A MULTI-CRITERIA MODEL APPROACH TO EXTENDED INFORMATION LITERACY AS A BASIS OF LABOUR MARKET SUSTAINABILITY IN V4 COUNTRIES

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Abstract: In the knowledge-based economy, strong information literacy skills are highly valued by employers due to their positive impact on productivity, innovation and adaptability. This study proposes a model approach to extended information literacy (EIL) to enhance the workforce potential in the Visegrad Group countries. A comprehensive literature review was conducted, followed by the implementation of a multiple-criteria decision-aid weighting method, resulting in rankings of V4 countries' EIL levels. The study confirms that higher information literacy provides a competitive advantage in the labor market. The methodology serves as a useful comparative tool and an indicator of areas for improvement. The proposed model can be applied, with adaptations to local specifics, to other EU countries as well. The paper's uniqueness lies in filling the gap in understanding the relationship between individual variables (e.g., digital skills, financial literacy, education expenditure in relation to GDP) and the labor market in the context of EIL in the Visegrad Group countries.

Introduction

Companies establish their principles around addressing employee motivation, engagement, and commitment issues, as reflected in the substantial body of professional peer-reviewed articles dedicated to this field (Smerek and Vetráková, 2020). It is paramount to focus on the decision-making processes of the economically active population in relation to employment, taking a comprehensive approach. Most importantly, this perspective aims to optimize the utilization of human capital (Koeniger and Prat, 2014). Optimal use of resources, human labour in particular, is a prerequisite for increasing GDP and competitiveness on a global scale (Cai and Lu,

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2013). In recent decades, governments have intensified their employment policies within national labour markets, which aligns with the long-term strategy of the OECD and the European Commission (OECD, 2006, and European Commission, 2009, 2015, respectively). An active employment policy is being paid due attention by the EU (Favero, 2022), but its effect on GDP growth is not adequately considered from a macroeconomic perspective (Goulas and Zervoyianni, 2018).

From a microeconomic perspective, the overall labour market performance depends on the decisions of individual job applicants and employees. If social policies and other external influences are well-balanced, without negatively affecting the labor market, individuals can make their own choices regarding employment (Beran, 2020). Factors such as labor mobility, information literacy, and information asymmetry can influence the decision-making process to vary degrees. Although the key skills needed for rational decisions in the labour market are well known – defined, for example, by the International Labour Organization (ILO, 2021) – it is necessary to expand them with other information literacy variables.

The paper aims to develop a model approach to extended information literacy (EIL) as a prerequisite for maximizing the potential of the workforce in the Visegrad Group (V4, i.e., the Czech Republic, Hungary, Poland, and Slovakia). This goal is achieved by a model comparison based on the available 2014-2022 data, assigning relevant variables weights corresponding to the significance of particular criteria. Applying the model to the V4 countries, their rankings are compiled according to an information literacy impact on the labour market.

Two hypotheses (H1 and H2) and four research questions (Q1, Q2, Q3 and Q4) were established and are presented below.

The added value of the present paper is a novel design and application of the multi-variable method for long-term monitoring of EIL.

Literature Review

Information literacy is a necessary competence and prerequisite for success in the information society. Literacy research studies examining individual performance during the ICT boom agree that information literacy is an essential human ability (cf., e.g., Nisha and Varghese, 2021).

Institutions, such as UNESCO, the International Federation of Library Associations and Institutions or the American Library Association (UNESCO, 2019, Lau, 2006), have developed standards and models of information literacy. Despite issuing regular updates, basic definitions in their documents remain more or less unchanged. Information literacy encompasses recognising one's information needs and searching for, evaluating, organising, using, and communicating information. Moreover, according to the above-mentioned institutions, information literacy should be part of the general right to lifelong education.

A narrower concept of financial literacy also has a few definitions. For instance, it can be identified as the ability to read, analyze, manage and communicate about personal financial conditions that affect material well-being (Fachrudin and

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Fachrudin, 2016). Financial literacy is often narrowed down to financial expertise, financial literacy and awareness in everyday language; however, it is a much more complex issue (Nguyen et al., 2019). Simply put, it is a set of knowledge, skills, and competencies of an individual necessary to achieve economic prosperity through responsible financial behaviour (cf. OECD/INFE, 2018). Regarding handling data, financial literacy is closely related to broader information literacy, paralleling the ability to search for, utilize, and evaluate useful information in the context of financial decision-making. Finally, it is worth emphasizing that financial literacy is closely linked to access to formal education (Kuzior et al., 2022). Financial literacy and financial education are essential elements contributing to society's well-being (Titko et al., 2015).

Considerable emphasis has been placed on increasing financial literacy. Its global importance is manifested by the International Network on Financial Education (INFE) programme, which runs within the OECD and focuses on financial education in member countries. An international questionnaire (OECD/INFE, 2011) was created under the auspices of the INFE, allowing for a comparison of national financial literacy levels. An OECD/INFE survey showed considerable differences among the V4 countries (see Krechovská, 2015). Having been updated in 2018, the questionnaire is available as the OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion (OECD/INFE, 2018). A good example of national measures adopted to enhance financial literacy in OECD countries is the National Financial Education Strategy 2.0, approved by the government of the Czech Republic in 2020 (MFČR, 2020), replacing the original strategic plan launched in 2010.

The results of the aforementioned research (Krechovská, 2015) show that the population's financial literacy is closely linked to socio-economic trends in the given country. The degree of financial literacy is thus determined by indicators such as household indebtedness, payment morale, household bankruptcies, the percentage of insolvencies and foreclosures, and citizens' grasp of their financial income options.

The present paper investigates the competencies of information literacy supplemented by those of financial literacy and other factors determining training and educational strategies pursued in the V4 countries, i.e., a comprehensive concept of EIL. Responding to the development of artificial intelligence, it will be necessary to expand the above concept with algorithmic [AI] literacy).

The novel approach to training citizens' competencies, brought about mainly by information and communication technologies, is supposed to reflect social realities, including the expected changes in the labour market. The Cedefop's European Skills Index suggests that the changes will affect not only labour positions but also the competencies required when choosing a job (CEDEFOP, 2022).

The paper is based on the assumption that optimal occupational choice will lead to long-term labour market sustainability in the selected countries.

At the end of the literature search, it is appropriate to briefly define the individual countries analyzed. The economies and labour markets of the V4 countries – despite

their different size, population, and other specifics – are interconnected by common socio-political histories and shared trends such as demographic transition (Tomczyk and Klimczuk, 2017). A number of comparative studies are available, exploring the similarities and connections, for example, the interdependence of GNP and export growth rates (cf. Lacka et al., 2020). The V4 countries' common interest is a sustainable labour market providing equal conditions and treatment to all its participants with optimal use of human capital (knowledge and skills) to deliver prosperity and global competitiveness (Farkačová, 2022). Having a particular macroeconomic significance for the labour market, the unemployment rate fluctuated around 3 % in Poland and the Czech Republic, while it climbed almost to 6 % in Hungary and Slovakia in 2022 (Eurostat, 2023a).

Research Methodology

First of all, it is necessary to determine the metric variables of EIL. The subsequent section outlines imperative variables for inclusion. There is a research consensus (Lusardi and Mitchell, 2014; van Deursen and van Dijk, 2011; OECD, 2016; Potrich et al., 2015) that an individual's level of information and financial literacy is influenced by the following factors:

i) Education: Higher education correlates with higher information literacy, especially among individuals with university and college degrees. The proportion of tertiary-educated population is a crucial factor; **ii)** Age: Younger individuals tend to exhibit higher information literacy, while older generations may have higher financial literacy; **iii)** Gender: Studies show mixed results, with some indicating that men are more information literate, while others find both sexes to be equally skilled. In contrast, certain studies suggest that females are often more proficient in financial literacy; **iv)** Income: Higher income is associated with increased levels of information and financial literacy; **v)** Family background and social status: Individuals from higher social statuses generally achieve higher information literacy levels. Those raised in families with proactive financial discussions tend to have higher financial literacy.

However, the above primary determinants of EIL are unsuitable for measuring EIL for international comparison (the above variables are more suitable for comparing two or more socio-economic groups, etc.). For this reason, it was imperative to focus on other secondary factors influencing EIL.

The potential for the development of information and financial literacy is influenced by the following downstream factors related to the secondary effects of the previous factors detected by the research measurement of digital skills (van Deursen and van Dijk, 2014; OECD, 2016):

i) Digital literacy: The level of digital literacy strongly influences financial literacy. Economically developed countries with accessible ICT infrastructure and higher digital literacy generally exhibit better financial literacy compared to less developed countries; **ii)** Access to the Internet: Internet availability and other technologies play a crucial role in enhancing digital and financial literacy. Access to information and

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resources through the internet aids skill development in various areas; **iii)** Expenditure on education in relation to GDP: Education expenses relative to GDP indicate the availability of education, which can directly impact the level of general knowledge. It is important to emphasise that learning is no longer just connected to education or seen as a purely pre-job matter (Grabara et al., 2019). There has been a change of emphasis from lifelong employment and job security to employability and lifelong learning (Collings et al., 2019). On the other hand, this variable still appears to be the most relevant for this paper.

One more variable to consider is population density. A higher density of population can be assumed to indicate greater availability of information, thus providing the stimulus for enhanced information literacy; in densely populated areas, a larger ICT infrastructure is usually accessible. This trend is also described in research studies on the digital divide in the EU rural areas (Kos-Łabędowicz, 2017), demonstrating that lower density can lead to less information availability and, thus, a lower level of digital literacy (Lower density may also cause depopulation and overall population reduction).

Based on the above, individual variables were determined and are listed below. Identify variables below that can be used to determine the level of EIL. The following variables were excluded: Gender, Age, Family background, social status, and Income. All these variables are more appropriate for comparing selected socio-economic groups. While these variables affect an individual's EIL, they are not relevant for creating an instrument for international comparison.

The following variables were chosen to meet the objective of the analysis: 1) Digital skills; 2) Financial literacy; 3) Proportion of tertiary education students; 4) Education expenditure in relation to GDP; 5) Access to the internet; 6) Population density.

These criteria are examined using the available statistics from the 2014-2022 period. For most variables, the present analysis relies on available Eurostat statistics. Specific sources are listed for each individual variable in the text below.

To compare individual countries applying the quantitative evaluation criteria defined above, the Multi-Criteria Decision Analysis (MCDA) method was chosen, which is suitable for measuring information literacy in terms of the data structure (Podviezko, 2015). The weights of the selected variables are listed in Table 1.

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Table 1. Selected criteria and their weights

Item	Criterion (abbrev.)	Full title of criterion	Descriptions / Context	Weight
1	DL	Digital literacy / skills	Overall digital skills refer to five areas: information and data literacy skills, communication and collaboration skills, digital content creation skills, safety skills and problem-solving skills. (Eurostat, 2023a)	0.40
2	FL	Financial literacy	It is ability to read, analyze, manage and communicate about personal financial conditions that affect material well-being (Fachrudin and Fachrudin, 2016).	0.10
3	TS	Proportion of tertiary students	Ratio of university students to total population.	0.10
4	EE	Education expenditure in relation to GDP	Education finance, namely sources of funding by the government. (Eurostat, 2023c)	0.25
5	IA	Internet access	Share of households with an internet connection (Eurostat, 2022a).	0.05
6	PD	Population density	Population density is the number of people per unit of area, "per square kilometer" (Eurostat, 2022b)	0.10
			Weights of all criteria in total	1.00

Source: Authors' analysis

The variable weights were set to optimally reflect the characteristics of the V4 countries and the importance of a given criterion in developing extended literacy; see formulas 1.1 and 1.2 below.

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Formula 1.1

$$\text{EIL} = (DL \times 0.40) + (FL \times 0.10) + (TS \times 0.10) + (EE \times 0.25) + (IA \times 0.05) + (PD \times 0.10) / (0.40 + 0.10 + 0.10 + 0.25 + 0.05 + 0.10),$$

or alternatively

formula 1.2
$$\text{EIL} = \Sigma \, [w_i \times x_i] \, / \, \Sigma \, w_i,$$

Where: **EIL** denotes extended information literacy; **i** is an index that moves through all the variables (DL, FL, TS, EE, IA, PD); x_i denotes the value of the i-th variable; w_i denotes the weight of the i-th variable.

Based on the above, the V4 countries are ranked according to their extended information literacy (EIL) degrees.

The following hypotheses were established following the testing of the method in the case of the V4 countries.

H1 EIL will be at the same level in the case of the Czech Republic and Slovakia due to their common history until the 1990s. **Q1** Will the level of EIL in the Czech Republic and Slovakia be higher than in Poland? **Q2** Will the level of EIL in the Czech Republic and Slovakia be higher than in Hungary?

H2 The trend of digital skills development in all V4 countries is expected to increase due to geopolitical similarities. **Q3** Will the level of digital skills in the Czech Republic and Slovakia exceed that in Poland? **Q4** Will the level of digital skills in the Czech Republic and Slovakia exceed that in Hungary?

A similar trend in developing digital skills is expected, given that all the countries analyzed have moderate development in fostering innovation, building stable infrastructure and promoting sustainable industrialization (Brodny and Tutak, 2023).

MCDA Method Application and V4 Countries Rankings

The first variable analyzed is **digital literacy**. As shown by the 2015–2021 Eurostat data provided in Table 2, the highest levels of digital literacy are in the Czech Republic and culturally close Slovakia, followed by Hungary and Poland.

Table 2. Share of people with at least basic digital skills (in percent)

Country	Year				
	2015	2016	2017	2019	2021
Czechia	56.89	53.80	59.85	62.10	59.69
Hungary	49.52	51.36	49.59	48.68	49.09
Poland	40.04	44.42	46.38	44.45	42.93
Slovakia	53.15	55.26	59.01	53.87	55.18

Source: Eurostat, 2023b

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As the trend in digital skills shows, the level of digital skills is increasing in the Czech Republic, Slovakia and Poland. Some stagnation can be seen in the case of Hungary. Explaining why the level of digital skills in Hungary is not growing as in the other V4 countries is not easy. Although Hungary is reducing its education spending as a share of GDP in the period analysed by Eurostat (2023c), this could be reflected in the longer term. An explanation may be that the Hungarian research, development and innovation ecosystem consists of many actors, support tools and programs. Universities, with their technology transfer offices and university-industry hubs, are central to the local ecosystem. The Hungarian research and innovation strategy from 2021 to 2030 focuses on three main pillars: knowledge creation, knowledge transfer and its use. Hungary wants to rank among the strong innovative countries in the EU by the end of the decade. The government, therefore, plans to increase its spending to 3% of the national GDP (as well as the Czech Republic) (Vedaavyzkum.cz, 2022). Hypothesis **H2** is partially confirmed.

The chart below also delineates the answers to research questions – **Q3** Will the level of digital skills in the Czech Republic and Slovakia exceed that in Poland? **Q4** Will the level of digital skills in the Czech Republic and Slovakia exceed that in Hungary? The level of digital skills in the Czech Republic and Slovakia is indeed higher than in Poland and Hungary.

Partly, the above findings are consistent with those of other authors. For example, the collective of authors Małkowska, Urbaniec and Kosała (2021) focused on the issue of identifying the digital divide between EU Member States. The Czech Republic achieved better results in this respect than other V4 countries.
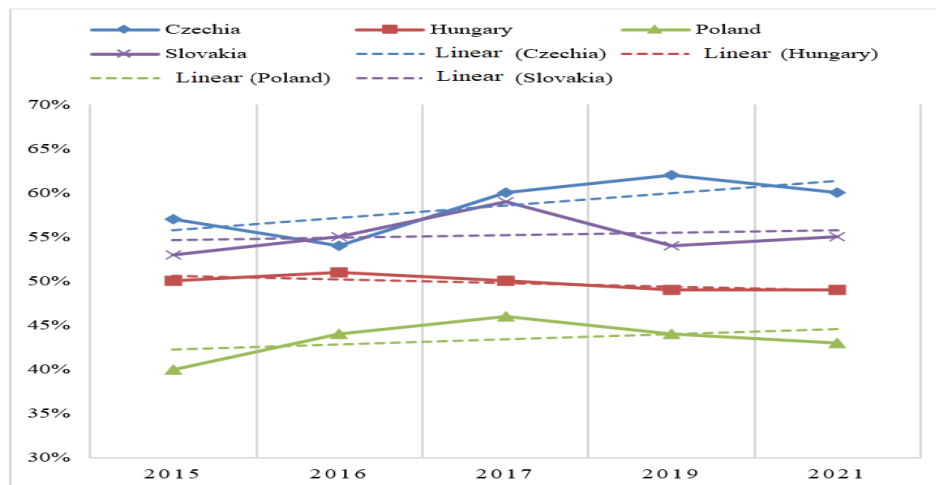

Figure 1: Share of people with at least basic digital skills (in %) and linear trendlines
Source: Eurostat, 2023b

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Comparison of financial literacy is hampered by gaps in the data time series. Although the OECD monitors financial literacy internationally, the data for Slovakia is incomplete. Within the monitored period, the results for all V4 countries are available only for 2015. As summarized in Table 3, the data is processed using the Index of Financial Literacy (IFIG). Despite non-identical comparison variables, it was possible to identify a trend signalling the level of financial literacy in Slovakia and add the relative standings of the country to Table 4, presenting the scores for 2020.

The obtained values show that the highest level of financial literacy is recorded in Poland, followed by the Czech Republic, Slovakia and Hungary.

Table 3. Average IFIG financial literacy (2015)

Country	IFIGo	IFIGi	IFIGfm	IFIGr	IFIGpf
Czech Rep.	0.676	0.752	0.542	0.643	0.694
Hungary	0.505	0.525	0.417	0.546	0.511
Poland	0.679	0.686	0.693	0.618	0.713
Slovakia	0.627	0.622	0.518	0.646	0.729

Source: Krechovská (2015)

Table 4. Financial literacy scores for V4 countries (2020)

Country	Financial literacy	Knowledge	Behaviour	Attitude
Czech Rep.	13.0	4.5	5.3	3.1
Hungary	12.3	4.6	4.5	3.3
Poland	13.1	5.0	5.5	2.6
Slovakia	SK > HU; SK < PL, CZ	SK > HU; SK < PL, CZ	SK > HU; SK < PL, CZ	SK > HU; SK < PL, CZ

Source: OECD (2020)

The following is an analysis of the variable proportion of tertiary education students. According to Eurostat data provided in Tables 5 and 6, the largest number and share of tertiary students in the population is in Poland, followed by the Czech Republic, Hungary, and Slovakia.

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Table 5. Number of students in tertiary education (2020; in thousands)

Country	Degree		
	Bachelor's	Master's	Doctoral
Czechia	190	105	21
Hungary	184	79	9
Poland	917	439	33
Slovakia	78	50	6

Source: Eurostat (2022c)

Table 6. Ratio of university students to total population (%)

Country	Czechia	Hungary	Poland	Slovakia
Ratio	2.95 %	2.78 %	3.66 %	2.46 %

Source: Eurostat (2022c)

The following is an analysis of the variable public expenditure on education. Public expenditure on education and student ratios being interrelated variables, it is therefore not surprising that the highest share of education spending on GDP is again reported by Poland. The overall ranking is the same as for the previous criterion, as displayed in Table 7.

Table 7. Public education expenditure (percentage of GDP)

Country	2015	2016	2017	2018	2019
Czechia	3,79	3,56	3,77	4,23	4,50
Hungary	4,26	4,46	4,18	4,07	3,90
Poland	4,81	4,63	4,56	4,62	4,67
Slovakia	4,59	3,89	3,94	3,98	-

Source: Eurostat (2023c)

The following is an analysis of the variable Internet access. Reporting the highest share of households with an internet connection, Poland again tops the list. In a closer international comparison, the Czech Republic, Hungary, and Slovakia record the same values, as shown in Table 8.

Table 8. Household Internet access (2022, %)

Country	Czechia	Hungary	Poland	Slovakia
Share	91 %	91 %	93 %	91 %

Source: Eurostat (2022a)

The following is the analysis of Population density. As shown in Table 9, the densest population is in the Czech Republic, followed by Poland, Slovakia and Hungary.

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Table 9. Population density (*per km²*) 2022

Country	Czechia	Hungary	Poland	Slovakia
Population density	138,2	107,1	123,6	112,0

Source: Eurostat (2022b)

Research Results

Based on the analysed factors of EIL, the ranking of the V4 countries can be summarized, as illustrated in Table 10.

Table 10. V4 countries ranking according to EIL criteria

	Czech Republic	Hungary	Poland	Slovakia
Digital literacy / skills	1st	3rd	4th	2nd
Financial literacy	2nd	4th	1st	3rd
Proportion of tertiary students	2nd	3rd	1st	4th
Education expenditure (relative to GDP)	2nd	3rd	1st	4th
Internet access	2nd	2nd	1st	2nd
Population density	1st	4th	2nd	3rd

Source: Authors' analysis Note: For greater clarity, the placement in each category is separated by colour. Blue indicates first place, yellow indicates second place, red indicates third place, and white indicates fourth place

The overall ranking of the V4 countries is as follows: 1st: Czech Republic; 2nd: Poland; 3rd: Slovakia; 4th: Hungary.

Concerning the above, it can be concluded that hypothesis **H1** was not confirmed. Based on the observed EIL levels, the Czech Republic reaches a higher level than Slovakia. Even between the Czech Republic and Slovakia, Poland is ranked. Thus, research question **Q1** is partly answered. Slovakia has a lower EIL level than the Czech Republic and Poland. On the other hand, **Q2** can be answered in the affirmative. The Czech Republic and Slovakia indeed have a higher level of EIL than Hungary.

The Czech Republic and Slovakia have achieved higher levels of digital literacy than Hungary due to their strong emphasis on educational reforms and investments in technology infrastructure. The Czech Republic and Slovakia have also prioritised developing digital skills through comprehensive government policies, resulting in a more technologically advanced workforce and higher information literacy rates than Hungary. The higher level of expanded information literacy in the Czech Republic and Slovakia can be attributed to their proactive approach to promoting digital

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literacy through various initiatives, such as widespread access to educational resources, digital training programs, and technology integration in schools. The above is supported by the Digital Economy and Societies Index (European Commission, 2022), according to which the Czech Republic scores better than Slovakia, Poland and Hungary.

The present model demonstration of EIL indicates that the Czech Republic and Poland are currently in the best shape, although the latter shows the greatest lag in all countries monitored digital literacy. Thus, the above-mentioned countries have the greatest potential for building a sustainable labour market.

As far as Slovakia and Hungary are concerned, the assessment of the information literacy status of the population is relatively less favourable, which is particularly alarming in view of a competitive labour market environment. However, a heightened awareness of the factors determining EIL may prompt the governments of both countries to adopt systemic measures to enhance the requisite practical skills. Both countries are supposed to invest more in education and increase the number of university students. Hungary is also expected to take steps to improve the financial literacy of its citizens.

Research Limitations

During data gathering, the research team encountered challenges related to data availability, consistency and sample representativeness. Due to the diverse selected factors and limited research on expanded information literacy, various data sources from different periods were utilized.

Discussion

This article focused on defining EIL content methodology and its application to the V4 countries. A final comparison with published documents is desirable.

Based on the literature search carried out before the development of the approach to the measurement of EIL itself, as well as taking into account the results of the analysis in the IDEAS database (the largest bibliographic database dedicated to Economics) from 22/05/2023, it can be confirmed that introduced approach to the definition of the term "extended information literacy", as well as the approach to the methodological assessment of the level of EIL is unique.

Table 11. Search results for comparison with other published papers/articles

Keywords	Results for keywords (peer-reviewed articles from 1980 - 2023)
extended information literacy	60
information literacy	2396

Source: Own elaboration

Although more than 60 documents were searched for the keyword "extended information literacy" in the above-mentioned database, none contained a definition

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of "extended information literacy" itself. A similar content result is found for the knowledge from 2396 documents containing the keywords "information literacy".

The constant emergence of new approaches in this domain and the frequent disagreements in terminology have been validated by multiple studies (Wuyckens et al., 2022). Consequently, the application of various information literacy concepts to the labor market may propose a novel approach to addressing the insufficiency of the original definitions. The authors have endeavored to examine the subject matter from a fresh perspective, directing our attention towards variables that we deem significant and that have hitherto been disregarded in this association.

Anyway, by adapting the information literacy criteria and their weights to local specificities, this new methodology can be applied in other EU countries and thus expand the knowledge in existing research (Pașa et al., 2022) on financial literacy and its impact on economic growth and labour market.

Conclusion

The purpose of this paper was to create a model approach for analyzing extended information literacy (EIL), recognizing the role of literacy skills in maximizing workforce potential and stabilizing the labor market in V4 countries. A multi-criteria MCDA method was developed, considering six variables with appropriate weights, selected based on a comprehensive literature search and accounting for the specificities of V4 countries.

Using the multi-criteria methodology, a ranking of V4 countries was generated, reflecting their level of expanded information literacy. The Czech Republic exhibited the highest developed literacy skills, while Hungary had the least developed, with Poland and Slovakia ranking second and third, respectively. Notably, countries with higher EIL, such as the Czech Republic and Poland, also displayed relatively lower unemployment rates than other V4 countries. Two hypotheses (H1 and H2) and four research questions (Q1, Q2, Q3, and Q4) were identified, with H1 not being confirmed and H2 only partially confirmed.

These findings support the notion that improved literacy skills facilitate better orientation and application in the labor market. Furthermore, the applied methodology can be a practical tool for government policies, identifying areas requiring change, such as addressing inadequate education investments in Hungary and Slovakia. After adapting the information literacy criteria and weights to local characteristics, this methodology can be extended to other EU countries.

The paper also highlights the lack of relevant statistics (e.g., digital literacy) faced by the authors, emphasizing the need for European institutions to continuously publish all unclassified data and include all EU countries in statistical measurement models.

Finally, practical recommendations related to the method and its implementation are worth mentioning. Policymakers and government officials can employ the developed multi-criteria MCDA method to assess and compare the level of EIL in different regions or countries. The ranking of countries based on information literacy levels

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can guide resource allocation and policy decisions, emphasizing the importance of investing in literacy skills development, especially in countries with lower rankings. The methodology can help identify specific areas within the education system that require attention and improvement, such as addressing inadequate investments in education and promoting digital literacy initiatives.

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References

Bejaković, P., Mrnjavac, Ž., (2020). The importance of digital literacy on the labour market. *Employee Relations: The International Journal*, *42*(4), 921-932.

Beran, V., (2020). Demotivative Effect of Social on the Labor Supply of Low-Skilled

Brodny, J., Tutak, M., (2023). The level of implementing sustainable development goal "Industry, innovation and infrastructure" of Agenda 2030 in the EU countries: Application of MCDM methods. *Oeconomia Copernicana*, *14*(1),47–102.

Cai, F., Lu, Y., (2013). Population Change and Resulting Slowdown in Potential GDP Growth in China. *China and World Economy*, *21*(2), 1-14.

CEDEFOP., (2022). Skills intelligence [Online]. [cit. 2023-04-07]. Available online at: https://l1nq.com/FuKsu

Collings, D. G., Mellahi, K. and Cascio, W. F., (2019). Global Talent Management and Performance in Multinational Enterprises: A Multilevel Perspective. *Journal of Management, 45(2), 540–566.*

European Commission., (2009). *Employment in Europe 2006*. European Commission.

European Commission., (2015). Guidelines for the employment policies of the member states: Council Decision (EU) 2015/1846 [Online]. [cit. 2023-04-09]. Available online at: https://shorturl.at/oyK28

European Commission., (2022). Digital Economy and Society Index (DESI) 2022: Czechia [Online]. [cit. 2023-06-02]. Available online at: https://shorturl.at/eptBR

EUROSTAT., (2021). Share of individuals having at least basic digital skills, by sex [Online]. [cit. 2023-04-11]. Available online at: https://shorturl.at/lo179

EUROSTAT., (2022a). Translate Digital economy and society statistics - households and individuals [Online]. [cit. 2023-04-05]. Available online at: https://t.ly/qt4Es

EUROSTAT., (2022b). Population Density [Online]. [cit. 2023-04-06]. Available online at: https://ec.europa.eu/eurostat/databrowser/view/tps00003/default/table

EUROSTAT., (2022c). Tertiary education statistics [Online]. [cit. 2023-04-05]. Available online at: https://t.ly/815db

EUROSTAT., (2023a). Euro area unemployment at 6.6% [Online]. [cit. 2023-04-07]. Available online at: https://t.ly/YNKl7

EUROSTAT., (2023b). Public expenditure on education by education level and programme orientation - as % of GDP [Online]. [cit. 2023-04-05]. Available online at: https://ec.europa.eu/eurostat/databrowser/view/educ_uoe_fine06/

POLISH JOURNAL OF MANAGEMENT STUDIES
Farkačová L., Zadražilová I., Tomášková A.

**2023
Vol.28 No.2**

EUROSTAT., (2023c). How many citizens had basic digital skills in 2021? [Online]. [cit. 2023-04-05]. Available online at: https://t.ly/CcNOS

Farkačová, L., (2022). Dlouhodobá udržitelnost zdravého trhu práce v kontextu Evropské unie. *Scientia Et Societas*, (2), 81-89.

Favero, F., (2022). *Political economy of labor market policies for current labor market transformations in Europe*. St. Louis: Federal Reserve Bank of St Louis. [cit. 2023-04-05]. Available online at: https://cutt.ly/nwsMVfow

Fachrudin, K. R., Fachrudin, K. A., (2016) The Influence of Education and Experience Toward Investment Decision with Moderated by Financial Literacy. *Polish Journal of Management Studies*, *14*, 51-60.

Grabara, J., Cehlar, M. and Dabylova, M., (2019). Human factor as an important element of success in the implementation of new management solutions. *Polish Journal of Management Studies, 20*(2), 225-235.

Goulas, E., Zervoyianni, A., (2018). Active labour-market policies and output growth: Is there a causal relationship? *Economic Modelling*, *73*, 1-14.

International Labour Organization. (2021). *Global framework on core skills for life and work in the 21st century* [Online]. [cit. 2023-04-05]. Available online at: https://cutt.ly/dwsMVWXa

IDEAS (2023) [Online]. [cit. 2023-05-22]. Available online at: https://ideas.repec.org/

Koeniger, W, Prat, J., (2014). Human Capital and Optimal Redistribution. *Economics Working Paper Series 1434*, 54.

Kos-Łabędowicz, J., (2017). The issue of digital divide in rural areas of the European Union. *Ekonomiczne Problemy Usług*, *126*, 195-204.

Krechovská, M., (2015). *Financial literacy in Visegrad Group Countries*. Plzeň: Nava.

Lacka, I., Myszczyszyn, J., Golab, S., Bedzik, B. and Supron, B., (2020). Correlation between the Level of Economic Growth and Foreign Trade: The Case of the V4 Countries. *European Research Studies Journal*, *XXIII* (3), 657-678.

Lau, J., (2006). Guidelines on Information Literacy for Lifelong Learning [Online]. [cit. 2023-04-16]. Available online at: https://cutt.ly/awsMVGNy

Lusardi, A., Mitchell, O. S., (2014). The Economic Importance of Financial Literacy: Theory and Evidence. *Journal of Economic Literature*, *52*(1), 5-44.

Małkowska, A., Urbaniec, M. and Kosała, M., (2021). The impact of digital transformation on EU countries: insights from a comparative analysis. Equilibrium. *Quarterly Journal of Economics and Economic Policy*,*16*(2), 325–355.

MFČR., (2020). Národní strategie finančního vzdělávání 2.0 [Online]. [cit. 2023-04-18]. Available online at: https://rb.gy/tggss

Nisha, N. B., Varghese, R. R., (2021). Literature on Information Literacy. *Desidoc Journal of Library and Information Technology*, *41*(4), 308-315.

Nguyen, T. A. N., Polách, J. and Vozňáková, I., (2019). The role of financial literacy inretirement investment choice. Equilibrium. *Quarterly Journal of Economics and Economic Policy*,*14*(4), 569–589.

OECD., (2006). *Boosting Jobs and Incomes: The reassessed job strategy*. OECD.

OECD., (2016). Skills for a Digital World [Online]. [cit. 2023-04-16]. Available online at: https://rb.gy/xzeri

OECD., (2016). OECD/INFE International Survey of Adult Financial Literacy Competencies [Online]. [cit. 2023-04-16]. Available online at: https://rb.gy/8ln5y

2023
Vol.28 No.2

POLISH JOURNAL OF MANAGEMENT STUDIES
Farkačová L., Zadražilová I., Tomášková A.

OECD., (2020). OECD/INFE 2020 International Survey of Adult Financial Literacy [Online]. [cit. 2023-04-10]. Available online at: https://rb.gy/whzro

OECD INFE., (2011). Measuring Financial Literacy: Core Questionnaire in Measuring Financial Literacy: Questionnaire and Guidance Notes for conducting an Internationally Comparable Survey of Financial Literacy [Online]. [cit. 2023-04-16]. Available online at: https://urx1.com/F8YNu

OECD INFE., (2018). Toolkit for Measuring Financial Literacy and Financial Inclusion [Online]. [cit. 2023-04-16]. Available online at: https://l1nq.com/O6ayh

Pașa, A. T., Picatoste, X. and Gherghina, E. M., (2022). Financial Literacy and Economic Growth: How Eastern Europe is Doing? *Economics, 16*(1), 27-42.

Podviezko, A., (2015). Use of multiple criteria decision aid methods in case of large amounts of data. *International Journal of Business and Emerging Markets*, *7*(2).

Potrich, A. C. G., Vieira, K. M. and Kirch, G., (2015). Determinants of Financial Literacy: Analysis of the Influence of Socioeconomic and Demographic Variables. *Revista Contabilidade and Finanças*, *26*(69), 362-377.

Smerek, L., Vetráková, M., (2020). Difference in human resources development in various types of companies. *Polish Journal of Management Studies*, *21*(2), 398-411.

Titko, J., Lace, N. and Polajeva, T., (2015). Financial Issues Perceived by Youth: Preliminary Survey for Financial Literacy Evaluation in the Baltics. *Oeconomia Copernicana*, *6*(1), pp. 75-98.

Tomczyk, Ł., Klimczuk, A. (Eds.)., (2017). *Selected Contemporary Challenges Of Ageing Policy*. Uniwersytet Pedagogiczny w Krakowie.

UNESCO., (2019). Global Standards for Media and Information Literacy Curricula Development Guidelines [Online]. [cit. 2023-04-26]. Available online at:https://www.unesco.org/sites/default/files/medias/files/2022/02/Global%20Standards%20for%20Media%20and%20Information%20Literacy%20Curricula%20Development%20Guidelines_EN.pdf

van Deursen, A., van Dijk, J., (2014). The digital divide shifts to differences in usage. *New Media and Society*, *16*(3), 507-526.

van Deursen, A., van Dijk, J., (2011). Internet skills and the digital divide. *New Media and Society*, *13*(6), 893-911.

Vedaavyzkum.cz., (2022). Věda a inovace v Maďarsku: Bohatý výzkumný ekosystém a velké plány [Online]. [cit. 2023-05-16]. Available online at: https://shorturl.at/beltP

Wuyckens, G., Landry, N. and Fastrez, P., (2022). Untangling media literacy, information literacy, and digital literacy: A systematic meta-review of core concepts in media education. *Journal Of Media Literacy Education*, *14*(1), 168-182.

MODELOWE PODEJŚCIE WIELOKRYTERIALNE DO ROZSZERZONEJ KOMUNIKACJI JAKO PODSTAWA ZRÓWNOWAŻONEGO RYNKU PRACY W KRAJACH GRUPY WYSZEHRADZKIEJ

Streszczenie: W gospodarce opartej na wiedzy pracodawcy wysoko cenią silne umiejętności korzystania z informacji ze względu na ich pozytywny wpływ na produktywność, innowacyjność i zdolność adaptacji. W niniejszym opracowaniu zaproponowano modelowe podejście do rozszerzonej komunikacji (EIL) w celu zwiększenia potencjału siły roboczej

w krajach Grupy Wyszehradzkiej. Przeprowadzono kompleksowy przegląd literatury, a następnie zastosowano wielokryterialną metodę ważenia decyzji, w wyniku czego powstały rankingi poziomów EIL krajów V4. Badanie potwierdzają, że wyższe umiejętności komunikacyjne stanowią przewagę konkurencyjną na rynku pracy. Metodologia niniejsza służy jako przydatne narzędzie porównawcze oraz wskaźnik obszarów wymagających poprawy. Proponowany model można zastosować także w innych krajach UE, po uprzednim dostosowaniu go do specyfiki lokalnej, Wyjątkowość artykułu polega na wypełnieniu luki w rozumieniu zależności pomiędzy poszczególnymi zmiennymi (np. umiejętnościami cyfrowymi, znajomością finansów, wydatkami na edukację w relacji do PKB) a rynkiem pracy w kontekście EIL w krajach Grupy Wyszehradzkiej.

Słowa kluczowe: Rozszerzona komunikacja, wiedza finansowa, metoda wielokryterialna, kraje Grupy Wyszehradzkiej, zrównoważony rynek pracy