

Factors influencing the development of digital competences in the Piła region

Factores que influyen en el desarrollo de las competencias digitales en la región de Piła

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Recibido: 15.08.2024

Acceptado: 15.10.2024

Abstract

This article examines the factors influencing the development of digital competencies in the Piła region. Key elements influencing these competencies, including employee education and technological innovations, were identified in confrontation with demographic factors. The research was conducted using the diagnostic survey methodology, covering 53 companies and 1,312 employees. Correlations between variables were analyzed using statistical tests, including the chi-square and Student's t-test. The data obtained showed strong correlations between expenditure on education and the level of digital competencies, as well as between investments in modern technologies and employees' digital skills. In addition, a significant impact of demographic factors such as education, gender and age on the development of digital competencies was noted. The results emphasize the need to intensify educational activities aimed at employees from demographic groups in more difficult situations, indicating the important role of local authorities in supporting these trends. Recommendations indicate

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the need for further analysis of the factors shaping digital competencies and activities promoting education in this area.

Keywords: digital education, digitalization, statistical correlations, digital competencies, advanced technologies, development factors, educational recommendations

Resumen

Este artículo examina los factores que influyen en el desarrollo de las competencias digitales en la región de Piła. Se identificaron elementos clave que influyen en estas competencias, incluida la educación de los empleados y las innovaciones tecnológicas, frente a factores demográficos. La investigación se realizó según la metodología de encuesta de diagnóstico, abarcando una muestra de 53 empresas y 1.312 empleados. Las correlaciones entre variables se analizaron mediante pruebas estadísticas, incluida la prueba de chi-cuadrado y la prueba t de Student. Los datos obtenidos mostraron fuertes correlaciones entre el gasto en educación y el nivel de competencias digitales, así como entre las inversiones en tecnologías modernas y las habilidades digitales de los empleados. Además, se observó un impacto significativo de factores demográficos como la educación, el género y la edad en el desarrollo de las competencias digitales. Los resultados resaltan la necesidad de intensificar las actividades educativas dirigidas a los empleados de grupos demográficos más difíciles, señalando el importante papel de las autoridades locales en el apoyo a estas tendencias. Las recomendaciones indican la necesidad de analizar más a fondo los factores que configuran las competencias digitales y las actividades que promueven la educación en este ámbito.

Palabras clave: educación digital, digitalización, correlaciones estadísticas, competencias digitales, tecnologías avanzadas, factores de desarrollo, recomendaciones educativas

Introduction

Recently, there has been a lot of talk about digital competencies, especially in the context of the Covid-19 pandemic. The factors that cause the development of digital competencies are much less discussed. In this article, they were selected in terms of the degree of relationship with digitization as part of survey research in randomly selected enterprises from the Piła region in the Wielkopolska province. Particular attention was paid to factors influencing the development of digital competencies related to employee education (digitization training, co-financing of postgraduate studies in this area) and modern technology and economy (digitization, process automation). The factors listed were confronted with demographic factors, such as gender, age or education of employees.

The aim of the article was to identify, learn about, and statistically verify the factors influencing the development of digital competencies, using the example of randomly selected enterprises located in the Wielkopolska region.

The subjects of the research were the factors that create relationships with the digital competencies of employees employed in these enterprises, and the subject – employees and managers of the companies studied. The following research problems were posed in the presented article:

- . Is there a correlation between the development of digital competencies and expenditure on employee educational activities?
- . Is there a correlation between the development of digital competencies and the expenditure on the development of advanced technology in the enterprise?
- . Can variables such as education, gender and age influence the development of digital competencies?

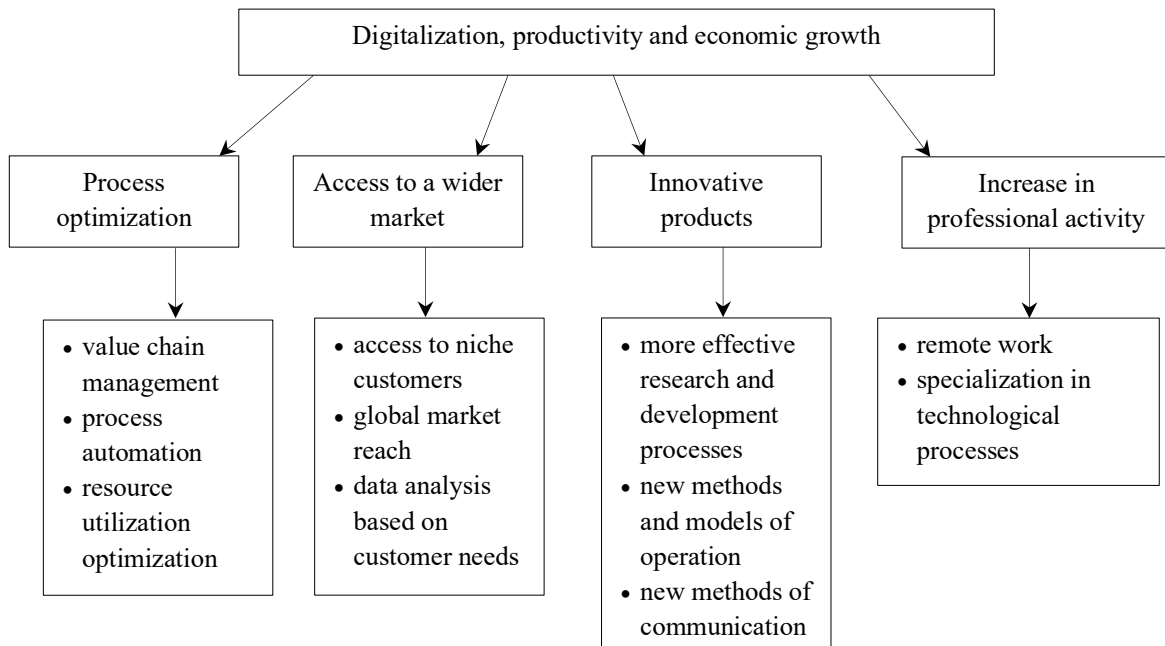
The main research method was a diagnostic survey addressed to employees of the surveyed enterprises and their managers.

The article consists of five parts. Part one defines and discusses digital competencies. Part two presents statistical data on the Piła region. Then, the basic factors that cause the development of digital competencies in enterprises and state and local government institutions are described. Part four is devoted to discussing the methodology of the author's research. It specifies the purpose of the research, the main research problems, the subject and object of the research, and the research tools and scope of the research. The next element of the article concerns the analysis of selected factors that may affect the development of digital competencies in the Piła region. This part defines the development of digital competencies depending on the resources available for educational activities in this area and on the resources available for the development of advanced technology in the surveyed entities. The frequency distribution for the assessment of digital competencies in the surveyed companies and institutions depending on the gender, age and education of the employees is also provided. The article ends with a discussion and conclusions.

1. Digital competences

In the 21st century, many scientists deal with digitization, competencies and digital competencies. This topic is related to the rapid development of digital technology, which is becoming an indispensable element of almost every enterprise. Problems arise when trying to define these phenomena. According to R. Vuorikari and S. Kluzer (2022, p. 1), digitization concerns not only the economy but every area of today's life. M. Chądzyński et al. (2021, p. 17) define digitization as activities using so-called digital tools, the purpose of which is to increase productivity and accelerate the economic growth of an enterprise - Figure 1.

Figure 1. The impact of digitalization on the economic growth of enterprises



Source: A chance to jump, 2016, pp. 25-29

The positive features of digitalization can be obtained in the following four ways (Chądzyński et al., 2021, p. 18):

- . process optimization (advanced database analysis, which influences the optimization of resource size and thus increases work efficiency, as well as digital value chain management),
- . expanding the sales market (searching for new sales markets using the advantage related to the use of new technologies and digitalization),
- . conducting innovative activities using digital technologies,
- . more efficient use of human capital.

Digital businesses gain global reach and access to niche customers online. They also collect data that they use to analyze customer needs and evaluate their interactions with the brand. According to LK Bugowski and K. Trzaska (2024, pp. 162-163), the digitalization of the economy enables a new quality of conducting economic activity through the processing of knowledge and the ease of collecting and exchanging information, as well as by increasing

the speed of communication. The development of social life (social networking sites, ease of interaction) and the economy itself are also changing, for example towards the development of a low-emission industry. Increasing efficiency (thanks to digitalization) helps to move from an economy competing on labour costs to one based on competencies.

Defining competencies is also not easy. Despite many attempts, it has not been possible to establish one binding definition. It is most often said that competencies concern people responsible for a given activity or action or having a privilege or obligation (Górska- Rożej, 2014, p. 12).

The dictionary concept of competence specifies the meaning of this term as skill, knowledge, ability, familiarity with a subject, professionalism, and a competent person is a reliable, authoritative, experienced, professional person, and it may also be the scope of authorization to act of a government body or an organizational unit, but also the scope of someone's power, skills and responsibility (Drabik et al., 2023, p. 348).

In addition to the concept of competence, there is often the so-called competence management, i.e. a method of managing human resources that combines activities from various areas, for example: improving and motivating employees, as well as their acquisition and creation of career paths (Filipowicz, 2004, p. 46). Competence management is a dynamic activity consisting of shaping and using employee competencies towards achieving the goals of the organization (Walkowiak, 2024, p. 58). The tasks of this process include, above all, directing the professional development of employees, which is related to the permanent increase in the economic power of the organization. In addition, the following activities occur in this process (Kupczyk, Stor, 2017, pp. 54-55):

- . designing competency profiles,
- . exploration of employee needs,
- . identifying competencies within a given job position,
- . motivating employees.

Digital competencies, according to D. Batorski and A. Płoszaj (2012, p. 10), mean a certain set of skills that determine the effective use of all types of electronic media, such as operating hardware and software, using applications (IT competencies), as well as finding the necessary information (electronic and traditional) to process and use it by specific needs (information competences). Digital competencies also include the ability to creatively use the possibilities offered by digital technology, as well as the ability to build relationships with customers or suppliers and the ability to ensure the security of collected data or information (Vuorikari et al., 2022, p. 64). Digital competencies also consist of a certain level of knowledge of the law, as well as the mechanisms of media economics and the ability to use the latest technologies, but in an ethical manner (Batorski, Płoszaj, 2012, p. 10).

The European Union, in the recommendation of the European Parliament, recognized that digital competencies should be included among eight key competencies that will be necessary during the implementation of the lifelong learning program or acquisition of new competencies (Recommendation of the European Parliament and of the Council, 2006, p. 11). These competencies are to be necessary for personal development and employment, self-fulfilment, participation in social life and integration.

According to Ł. Fiebich (2018, p. 6), digital competencies include the skilful and critical use of technology present in the information society during work while being entertained or in communication. These competencies are the ability to use computers and the Internet to store, create, present and exchange information. This author divided the indicators of digital competence development into the following five areas: information, communication, security, content creation and problem-solving.

In the further part of the study, the definition of digital competencies proposed by the Council of Europe was adopted, which is as follows: digital competencies include the confident, responsible and critical use of digital technologies, as well as their application in learning, work and everyday life. They also include the ability to use information and data obtained digitally, communicate and collaborate, use digital media, create digital content and programs

while maintaining security, respect intellectual property and solve problems, and think critically (Recommendation of the Council of Europe, 2018).

2. Piła region

Piła County was established in 1999, previously it was the Piła Voivodeship located in the northern part of today's Wielkopolska – Figure 2.

Figure 2. Location of the Piła region on the map of Poland



Source: Own study

The seat of the regional authorities is the city of Piła. This region is characterized by a high rate of urbanization. The district consists of: the city of Piła, Kaczory, Łobżenica, Ujście, Miasteczko Krajeńskie, Wyrzysk, Wysoka and the rural communes of Białośliwie and Szydłowo. This region is inhabited by 136,112 people (51.19%, women) on an area of 1,267 km². At the end of 2019, the number of registered unemployed included 2,300 inhabitants, which constituted 4.2% of the unemployment rate (GUS, 2019)

3. Factors contributing to the development of digital competencies

There is a great difficulty in identifying factors causing the development of digital competencies. Practically, the complete lack of documents that would indicate their evaluation means that the available texts describe only the current state, without referring to previous strategies, which results in gaps in the analysis of changing trends, and thus a lack of data on the effectiveness of factors, approaches, projects that would indicate an increase or decrease in digital competences. The author also noted that although there are activities towards the development of digital competencies, they only concern a longer time perspective, and do not refer to key individual factors that should determine the current level of competencies in a given country. General systemic, comprehensive approaches are rather indicated as key factors conditioning the development of digital competencies. A similar opinion was declared in the report by A. Tarkowski et al. (2018, p. 15, Helsper, 2014).

A rare example of a document that aims to identify factors causing the development of digital skills is the UNESCO Report (Simon, Yasmineen, 2018), which is an analysis of strategies and actions implemented in the past – aimed at developing digital competencies, such as a high level of access to broadband and mobile Internet, a high level of urbanization, a high Human Development Index *and* a high percentage of the population with higher education. According to this report, the development of technology and digital competencies is influenced by the level of digitization of the entire economy, which generates the supply of digital skills, as well as the availability of content in the local language, which greatly increases the benefits of having these skills (Tarkowski et al., 2018, p. 16)

The factors most frequently mentioned in the development of digital competencies include the following areas of knowledge, experience and skills:

- . expenditure on digital education (European Commission, 2023),
- . support and support of local authorities for people working in the field of developing digital competencies (Resolution No. 24 of the Council of Ministers, 2023 item 31),

- . management and coordination of activities in the field of development of digital competences (Tarkowski et al., 2018, pp. 9-10),
- . pandemic threats (Chojnacka et al., 2022, pp. 42-49),
- . artificial intelligence (Skorupska, 2018),
- . expenditure on the development of advanced technologies (Big Data, machine learning) (Tarkowski et al., 2018, p. 63),
- . globalization (online work) (Rogacka, 2022, p. 56),
- . demography (ageing of society) (Jurek, 2023, p. 68),
- . legislative changes in the field of digitalization (European Commission, 2023),
- . social trends (demand for employees knowledgeable in digital technologies) (Jurek, 2023, pp. 68-71),
- . employee awareness (Jabłoński, 2016, p. 140),
- . universal access to broadband and mobile Internet and the percentage of the population with higher education (Simon, Yasmeen, 2018),
- . level of urbanization and social development (Simon, Yasmeen, 2018).

Among the described factors, the following were selected: expenditure on employee educational activities, expenditure on the development of advanced technologies, as well as education, gender and age.

The described phenomena and observed factors of the development of digital competencies change the approach to this issue. Author E. Helsper put forward the thesis that the direction of the development of digital competencies should be changed from the issues of digital exclusion or divisions to e-integration, understood as a gradual phenomenon (Helsper, 2014). It is therefore about access to digital technologies, skills, motivation and engagement. The author emphasizes that digital skills are commonly considered to be a key factor that determines whether individuals will participate in social life through engagement in ICT.

4. Own research methodology

The aim of this study, understood as an activity enabling the examination of the significance of the influence of a given circumstance on another (Pilch, Bauman, 2001, pp. 35-36, Kowalska, 2016, pp. 8-9) is to verify the factors that influence the development of digital competences in the Piła region, using the example of enterprises and institutions located in Wielkopolska. The subject of the research understood as all phenomena subject to specific processes – based on which research questions can be formulated (Maszke, 2004, pp. 43-44), were the factors influencing the development of digital competencies in the surveyed enterprises and institutions, and the subjects were the surveyed companies and institutions from the Piła region. The research problem (research question) is a set of questions, the answers to which will facilitate the achievement of the research goal. The problem posed in the study concerns the conditions of the research subject, and its exclusive impact (Kucinski, 2010, p. 84).

The following research problems were adopted in this article:

- . Is there a correlation between the development of digital competencies and expenditure on employee educational activities?
- . Is there a correlation between the development of digital competencies and the expenditure on the development of advanced technology in the enterprise?
- . Can variables such as education, gender and age influence the development of digital competencies?

The empirical basis of the own research is measurements taken in the Piła region, carried out in January 2024. The relationships between variables were examined on a group of 53 enterprises and 1312 of their employees. The analysis of the research results was performed using statistical tests of independence (chi-square, t-Student). Calculations were performed using Excel.

The summary of survey results from our research is presented in Tables 1 and 2.

Table 1 Summary of survey results from own research

LP.	QUESTION	VARIABLES	EMPLOYEES IN THE SURVEYED COMPANIES (number: 1312)	
			number	%
1.	Age	Under 40 years old	685	52.21%
		Over 40 years old	627	47.79%
2.	Sex	Woman	762	58.08%
		Man	550	41.92%
3.	Education	Higher	280	21.34%
		Other	1032	78.66%
4.	Sources of Acquiring Digital competencies	Training	498	37.92%
		Advice from management	115	8.78%
		Financial assistance from the workplace	244	18.56%
		Independent work at home	426	32.49%
		Other (what)	29	2.25%
5.	Digital competences acquired	Increasing digital skills	999	76.12%
		IT skills	41	3.13%
		Information and communication skills	123	9.34%
		Functional competencies	120	9.18%
		Programming	29	2.23%

Source: survey for employees

Table 2 Summary of survey results from own research

LP.	QUESTION	VARIABLES	MANAGERS IN THE SURVEYED COMPANIES (number: 53)	
			number	%
1.	Annual financial outlays for educational activities in the field of digitalization for employees	< 100,000	21	39.62%
		101,000 to 200,000	13	24.53%
		201,000 to 500,000	11	20.75%
		> 500,000	8	15.09%
2.	Annual expenditure on the development of advanced technologies	< 1,000,000	27	50.94%
		1,000,001 to 2,000,000	12	22.64%
		2,000,001 to 5,000,000	9	16.98%
		> 5,000,000	5	9.43%

Source: survey for managers

5. Analysis of selected factors that may influence the development of digital competencies in the Pila region

The frequency distribution for the assessment of taking actions towards digitalization in the surveyed enterprises and institutions depending on financial outlays is presented in Tables 3, 4.

Table 3 Frequency distribution for the assessment of taking action towards digitalization, by expenditure

Taking action towards digitalization	Expenditures on educational activities in the field of digitalization				Expenditures on the development of advanced technology			
	Annual expenditure over 200,000 PLN		The remaining		Annual expenditure over 2,000,000 PLN		The remaining	
	n	%	n	%	n	%	n	%
Very high	7 (3)	35.00	1 (5)	2.94	6 (2)	42.86	1 (5)	2.56
High	6 (3)	30.00	3 (6)	8.82	5 (3)	35.72	7 (9)	17.95
Average	4 (6)	25.00	12 (10)	35,29	1 (4)	7.14	13 (10)	33,33
Niska	1 (5)	5.00	14 (10)	41,19	1 (4)	7.14	14 (11)	35.90
Bardzo niska	1 (2)	5.00	4 (3)	11.76	1 (1)	7.14	4 (4)	10.26
Total:	19	100	34	100	14	100	39	100

Source: own study based on Tables 1, 2

() – theoretical numbers

Table 4 Data for calculating theoretical numbers

Taking action towards digitalization	Expenditures on educational activities in the field of digitalization			Expenditures on the development of advanced technology		
	Annual expenditure over PLN 200,000	The remaining	SUM	Annual expenditure over PLN 2,000,000	The remaining	SUM
Very high	7	1	8	6	1	7
High	6	3	9	5	7	12
Mean	4	12	16	1	13	14
Low	1	14	15	1	14	15
Very low	1	4	5	1	4	5
Total:	19	34	53	14	39	53

Source: own study based on Tables 1, 2

Test χ^2 (Kończak, 2014, p. 41):

$$\chi^2 = \sum_{i=1}^k \sum_{j=1}^s \frac{(n_{ij} - n'_{ij})^2}{n'_{ij}};$$

where: n_{ij} - observed numbers; n'_{ij} - theoretical

The variables: "Taking actions towards digitization" and "Expenditure on educational activities in the field of digitization" in the context of annual expenditure on educational activities in the field of digitization above PLN 200,000, demonstrate a statistically significant relationship: $\chi^2 = 19.92$; $df = 5$; $significance = 0.0005187 < 0.001$.

The variables: "Taking actions towards digitalization" and "Expenditures on the development of advanced technology", in the context of expenditures on educational activities in the field of digitalization above PLN 200,000, demonstrate a statistically significant relationship: $\chi^2 = 19.89$; $df = 5$; $significance = 0.0005249 < 0.001$.

Statistical relationships for other variables:

. By education: The frequency distribution for the assessment of activities towards digitalization in the surveyed enterprises and institutions depending on the education of the employees is presented in Table 5.

Table 5 Frequency distribution for the assessment of taking action towards digitalization, according to employee education

Taking action towards digitalization	Expenditures on educational activities in the field of digitalization				Expenditures on the development of advanced technology			
	Higher education		The remaining		Higher education		The remaining	
	n	%	n	%	n	%	n	%
Very high	101 (85)	36.07	297 (313)	28.78	86 (73)	30.71	254 (267)	24.61
High	66 (57)	23.57	203 (212)	19.67	82 (70)	29,29	245 (257)	23.74
Mean	64 (68)	22.86	256 (252)	24.81	62 (66)	22.14	249 (245)	24,13
Niska	41 (41)	14.64	153 (153)	14.83	41 (47)	14.64	181 (175)	17.54
Bardzo niska	8 (28)	2.86	123 (103)	11.91	9 (24)	3.22	103 (88)	9.98
Total:	280	100	1032	100	280	100	1032	100

Source: own study based on Tables 1, 2

() – theoretical numbers

The variables: "Taking action towards digitalization" and "Expenditures on educational activities in the field of digitalization" in the context of the number of employees with higher education, showed a statistically significant relationship: $\chi^2 = 23.96$; $df = 5$; $significance = 0.000081 < 0.001$.

The variables: "Taking action towards digitalization" and "Expenditures on the development of advanced technology" in the context of the number of employees with higher education, show a statistically significant relationship: $\chi^2 = 19.15$; $df = 5$; $significance = 0.0007338 < 0.001$.

. by gender: The frequency distribution for the assessment of taking action towards digitalization in the surveyed enterprises and institutions depending on the gender of the employees is presented in Table 6.

Table 6 Frequency distribution for the assessment of taking action towards digitalization, by employee gender (own study based on Tables 1, 2)

Taking action towards digitalization	Expenditures on educational activities in the field of digitalization				Expenditures on the development of advanced technology			
	Men		Women		Men		Women	
	n	%	n	%	n	%	n	%
Very high	99 (82)	18.00	97 (114)	12.73	82 (72)	14.91	89 (99)	11.68
High	154 (137)	28.00	172 (189)	22,57	155 (136)	28,18	169 (188)	22,18
Średnia	152 (158)	27,64	226 (220)	29,66	151 (171)	27,45	258 (238)	33,86
Niska	115 (135)	20,91	207 (187)	27,17	110 (115)	20,00	165 (160)	21.65
Very low	30 (38)	5.45	60 (52)	7.87	52 (56)	9.46	81 (77)	10.63
Total:	550	100	762	100	550	100	762	100

Source: own study based on Tables 1, 2

() – theoretical numbers

The variables: "Taking action towards digitalization" and "Expenditure on educational activities in the field of digitalization" in the context of employee gender show a statistically significant correlation: $\chi^2 = 18.00$; $df = 5$; $significance = 0.0012 > 0.001$, but $significance = 0.0012 < 0.05$.

The variables: "Taking action towards digitalization" and "Expenditures on the development of advanced technology" in the context of employee gender show a statistically significant relationship: $\chi^2 = 12.27$; $df = 5$; $significance = 0.01544 > 0.001$, but $significance = 0.01544 < 0.05$.

. By age: The frequency distribution for the assessment of taking action towards digitalization in the surveyed enterprises and institutions depending on the age of employees is presented in Table 7.

Table 7 Frequency distribution for the assessment of taking action towards digitalization, by employee age (own study based on Tables 1, 2)

Taking action towards digitalization	Expenditures on educational activities in the field of digitalization				Expenditures on the development of advanced technology			
	Age under 40		Age over 40		Age under 40		Age over 40	
	n	%	n	%	n	%	n	%
Very high	67 (56)	9.78	41 (52)	6.54	52 (47)	7.59	38 (43)	6.06
The way	135 (122)	19.71	98 (111)	15.63	164 (148)	23.94	119 (135)	18.98
Średnia	202 (208)	29.49	197 (191)	31.42	209 (204)	30.51	182 (187)	29.03
Low	198 (194)	28.91	173 (177)	27.59	175 (182)	25.55	174 (167)	27.75
Very low	83 (105)	12.11	118 (96)	18.82	85 (104)	12.41	114 (95)	18,18
Total:	685	100	627	100	685	100	627	100

Source: own study based on Tables 1, 2

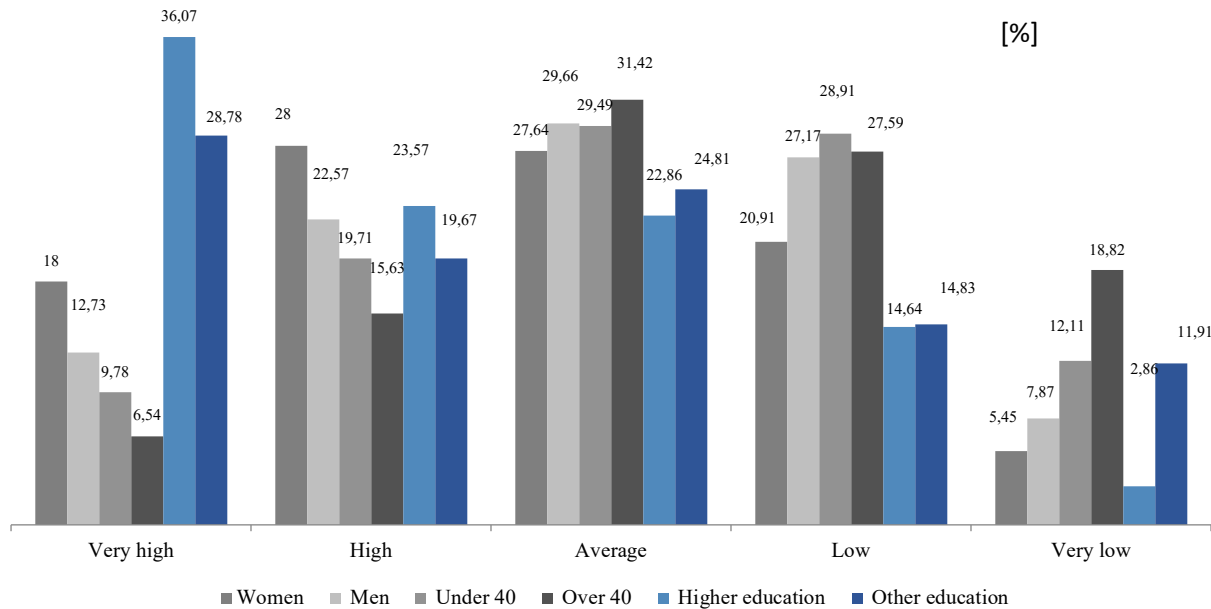
() – theoretical numbers

The variables: "Taking actions towards digitalization" and "Expenditures on educational activities in the field of digitalization" in the context of employee age show a statistically significant relationship: $\chi^2 = 17.45$; $df = 5$; $significance = 0.0016 > 0.001$, but $significance = 0.0016 < 0.05$.

The variables: "Taking action towards digitalization" and "Expenditures on the development of advanced technology" in the context of employee age show a statistically significant relationship: $\chi^2 = 12.89$; $df = 5$; $significance = 0.01184 > 0.001$, but $significance = 0.01184 < 0.05$.

The relationship between expenditure on educational activities in the field of digitalization and taking actions towards digitalization was indicated most highly by people with higher education (60% - very high and high), then by women (46%) and people under 40 years of age (30%) – Figure 3.

Figure 3. The relationship between expenditure on educational activities in the field of digitalization and taking actions towards digitalization in the context of gender, age and education

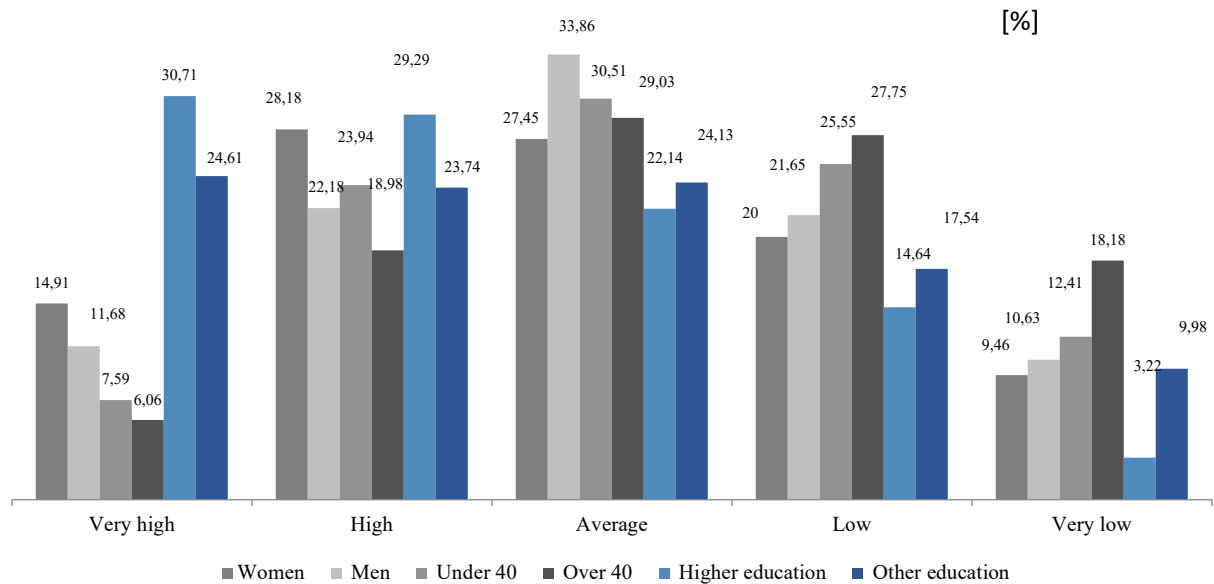


Source: own study, based on own research results

The least likely to undertake educational activities in the field of digitalization were people over 40 years of age (46% – very low and low), men (35%) and people with education other than higher education – 27%.

The relationship between expenditure on the development of advanced technology and taking action towards digitalization was indicated most highly by people with higher education (60% - very high and high), then by women (43%) and people under 40 years of age (31%) – Figure 4.

Figure 4. The relationship between expenditure on the development of advanced technology and taking action towards digitalization in the context of gender, age and education



Source: own study, based on own research results

The least likely to undertake educational activities in the field of digitalization were people over 40 years of age (46% – very low and low), men (32%) and people with education other than higher education – 27%.

Conclusion

The analysis of factors influencing the development of digital competencies in the Píla region has shown the complexity of this phenomenon, which is determined by both demographic aspects and the investment activity of enterprises in education and digital technologies. The research revealed that significant expenditures on employee education and the development of advanced technologies are important for raising the level of digital skills among employees. The research results indicate a solid correlation between the level of digital competencies and variables such as education, gender and age of employees.

Many respondents with higher education, younger employees and women show a higher level of engagement in developing digital competencies, which may suggest the need to focus educational and promotional activities on opposing groups who may be less inclined to actively improve their skills in connection with new technologies.

From the perspective of local authorities and managers of enterprises in the region, it seems important to invest in support and motivation programs that will stimulate employees to improve their digital skills. To achieve the intended progress in the field of digital competencies in the Piła region, it is also necessary to examine other, equally important factors and select those that most significantly affect the development of digital competencies in the Piła region.

Digital competence management should become an integral part of the development strategy of enterprises, and their support should be undertaken not only at the local level but also at the regional and national levels. It is necessary to strive to create a favourable climate for training, support in access to modern technologies and investment in education to fully use the potential of digital competencies of residents of the Piła region.

The solution to the first research problem is to state that there is a strong correlation between the development of digital competencies and expenditures on employee educational activities, with a significance level of < 0.001 . Similarly, the second research problem: there is a strong correlation between the development of digital competencies and expenditures on the development of advanced technology in the enterprise, with a significance level of < 0.001 . The solution to the third research problem showed that the development of digital competencies can be influenced by variables such as education, gender, and age, although at a lower significance level of < 0.05 , except education, where this level was strongly significant < 0.001 .

The development of digital competences in the Piła region not only increases the efficiency and innovation of enterprises, but also contributes to the sustainable development of local communities and their better integration in the global labour market. In the face of the changing digital reality, further analysis and actions in this area are necessary to ensure the competitiveness of the region on the economic map of the country.

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