders, who earn interest on their loans. This creates a more efficient and transparent lending market, where borrowers can access capital at lower rates and lenders can earn higher returns on their investments.

In the following, we present another perspective - DeFi is decentralized exchanges (DEXs), which allow users to trade cryptocurrencies without the need for a centralized intermediary. DEXs operate using automated market makers (AMMs), which use smart contracts to determine the price of assets based on supply and demand. This creates a more efficient and transparent trading market, where users can trade cryptocurrencies without the risk of losing their funds to hacks or other security breaches. Other use cases of DeFi include prediction markets, insurance, stablecoins, and yield farming. Insurance allows users to protect themselves against risks, such as hacks or smart contract failures. Stablecoins are cryptocurrencies that are pegged to the value of a fiat currency, such as the US dollar, and provide users with a stable store of value. Yield farming allows users to earn rewards for providing liquidity to DeFi protocols.

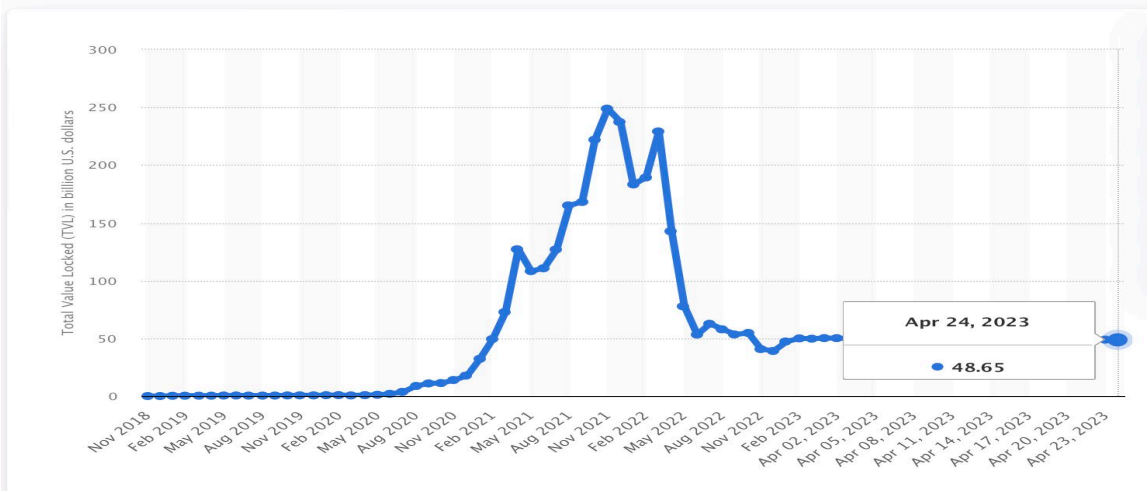
Given the above, in our opinion, DeFi is a revolutionary new paradigm in the financial industry that leverages blockchain technology to create a more accessible, transparent, and inclusive financial system. With the emergence of DeFi, anyone with an internet connection can participate in various financial activities without the need for intermediaries. DeFi provides users with more control over their funds, eliminates the risk of losing funds. When referring to DeFi, the term TVL (Total Value Locked) should be introduced. Total Value Locked (TVL) is a measure used in decentralized finance (DeFi) to evaluate the total value of assets locked in a specific DeFi protocol or application at a given time.

More specifically, TVL represents the sum of the monetary value of all cryptographic assets locked or engaged in a certain DeFi protocol. These assets can be, for example,

Ethereum (ETH), Bitcoin (BTC), stablecoins, or other tokens specific to a protocol. The TVL value is important for investors and developers as it can indicate the level of adoption and usage of a DeFi protocol, as well as the level of liquidity available in that protocol. Additionally, the TVL value can be used to compare the popularity and success of different DeFi applications. The adoption rate of decentralized finance can also represent a unit of measure for what the Web 3 concept aims to bring.

"The Blockchain technology can improve essential basic services in traditional finance and has the potential to become the foundation for decentralized business models, providing entrepreneurs and innovators with all the necessary tools. Through a distributed and trustworthy infrastructure, blockchain technology optimizes transaction costs and enables the emergence of innovative, interoperable, borderless, and transparent decentralized applications that facilitate open access and encourage permissionless innovation." (Decentralized Finance (DeFi) – The Lego of Finance, Andrei-Dragoş Popescu, 2020). One of the main problems that DeFi faces is the volatility of cryptocurrencies, which can fluctuate significantly in value in a short period of time. Additionally, there is also the risk of implosion of DeFi platforms, which could lead to significant losses for users.

Fig.2 - TVL (total value locked) across multiple Decentralized Finance (DeFi) blockchains



Source: (www.statista.com)

The connection between Web 3 and DeFi

As we have shown throughout the article, the technical connection between Web 3 and DeFi is that Web 3 technologies, such as blockchain and decentralized protocols, are used to build and power decentralized finance applications and systems. The use of Web 3 technologies allows for greater transparency, security, and trust in DeFi applications, as well as greater accessibility and interoperability. By leveraging Web 3 technologies, DeFi is able to create decentralized and trustless financial systems that are not subject to the control of centralized intermediaries, such as banks and financial institutions. Overall, Web 3 is a key enabler of DeFi, providing the technical foundation for the creation of a more open, transparent, and accessible financial system. Decentralized Finance (DeFi) is an emerging field that aims to provide financial services and applications using blockchain and Web3 technologies, as we have shown previously. The use of these technologies allows for the creation of decentralized and trustless financial systems that are not subject to the

control of centralized intermediaries, such as banks and financial institutions. One of the main advantages of DeFi is the ability to create a variety of financial applications, such as payments, loans, and digital asset exchanges, that are accessible to anyone with an internet connection. These applications are built on top of decentralized protocols, which are open source and transparent, allowing for greater trust and security compared to traditional financial systems. Payments are one of the most basic and widely used financial applications. With DeFi, payments can be made using cryptocurrencies, which are digital assets that are secured using cryptography and decentralized ledger technologies. Cryptocurrencies offer several advantages over traditional payment systems, such as lower transaction fees and faster settlement times. Another popular DeFi application is loans. With DeFi, loans can be made using cryptocurrencies as collateral, allowing for greater flexibility and accessibility compared to traditional loans. DeFi loans are typically facilitated through smart contracts, which are self-executing contracts that run on top of blockchain networks, allowing for greater automation and efficiency. Last but not least, digital asset exchanges are another key application of DeFi. With DeFi, digital assets can be exchanged in a decentralized and trustless manner, without the need for intermediaries such as centralized exchanges. Decentralized exchanges (DEXs) are built on top of decentralized protocols, allowing for greater transparency and security compared to centralized exchanges.

Regulatory perspective

From a regulatory perspective, DeFi presents significant challenges because it operates outside the traditional financial system, making it difficult to monitor and regulate. There is also a lack of clarity about the legal and regulatory framework for DeFi, which makes it challenging for regulators to determine how to manage the risks associated with it. One of the significant risks associated with DeFi is financial stability. The decentralized nature of DeFi means that there is no central authority or intermediary to regulate and manage the risks associated with the financial system. As a result, there is a higher risk of systemic failures, such as liquidity risks, market risks, and operational risks. To mitigate these risks, regulators need to implement regulatory frameworks that promote transparency, accountability, and risk management. They can do this by implementing regulations that require DeFi platforms to provide clear disclosures about their risks, performance, and governance. They can also require DeFi platforms to maintain adequate reserves to manage risks, ensure that DeFi protocols have sufficient liquidity, and require platforms to undergo regular audits to identify and mitigate any risks. Another significant risk associated with DeFi is the protection of consumers/investors. DeFi platforms operate in a decentralized environment, which means that there is no central authority to oversee the conduct of the platform operators. This makes it challenging to protect consumers/investors from fraud, theft, and other malicious activities. To manage such a risk, regulators can implement regulations that require DeFi platforms to adhere to the same consumer protection standards as traditional financial institutions. For example, they can require DeFi platforms to have a customer support mechanism, provide clear disclosures about their risks and fees, and ensure that investors have access to dispute resolution mechanisms.

From our perspective, regulation alone is not sufficient, and proactive risk management tools are needed to address the risks associated with new financial models. In our opinion, financial education is a proactive tool that can create healthy financial behaviors by

understanding the risks and making financial decisions that are in line with the real needs and risk appetite of each potential user or investor. Financial education is crucial in managing the risks associated with DeFi. The fast-paced nature of DeFi means that new financial concepts and products are continually emerging, making it challenging for consumers/investors to keep up. Therefore, education is essential to ensure that consumers/investors can make informed decisions about their investments in DeFi. In the same time, as we have shown, Web 3.0 represents a significant shift towards a more open, decentralized, and democratized internet. By eliminating intermediaries and giving users more control over their data and assets, Web 3.0 has the potential to revolutionize industries beyond finance, including media, gaming, and social networks, among others.

Conclusions

DeFi is a rapidly evolving field with the potential to revolutionize the financial industry by creating more open, transparent, and accessible financial systems that are not controlled by centralized intermediaries. DeFi presents significant opportunities and risks to the financial industry. To manage the risks associated with DeFi effectively, regulators need to implement regulatory frameworks that promote transparency, accountability, and risk management. Additionally, financial education is crucial in ensuring that consumers/investors can make informed decisions about their investments in DeFi. DeFi in Web 3.0 has the potential to revolutionize the financial industry by providing more open, transparent, and accessible financial services to everyone. However, to fully realize this potential, stakeholders must work together to manage the risks associated with these new technologies and ensure the safety and security of users and their assets.

This requires collaboration between developers, regulators, and users to establish robust security and risk management frameworks that protect against smart contract risks, liquidity risks, cybersecurity risks, and other potential threats. Additionally, financial education is essential to ensure that users have the knowledge and understanding necessary to make informed decisions and manage their assets effectively. In terms of DeFi, we can expect to see continued growth and innovation in decentralized finance protocols and applications. This may include the development of new DeFi platforms and tools, such as decentralized exchanges (DEXs), lending and borrowing protocols, stablecoins, and insurance products, among others. Additionally, we may see greater integration between DeFi and traditional finance, as more institutions and investors begin to recognize the potential benefits of decentralized finance.

As for Web 3.0, we can expect to see further development of decentralized technologies and applications, as well as greater adoption of blockchain and related technologies. This may include the development of new decentralized content creation and distribution platforms, gaming and social media platforms, and other applications that empower users and eliminate intermediaries. A general conclusion that we submit about DeFi and Web 3.0 is likely to be characterized by continued innovation, growth, and adoption, as more developers, entrepreneurs, and users recognize the potential benefits of decentralized technologies and work to realize their full potential.

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A NEW TOOL FOR ANALYSING THE PERFORMANCE OF INSTITUTIONS REGARDING PUBLIC PROCUREMENT PROCESSES

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Abstract: Public procurement is one of the ways in which authorities contribute to the welfare of citizens through investment and services. Articles in the literature have done relatively limited work on analysing the performance of the public procurement system and the factors that influence this performance in comparison with procurement and the way these processes are organised in private companies. The aim of this paper is to propose a new tool for analysing the factors influencing the performance of public procurement structures in Romanian government institutions. Based on the literature and the author's more than 15 years of experience in the field of public procurement, the present framework was developed. Several dimensions have been taken into account in the development of the tool, thus the following were taken into account: the organisation of the institution, the degree of specialisation of the staff involved in the procurement process, the degree of recognition of the procurement function within the institution. This questionnaire can be used in any analysis of factors leading to the performance of institutions in Romania in terms of the duration of public procurement processes. These analyses will contribute to the development of strategies in the field of optimising staffing requirements and improving the performance of procurement structures in public institutions.
Keywords: procurement; performance; time; tool
JEL Classification: H57, H41

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Introduction

The public procurement system is used by all public institutions wishing to procure goods, services and works for internal use or for the benefit of citizens. Often, the time between when a need is identified and when it is met is too long for the beneficiaries of these processes. The literature has dealt relatively lightly the factors that influence the performance of public institutions in terms of the duration of a procurement process. In order to be able to analyse why certain institutions perform better, it is necessary on the one hand to have a complex tool for analysing the factors influencing performance in terms of the duration of a procurement process and on the other hand to establish reference values for certain indicators. In the preliminary analysis it was taken into account that the activity of public institutions differs between the areas of activity of public institutions. Although

some internal needs are common, most of them are different depending on the field of activity in which they operate. In order to be relevant, benchmarks must be set at the level of the domain of activity of the public institution under analysis. The existence of different results per activity domain has been highlighted in the article "Romanian public procurement - an overview" (Ungureanu, 2023b). In this regard, a preliminary analysis of the information on these institutions is necessary. Some of the necessary data can be obtained directly from the Electronic Public Procurement System (EPPS) or from the centralised data published by the Authority for the Digitisation of Romania (Authority for the Digitisation of Romania - Authority, 2023) which ensures the functioning of the EPPS, without the need to contact the contracting authorities. The data are published by the Authority on https://data.gov.ro (Romanian Government, 2023). For other data, it has been considered introducing some questions in the questionnaire to obtain this information. Also, part of the data obtained from the questionnaire could be validated with the public data from the EPPS (Authority, 2023) or corroborated with them for the analysis. The data obtained from the questionnaire will be used to provide the necessary information for the analysis. The duration of public procurement processes is recognized in the literature as an indicator of the performance of public institutions in terms of these processes (Guccio et al, 2014) (Patrucco et al, 2019) (Patrucco et al, 2016). The rest of the paper is organized as follows: Section 2 will present the scope of this instrument, the hypotheses on which it is based and the proposed questions. Section 3 presents the limitations of this study and section 4 presents the conclusions.

Objective and hypotheses

Scope

The aim of this paper is to propose a questionnaire that allows the analysis of differentiators between public institutions in Romania, especially those in higher education in terms of factors that lead to better performance for some of them in terms of duration of public procurement processes. As a secondary objective we aimed the collection of data for the calculation of an additional number of performance indicators of the institution under analysis.

Research hypotheses

The hypotheses on which this questionnaire is based are:

H1. There are differences in the way procurement activity is organised in contracting authorities.

H2. There are differences in terms of procurement staff between contracting authorities, their level of responsibility and their level of knowledge.

H3. There are differences between contracting authorities in the recognition given to the procurement function.

H4. There are differences in the degree of standardisation of technical specifications, of the internal bureaucracy of the institution, as well as in the forms used for the products/services procured in public institutions in Romania.

H5. There are differences between the time of submission of the reports of necessity and opportunity for procurement in Contracting Authorities.

H6. There are differences between public institutions in terms of the structure that draws up the specifications for a procurement procedure and in terms of the structure that ensures contract management.

In structuring the questions and the data to be collected and analysed, the literature and the author's experience in the field of public procurement were taken into account.

Based on the research hypotheses mentioned above, the following questions were established:

2.2.1 With regard to the differences between the various approaches to procurement activity in Contracting Authorities, the following models have been found in the literature (Patrucco et al, 2019) (Glock and Broens, 2011)

All procurement is carried out centrally by the internal structure specialized in procurement (centralized model)

The structures of the institution can carry out small value purchases independently of the internal specialised procurement structure (hybrid model)

In order to check which of these two models I find in the institution under analysis, I introduced the following question:

Regarding your institution, please read carefully the questions below and give us your answer using a scale from 1 - completely disagree to 5 - completely agree

- The structures of the institution are involved in the procurement process.
- The structures of the institution have the right to carry out small value purchases independently of the internal structure specialised in procurement
- All purchases are carried out centrally by the specialised internal structure

2.2.2 With regard to how the procurement process is carried out, the following models have been found in practice and in the literature (Glock and Broens, 2011) (Patrucco et al, 2019):

A single person carries out the procurement activity from the request of quotation to the payment of the purchased product/service

The procurement activity is split between several structures in the institution according to the stages of a procurement, with a division of labour.

The procurement activity is carried out in several departments within the internal structure specialized in the field of public procurement, with one department dealing only with procurement through direct purchases and another dealing only with tender procedures.

In order to identify which of these models applies, we included the following question in the questionnaire:

Regarding your institution, please read carefully the questions below and give us your answer using a scale from 1 - completely disagree to 5 - completely agree

- Procurement activity is carried out from the time the request of quotation is drawn up to the time the order for payment is drawn up by the same person.
- Procurement activity is split between different structures in the institution, depending on certain stages of the procurement process
- Procurement activity is carried out by several departments within the internal structure specialised in the field of procurement, depending on the type of procurement method: direct purchase or tendering procedure

2.2.3 One of the factors that directly influences the conduct of a procurement process, and therefore its outcome, is personnel. This factor is mentioned in several articles analysing public procurement processes (Patrucco et al, 2019) (Glock and Broens, 2011) (Ungureanu, 2023a) (Plaček, 2019) (Abrahim and Tarekegn, 2020).

This factor is analysed in this questionnaire under several aspects:
- Number of Full Time Equivalent persons performing procurement activities.
- the level of studies of the staff involved in procurement processes
- the level of specialisation in the field of procurement of the persons in the internal structure specialised in the field of procurement
- the level of specialisation of the persons in the internal structure specialised in the field of procurement on certain stages of the procurement process
- experience of staff involved in procurement activities
- the level of workload of the staff in the internal structure specialised in the field of procurement in relation to the staff fluctuations within it
- the degree of involvement of persons from the technical structures of the institution in the various stages of the procurement process

In order to analyse and obtain data to be analysed in correlation with other variables, we have included the following questions:

Regarding your institution, please read the questions below carefully and provide us with your answer using a scale from 1 - strongly disagree to 5 - strongly agree
- The internal structure specialising in procurement has experienced staff fluctuations over the last 12 months
- Staff in the internal procurement specialist structure regularly raise the issue of overload
- Each procurement is assigned according to the knowledge of the person who will carry out the procurement
- Tasks arising in the course of an tender procedure are carried out by the same employees
- The internal procurement staff use the EPPS Portal without problems
- The commission for the evaluation of tenders in the tender procedure is usually composed of staff from the internal procurement structure
- The commission for the evaluation of tenders in the award procedure is usually composed of staff from the structure requesting the procurement
- The commission for the evaluation of tenders in the award procedure is usually composed of staff from several departments and structures and is composed of persons with experience and/or expertise in the field of procurement.
- The commission for the evaluation of tenders in the tender procedure is usually composed of 3 members
- The commission for the evaluation of tenders in the award procedure is usually composed of 5 members
- The commission for the evaluation of tenders in the award procedure is usually composed of 7 or more members
- The number of members of the evaluating commission has an impact on the duration of an award procedure
- The award criterion "Most advantageous tender" requires specialised staff to evaluate bids
- An evaluation commission composed of staff from the structure requesting the procurement runs an award procedure in a short time.
- An evaluation commission composed of staff from the internal structure specialised in the field of procurement carries out an award procedure in a short time.

- An evaluation commission composed of persons with experience and/or expertise in the field of procurement from several departments and structures carries out an award procedure in a short time.

I have also included the following questions:

Q.4. What is the total number of people (Full time equivalent - FTE) who carry out purchases in your institution? (open text, numeric)

Q.5. What is the total number of employees in the internal structure specialised in public procurement (open text, numeric)

Q.6. What is the percentage of people with higher education in the internal structure specialized in procurement (open text, numeric)?

Q.7. What is the average number of public procurement training courses attended by persons in the internal structure specialised in procurement: a) 1 course attended ; b) 2-4 courses attended; c) 5 or more courses attended

Q.8. What is, on average, the experience of the persons in the internal structure specialised in the field of public procurement in carrying out procurement processes? a) Less than 1 year; b) 1-3 years; c) 3-5 years; d) 5-10 years; e) More than 10 years

Q.9. What is the annual average number of award procedures carried out by each employee in the internal procurement structure that carries out award procedures? (open text, numeric)

Q.10. What is the number of award procedures that were carried out outside EPPS in the previous calendar year in your institution? (open text, numeric)

Q.11. What is the number of direct purchases that were carried out in the previous calendar year in your institution? (open text, numeric)

These questions will allow us to calculate the number of award procedures carried out by an employee in the internal structure specialised in the field of procurement in public institutions where employees have staff fluctuations and raise the issue of overload compared to public institutions at the opposite side.

Q.12. a) Out of the total number of award procedures carried out in the previous year, how many were the award documents subject to appeal? (open text, numeric) b) Out of the total number of appeals submitted against the Tender Documentation, how many were won by the Contracting Authority? (open text, numeric) c) Out of the total number of award procedures carried out in the previous year, in how many was the result of the procedure appealed? (open text, numeric) d) Out of the total number of appeals against the result of the procedure, how many were won by the Contracting Authority? (open text, numeric) e) Out of the total number of tender procedures carried out in the previous year, in how many of them were requests for clarification made at the stage of submission of bids? (open text, numeric) f) Out of the total number of tender procedures carried out in the previous year, how many were cancelled totally or more than 50% of the number of lots? (open text, numeric)

This question will allow us to assess the quality of the work at the planning stage of the tender procedures and at the evaluation stage of the tenders submitted. Also, the staff workload can be reduced by using the exceptions included in Law 98/2016.

We will analyse this aspect by asking:

Q13. For your institution, please read carefully the questions below and provide us with your answer using a scale from 1 - never to 5 - almost always

- In your institution as a rule the right to purchase on the basis of a single offer is used if the estimated value of the purchase is less than or equal to the value thresholds specified by Law 98/2016.
- In the institution the right to pay directly, on the basis of a legal agreement, without prior acceptance of an offer, is usually used if the estimated value of the purchase is less than the value thresholds specified in Law 98/2016

2.2.4 Central procurement units, according to previous studies by Ungureanu (2023a), Dameri et al (2012) or Abrahim (2020), often bring benefits to the institution by relieving staff from the internal structure specialized in procurement from carrying out certain award procedures. We will analyse this aspect by the following question:

Q14. Regarding your institution, please read the questions below carefully and provide us with your answer using a scale from 1 - strongly disagree to 5 - strongly agree

- Did the framework agreements organised by the Central Purchasing Unit in which you took part provided benefits to the institution.
- Did the framework agreements organised by the Central Purchasing Unit in which you took part provided benefits for the employees of the internal procurement structure?

2.2.5 The procurement function receives greater recognition in some Contracting Authorities than in others. The literature has found differences in the performance of the internal structure according to the degree of recognition of this function (Patrucco et al, 2019). Therefore, the closer the internal structure specialized in procurement is in terms of subordination to the first level of management, the higher the degree of recognition of the importance of this function and the higher the performance of this structure will be. In order to analyse this aspect, we included the following question in the questionnaire:

Q.15. In your institution, the internal structure specialised in procurement is subordinated to: a) The first level of management b) A person at the second level of management c) A person at the third level of management d) A person at the fourth level of management and above

2.2.6 Previous studies (Ungureanu C., 2023a) and literature (Patrucco et al, 2019) have revealed that greater standardization of technical specifications and forms used in tendering procedures implicitly leads to a shorter time for the conduct of a tender procedure. We will analyse these aspects in the questionnaire through the following question:

Q16. Regarding your institution, please read carefully the questions below and give us your answer using a scale from 1 - completely disagree to 5 - completely agree

- Technical specifications for purchased goods are standardised within the institution
- Technical specifications for purchased services are standardised within the institution
- The formalities used in the procedures are usually the same
- The formalities used in the procedures are different only according to the type of contract awarded.

2.2.7 Another factor impacting on the duration of an award procedure is a high level of internal bureaucracy of the Contracting Authority (Ungureanu C., 2023a) (Kolosova and Zilinskiene, 2021). In order to measure the existence or not of this high level, we introduced the following question:

Q17. Regarding your institution, please read carefully the questions below and give us your answer using a scale from 1 - completely disagree to 5 - completely agree

- There is an electronic document management system in place that includes components of the procurement process

- There are complaints from internal stakeholders regarding the high level of internal bureaucracy in the institution.

2.2.8 Previous studies (Ungureanu C., 2023a) have indicated that the length of the procedure and the quality of the outcome of an award procedure can be influenced by several factors, including better analysis at the planning phase and the level of knowledge of the people on the evaluation commission. Better analysis at the planning phase also influences the degree of workload of internal procurement staff.

Thus, we will check these aspects through the following questions:

Q18. Regarding your institution, please read carefully the questions below and give us your answer using a scale from 1 - strongly disagree to 5 - strongly agree

- An award procedure for which the planning phase is longer, has a shorter time for evaluation of tenders
- The quality of the analysis carried out and the decisions taken in the planning stage has an effect on the duration of an award procedure
- The quality of the analysis carried out and the decisions taken at the planning stage has an effect on the quality of the outcome of an award procedure
- The quality of the outcome of an award procedure depends on the level of knowledge of the person who draws up the specifications/technical specifications
- The quality of the outcome of an award procedure depends on the level of knowledge of the persons in the evaluation commission

Q.19. In your institution, the specifications for the purchase of products are usually drawn up by: a) Applicant; b) Internal structure specialised in public procurement; c) Internal structure specialised in the field of the purchased item; d) Other: (open text)

Q.20. In your institution, the specifications for the procurement of services are usually drawn up by: a) Applicant; b) Internal structure specialised in public procurement; c) Internal structure specialised in the field of the purchased item; d) Other: (open text)

Q.21. In your institution, management of the contract for the procurement of products is usually carried out by: a) Solicitor; b) Internal structure specialised in public procurement c) Internal structure specialised in the field of the purchased item; d) Internal structure specialised in procurement contract management; e) Other: (open text)

Q.22. In your institution, management of the contract for the procurement of services is usually carried out by: a) Solicitor; b) Internal structure specialized in public procurement c) Internal structure specialised in the field of the purchased item; d) Internal structure specialised in procurement contract management; e) Other: (open text)

Q.23. In your institution, management of the contract for works procurement is usually carried out by: a) Solicitor; b) Internal structure specialized in public procurement c) Internal structure specialised in the field of the purchased item d) Internal structure specialised in procurement contract management e) Other: (open text)

2.2.9 Previous experience has shown that the timing of the submission of the necessity and opportunity report has an effect on the duration of an award procedure, from the point of view of the stakeholders, so the following two questions have been introduced:

Q.24. In your institution, the reports of necessity and opportunity on the basis of which the award procedures are actually carried out are usually submitted: a) in the last quarter of the previous year for the entire following year b) quarterly in the year in which the purchase is made c) every six months in the year in which the contract is awarded d) immediately after

approval of the budget, within a period set by the management. e) at certain times/at certain intervals set by management f) at any time during the calendar year
Q.25. In your institution, the reports of necessity and opportunity on the basis of which direct purchases are actually made are usually submitted: a) in the last quarter of the previous year for the entire following year b) quarterly in the year in which the purchase is made c) every six months in the year in which the purchase is made d) immediately after approval of the budget, within a period set by the management. e) at certain times/at certain intervals set by management f) at any time during the calendar year

Additional indicators
As performance indicators complementary to the time in which an award procedure is carried out and that can be deduced from the resulting data I propose the following:
- Percentage of awarded procedures cancelled entirely or more than half of the lots out of the total number of procedures carried out in the calendar year.
- Percentage of appeals against the award documentation lost out of the total number of appeals filed against the award documentation
- Percentage of appeals filed against the report of the award procedure lost out of the total number of appeals filed against the report of the award procedure
- Percentage of award procedures for which clarifications were requested at the tender submission stage out of the total number of award procedures carried out in the calendar year.

Limits
This questionnaire cannot assess in detail the quality of the tender documents drawn up by the Contracting Authority nor the quality of the outcome of a tender procedure. Although some questions have been introduced in relation to these aspects, the quality of an award documentation would require a direct assessment from several points of view: clarity, degree of compliance with the legislation, whether or not the manner in which the requirements are formulated restricts competition, etc. In addition, this questionnaire requires a statistical analysis of the data on the procurement processes carried out by public institutions in the field of activity in question, in order to establish an average duration of the procurement processes carried out by them.

Conclusions
This tool aims to bring a new vision on how the performance of public institutions can be analysed in terms of the length of the procurement process. The immediate research direction is to use this questionnaire to determine the influences of the analysed factors on a sample of higher education institutions in Romania. This tool will allow a detailed analysis of the factors leading to success in terms of the duration of an award procedure. This tool aims to complete existing resources and to allow a comprehensive approach of the analysis.

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SMART CITIES AND THE PANDEMIC: CHALLENGES, SOLUTIONS AND PROSPECTS

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Abstract: As cities continue to evolve and face new challenges, the principles of smart cities - technology integration, data utilisation, sustainability, and community engagement - will remain vital in shaping the future of urban development. The COVID-19 pandemic has accelerated the adoption of these principles, highlighting their relevance and impact on enhancing the well-being of urban residents. This paper explores the evolving landscape of smart cities in the wake of the COVID-19 pandemic, delving into how cities are reimagining urban development to address the challenges they face. It examines the pivotal role of technology, data-driven decision-making, and sustainability in shaping the future of cities. Through a comprehensive analysis of key trends and best practices, this paper offers insights into how smart cities are navigating the post-pandemic era to create more resilient, sustainable, and inclusive urban environments that enhance the well-being of their residents.
Keywords: smart cities, pandemic, COVID-19, sustainability, resilience

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Introduction

Today's cities are complex systems, characterised by an increasing number of diverse and interconnected services and utilities, as well as extensive transport networks. They stand as the primary engines of economic development, concentrating more than half of the world's population and contributing over 80% of global GDP (UN, 2022). However, with this central role in global progress comes a stark reality: cities are also responsible for over 70% of global resource consumption and greenhouse gas emissions. These emissions are not only a result of urban density and the intensity of economic and social activities but also a consequence of inefficient urban planning (Bibri & Krogstie, 2017). As cities continue to grow and evolve, they grapple with multifaceted challenges that encompass various dimensions of life. These challenges span social issues, such as ensuring equitable access to education, healthcare, and housing, as well as environmental concerns related to pollution and ecosystem degradation. Furthermore, cities must address administrative challenges associated with citizen participation and the overall quality of life (Kirimtat et al., 2020; Zheng et al., 2020). In light of these complexities, the urbanisation process of the 21st century must be thoughtfully shaped and organised to allow cities to realise their

potential: not only to drive prosperity but also to enhance social cohesion, environmental quality, and the well-being of their residents.

The emergence of the COVID-19 pandemic has cast a unique spotlight on the inherent strengths and vulnerabilities of cities. While it has underscored the importance of adaptability and resilience in urban planning and governance, it has also accelerated trends in digital transformation, remote work, healthcare delivery, and sustainable mobility. The pandemic has prompted cities to reevaluate their priorities, with a newfound emphasis on public health, community engagement, and digital inclusion. This paper explores the evolving landscape of smart cities in the wake of the COVID-19 pandemic, delving into how cities are reimagining urban development to address the challenges they face. It examines the pivotal role of technology, data-driven decision-making, and sustainability in shaping the future of cities. Through a comprehensive analysis of key trends and best practices, this paper offers insights into how smart cities are navigating the post-pandemic era to create more resilient, sustainable and inclusive urban environments that enhance the well-being of their residents.

The Smart City Concept

The notion of the future of cities has been a subject of exploration across multiple disciplines, including urban planning, architecture, and research. In 1987, the Brundtland Report, titled "Our Common Future" and produced by the World Commission on Environment and Development, brought significant attention to the concept of a sustainable city. This report served as a pivotal moment, solidifying the sustainable city as the predominant vision for the urban landscapes of tomorrow. The sustainable city, grounded in a dynamic interplay of three fundamental pillars encompassing economic, social, and environmental dimensions, as articulated by Rogers (1998), strives to enhance the quality of life for urban populations while concurrently curbing resource consumption. It aspires to evolve into a self-sustaining ecosystem. In the pursuit of this ambition, various models of sustainable urban development have emerged in recent years, each contributing to the multifaceted goal of enhancing the prospects of urban inhabitants while navigating contemporary global challenges. Among these models are the "eco-city" (Bibri and Bardici, 2015), the "low-carbon city" (Gossop, 2011), the "compact city" (Neuman, 2005) and the "resilient city" (Jabareen, 2013). These models collectively represent the aspirations of cities to elevate the well-being of their residents and adapt to the complexities of the modern world.

The 1990s witnessed a remarkable period marked by technological advancements and the deep-seated integration of Information and Communication Technology (ICT) into urban services. This epoch gave rise to the concept of the digital city, which envisioned a comprehensive, internet-based representation of myriad city functions, designed to be accessible to all, irrespective of their technical expertise (Couclelis, 2004). Notably, the recognition of technology as an indispensable cornerstone in shaping the cities of the future dates back to the 1980s. During this time, various concepts emerged, such as the “wired city” (Dutton, 1987), the “information city” (Castells, 1996), the “cyber city” (Graham and Marvin, 1999), the “ubiquitous city” (Anthopoulos and Fitsilis, 2010), and the “'intelligent city” (Komninos, 2006). These conceptual frameworks provided diverse perspectives on the intricate relationship between the urban environment and ICT, thereby contributing significantly to the discourse on the evolution of cities in an increasingly digital age.

The latest concept at the forefront of discussions about the future of cities is the "smart city" (SC), representing an evolution of urban development practices informed by earlier models. The inception of the smart city concept has been the subject of extensive debate across various academic studies and fields. Today, the term "smart city" is in widespread use, encompassing a diverse array of actors, including universities, research institutes, governments, public administrations, and companies. However, despite its ubiquity, a universally accepted and comprehensive definition of the smart city concept remains elusive (Angelidou, 2015; Caragliu et al., 2009; Chourabi et al., 2012; Neirotti et al., 2014). Consequently, the notion of a smart city often appears vague and contingent upon the specific context in which it is examined, including factors like available resources, policy frameworks, administrative structures, or financial capabilities (Bibri & Krogstie, 2017).

Many of the prevailing definitions of smart cities are technology-centric, emphasising the role of technology in enabling cities to operate more intelligently and efficiently. This perspective is straightforward and revolves around the idea that technology can empower cities to work "smart" across various urban systems, which can be further segmented into technological domains (e.g., smart mobility, smart energy) and socio-economic aspects (e.g., smart population, smart economy). Another segment of the literature takes a more expansive view by highlighting the interplay between technology and human capital development. In this broader perspective, a smart city is not solely defined by its adoption of information and communication technology (ICT), but also by its capacity to empower citizens to innovate, participate in societal development, and collectively address common challenges for the greater good. This human-centric approach underscores the idea that the "smartness" of a city is intrinsically linked to the active engagement and agency of its residents in shaping their urban environment.

Numerous experts have conducted extensive research to understand the intricate factors that contribute to the success of smart cities. Given the multifaceted nature of urban systems and the dynamic concept of smart cities, a multitude of characteristics play pivotal roles in shaping their functionality and effectiveness. Lombardi et al. (2012) have proposed a holistic framework comprising six domains that collectively define the smart city. These domains encompass mobility and transport, environment, housing, people, economy, and governance. This comprehensive approach recognises that smart cities must excel in multiple dimensions, addressing various facets of urban life and development. Albino et al. (2015) claim that achieving sustainable urban development within the context of smart cities necessitates a framework that not only prioritises technological advancements but also fosters political competence and social development. Their perspective underscores the critical role of governance and community engagement in realising the full potential of smart city initiatives.

Giffinger et al. (2007) have contributed significantly to the discourse on smart cities by offering a comprehensive and intricate definition. Their framework serves as the foundation for the development of smart city rankings and assessments. Unlike simplistic approaches that rely on individual indicators, Giffinger et al.'s approach embraces a wide spectrum of characteristics and qualities. It is rooted in the concept of "future-oriented development" (Giffinger et al., 2007, p.10), acknowledging the influence of local conditions and the collective actions and decisions of local authorities, citizens, and private stakeholders. According to this framework, a city's smartness is assessed across six key

dimensions: economy, people, governance, mobility, environment, and living. Excellence in these dimensions collectively defines a city's status as "smart."

The COVID-19 Pandemic in Urban Environments

The COVID-19 pandemic had profound and far-reaching effects on cities around the world. It highlighted both the vulnerabilities and strengths of urban areas in responding to a global health crisis. Several studies have been conducted to understand the effects of the pandemic and explore potential strategies for resilience and sustainable development in the post-pandemic era (Sharifi and Khavarian-Garmsir, 2020; Sharifi, 2022). The concept of green recovery in urban areas has been explored, emphasising the importance of sustainable and environmentally friendly strategies in post-pandemic urban development (Moglia et al., 2021). Such strategies are essential for building resilient and eco-friendly cities. The importance of ensuring ample and equitable distribution of green spaces within urban areas has been a long-standing concern in urban planning. The COVID-19 pandemic has intensified this focus, as evidenced by a global analysis of urban park visitation trends conducted before and during the pandemic across numerous countries (Geng et al., 2021). As mobility restrictions elevated the risk of social isolation and increased anxiety-related issues, access to parks and green spaces emerged as crucial for individuals of all age groups to maintain their mental al physical well-being (Levinger et al., 2021; Pouso et al., 2021).

In addition to the issue of uneven access to green spaces and ecosystem services, the pandemic has drawn attention to vulnerabilities stemming from poverty and health disparities. Notably, certain North American cities have demonstrated a connection between unequal infrastructure distribution and heightened vulnerability to the pandemic within specific racial and low-income communities (Enright and Ward, 2021). Several significant factors contributing to these vulnerabilities include precarious livelihoods, which may lead individuals to disregard stay-at-home orders, and unfavourable living conditions, such as crowded slums, making it difficult to adhere to hygiene and social distancing guidelines (Sharifi and Khavarian-Garmsir, 2020; DeGroot and Lemanski, 2021).

Collectively, these vulnerabilities underscore the disproportionate impact of the pandemic on marginalised groups, especially during economic downturns and rising unemployment rates (Crețan and Light, 2020; Sharifi and Khavarian-Garmsir, 2020). There is a growing consensus that the pandemic has exacerbated existing urban inequalities (Turok and Visagie, 2021). One of the critical lessons learned is that societal inequalities act as barriers to effective pandemic response and control measures, potentially compromising the safety of more privileged groups (Moglia et al., 2021). One of the most prominently discussed effects in the literature has been the notable shift towards active transportation, encompassing walking and cycling (Buchel et al., 2022; Scorrano and Danielis, 2021). This shift, coupled with the evident environmental quality improvements resulting from substantial reductions in traffic, as previously explored, has opened unprecedented opportunities to reimagine the urban streetscape. Cities like Barcelona, New York and Melbourne have already embraced such transformations (Kakderi et al., 2021; Montero and Barcelo, 2020; Pase et al., 2020). The reallocation of underutilised public spaces to create cycling lanes and pedestrian areas has become a focal point of urban redesign.

This reshaping of the streetscape not only accommodates the rising trend of active transportation but also plays a pivotal role in averting the overburdening of public transit

systems, thus enhancing resilience against future pandemics (Barbarossa, 2020). Furthermore, these efforts to promote active transportation align with the broader goals of decarbonising urban transport and meeting urban climate change mitigation targets. To maximise these contributions, adopting integrated approaches is essential. For instance, integrating cycling and pedestrian corridors with urban green infrastructure networks not only enhances the appeal of the environment but also provides health and adaptation co-benefits (Valente et al., 2021). These integrated strategies are crucial for creating more sustainable, resilient, and liveable urban spaces in a post-pandemic world.

Smart city solutions and technologies present a unique opportunity to build upon the transformations spurred by the pandemic and sustain their momentum. For instance, teleworking can complement efforts to reduce travel demands, as some work-related trips that cannot be easily replaced by active modes may be cancelled (Sharifi, 2022). Automation, particularly through the deployment of autonomous vehicles, including public autonomous buses, has the potential to reduce the reliance on private cars and promote public transit and shared mobility (Ceder, 2020). Coupled with car-sharing and mobility-as-a-service schemes, autonomous vehicles can enhance accessibility for diverse social groups while offering cost-effective and comfortable mobility services (Mouratidis et al., 2021).

Shared mobility schemes, such as bike-sharing, have been the subject of extensive research (Kim et al., 2021). Notably, evidence from cities like New York City indicates a swift rebound in bike-sharing ridership to pre-pandemic levels following lockdown periods, demonstrating its resilience as a public transportation mode compared to subway ridership (Wang and Noland, 2021). When effectively integrated into the public transit system, bike-sharing systems offer a practical solution to the last-mile connection challenge and contribute to reducing automobile use (Pase et al., 2020).

Furthermore, the utility of smart city solutions and technologies extends beyond transportation, embracing areas like machine learning and artificial intelligence. These technologies have exhibited substantial potential in augmenting a city's ability to prepare for, recover from, and adapt to pandemic-related impacts. Their applications span predicting transmission patterns, contact tracing, ensuring uninterrupted city operations during lockdowns, mitigating disruptions in the supply chain, and facilitating optimised, integrated urban governance and management (Sharifi et al., 2020). For example, some countries, including South Korea, have harnessed web-based trading platforms to establish direct links between consumers and farmers in response to food supply chain disruptions (Blay-Palmer et al., 2021). Additionally, urban observatories have been deployed across diverse contexts, aiding in swift responses to evolving demands, engaging stakeholders, mitigating sectoral conflicts, and addressing intersectoral interactions across various scales through integrated multilevel governance systems (Moglia et al., 2021).

Nevertheless, it is crucial to acknowledge the raised concerns regarding data privacy and the dissemination of misinformation on social media platforms (Sharifi et al., 2020). These concerns underscore the necessity for further research to explore how smart solutions and technologies, underpinned by artificial intelligence, the Internet of Things, and machine learning, can effectively address privacy and data security issues, which hold paramount importance for urban residents. Furthermore, these technologies possess the potential not only to promote more sustainable urban development patterns but also to reform urban

economic structures, enhance integrated urban management, and fortify planning, absorption, recovery and adaptation capacities in the face of adverse events (Sharifi, 2020).

Methodology

The paper's methodology will involve a comprehensive review of best practices and case studies from smart cities worldwide that have demonstrated effective responses to the challenges posed by the COVID-19 pandemic. The research implied three levels of analysis, starting with an extensive review of academic literature and government reports detailing the initiatives and various practices adopted by cities during the pandemic. A central aspect of this study involves the identification and analysis of best practices adopted by the selected smart cities in response to the pandemic. Data was collected from official reports, case studies, government documents and academic research that provide insights into strategies, technological implementation and sustainability dimensions of these cities. In addition to best practices, this research implies a rigorous analysis of emerging trends that have surfaced as a result of the COVID-19 pandemic's impact on smart cities. The analysis of these trends contributes to a holistic understanding of how smart cities are navigating the post-pandemic landscape to create more resilient, sustainable, and inclusive urban environments for their residents.

The selection of the cities, Singapore, Barcelona, Bogota, Melbourne and Seoul was based on a combination of factors that made them notable examples of smart city responses to the COVID-19 pandemic. The chosen cities represent different regions of the world, offering a global perspective on how smart cities responded to the pandemic. This diversity allows for a comprehensive examination of practices across different cultural, economic, and urban contexts. These cities offer valuable lessons and insights for other urban centres facing similar challenges. Their experiences can serve as models for future urban development strategies in a post-pandemic world. It's worth noting that this study comes with certain limitations, including its reliance on secondary data sources as the accuracy and completeness of the collected documents are beyond the researcher’s control. Furthermore, this study focuses exclusively on Singapore, Barcelona, Bogota, Melbourne and Seoul and its findings may not be directly transferable to other cities.

Results and discussions

Amid the economic, social and political pressures, the pandemic prompted a swift and transformative response in urban policymaking and planning. Cities were compelled to adapt to the evolving landscape, fostering innovation and resilience. Examples abound of cities enacting policy changes and embarking on urban planning initiatives tailored to the new reality. The best practices observed in smart cities, including Singapore, Barcelona, Bogota, Melbourne and Seoul, offer valuable insights into how urban centres have responded to the challenges posed by the COVID-19 pandemic. These practices encompass a range of strategies, from digital health services to sustainable urban development and innovative approaches to mobility. The digital health services implemented by Singapore during the pandemic were instrumental in managing the virus’s spread. The “TraceTogether” App was a critical tool for contact tracing and controlling the spread of COVID-19 (Singapore Government Agency, n.d.). The app used Bluetooth signals to exchange anonymised proximity data with nearby phones. This allowed for the identification of close contacts of confirmed COVID-19 cases (Singapore Government

Developer Portal, 2023) When a user tested positive for COVID-19, the app helped authorities identify and notify individuals who had been in close contact with the infected person. This sped up contact tracing efforts and reduced potential transmission. The app prioritised user privacy by using temporary, anonymised IDs rather than collecting personal data. Data was stored locally on users' devices and automatically deleted after 25 days.

Seoul, the capital of South Korea, demonstrated exceptional pandemic response measures during the COVID-19 crisis, leveraging technology and innovation to enhance testing efficiency and healthcare access (Lee and Lee, 2020). These facilities allowed residents to get tested for COVID-19 quickly and conveniently while minimising the risk of virus transmission in crowded healthcare settings. By offering multiple testing options, Seoul ensured that individuals had access to testing resources tailored to their needs and preferences. Seoul prioritised transparent communication with the public (Seoul Metropolitan Government, 2020). The city regularly provided updates on COVID-19 cases, safety guidelines, and testing locations through various communication channels, including websites, mobile apps, and social media. This transparent communication strategy helped build public trust, encouraged compliance with safety measures, and promoted a sense of collective responsibility among residents.

Bogota's emphasis on active transportation emerged as a standout best practice during the COVID-19 pandemic (Bogota Government, 2021). One of Bogota's key initiatives was the expansion of dedicated bike lanes throughout the city. This strategic move not only encouraged residents to adopt cycling as a mode of transportation but also provided a safer and more accessible alternative to public transportation and private vehicles. By creating a network of bike lanes, Bogota facilitated a convenient and eco-friendly means of commuting, particularly during a time when social distancing and reduced vehicle occupancy were critical. In addition to bike lanes, Bogota also increased the availability of pedestrian zones in various parts of the city. These pedestrian-friendly areas allowed residents to walk safely while maintaining physical distance from others. These zones were often situated in busy urban areas, making it easier for people to access essential services and recreational spaces without relying on traditional forms of transportation.

Melbourne's "Reimagine the City" project was a remarkable initiative undertaken by the city to respond to the challenges posed by the COVID-19 pandemic (City of Melbourne, 2020). The administration prioritised community engagement as it sought input from residents, businesses, and community organisations to ensure that the project's interventions aligned with the needs and preferences of the local population. This collaborative approach fostered a sense of ownership and unity among locals. The city also introduced initiatives such as outdoor dining spaces (City of Melbourne, n.d.) and pop-up markets to enable businesses to operate safely while adhering to social distancing guidelines. These measures not only helped businesses stay afloat but also contributed to the vibrancy of Melbourne's urban spaces.

Barcelona's "Superblocks" project represents an innovative and sustainable urban planning initiative that significantly improved the quality of life for residents while addressing challenges posed by the COVID-19 pandemic. Barcelona's "Superblocks" project involved the transformation of traditional urban blocks into pedestrian-centric zones. The city identified nine-square-block areas and reimagined them as car-free or car-limited spaces. The primary goal was to reduce traffic congestion, improve air quality, and promote

sustainable mobility within these zones (Camerin and Fabris, 2021). The Superblocks project promoted sustainable mobility options such as walking and cycling. Wider sidewalks, dedicated bike lanes, and pedestrian-friendly infrastructure were introduced to encourage residents to choose active transportation modes (Benavides et al., 2022). This approach aligned with the need for safe and socially distanced means of getting around the city during the pandemic.

The analysis of the five cities reveals common features and valuable lessons in how they responded to the COVID-19 pandemic and embraced smart city principles to navigate through the crisis. All five cities prioritised data-driven decision-making during the pandemic. They leveraged advanced data analytics, real-time monitoring, and innovative technologies to track the virus's spread, identify hotspots, and allocate resources effectively.

Singapore, Seoul, Barcelona, Bogota, and Melbourne showcased their commitment to technological innovation. They employed various digital tools, mobile apps, and telemedicine to provide healthcare services, disseminate information, and engage with residents. These technologies not only supported pandemic response but also promoted efficiency and accessibility in urban services. Transparent communication was pivotal in managing the pandemic. These cities regularly provided updates on COVID-19 cases, safety guidelines, and testing locations through various communication channels. This transparency built public trust and ensured that residents were well-informed.

The pandemic has underscored the pressing need for cities to address disparities in access to green spaces, ensuring that all residents, regardless of their socioeconomic status or neighbourhood of residence, have the opportunity to benefit from these vital urban resources. The equitable provision of green spaces is not only a matter of urban planning but also a critical component of promoting public health and well-being, particularly during times of crisis. All five cities invested in resilient infrastructure. Whether it was Bogota's expanding bike lanes, Melbourne's street reimagining project, or Barcelona's Superblocks, they prioritised sustainable and adaptable urban environments. These investments not only improved mobility but also enhanced residents' well-being during the pandemic. The cities recognised the importance of green spaces for public health. Barcelona, Bogota, and Melbourne, in particular, preserved and expanded green areas, providing residents with opportunities for outdoor activities, exercise, and mental relaxation during lockdowns.

Conclusions

The COVID-19 pandemic has brought to the forefront the critical importance of smart city principles in urban development. Cities have faced multifaceted challenges during the pandemic, ranging from public health crises to economic disruptions and social inequalities. However, they have also demonstrated remarkable resilience, adaptability, and innovation in response to these challenges. This paper has explored the evolving landscape of smart cities in the post-pandemic era, focusing on key trends and best practices adopted by notable cities such as Singapore, Barcelona, Bogota, Melbourne, and Seoul. Drawing on the smart city conceptualisation and its dimensions, a few key lessons and features have been identified.

Smart cities prioritise data as a foundation for informed decision-making. The pandemic underscored the significance of data analytics, real-time monitoring, and predictive modelling in pandemic control and resource allocation. The adoption of innovative technologies, such as mobile apps, telemedicine, and digital platforms, has been

instrumental in delivering healthcare services, disseminating information, and engaging with residents during the pandemic. Furthermore, cities have recognised the importance of community engagement and transparent communication in fostering public trust, ensuring compliance with safety measures, and promoting collective responsibility.

Moreover, investments in resilient infrastructure, including green spaces, cycling infrastructure, and adaptable urban environments, have contributed to both pandemic response and long-term sustainability. Preserving and expanding green spaces has provided residents with outdoor recreational opportunities and improved mental well-being during lockdowns. At the same time, promoting active transportation modes like cycling and pedestrian zones has reduced reliance on public transportation and private cars, promoting both mobility and public health.

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