REQUIREMENTS FOR EMPLOYEES IN THE DIGITAL ECONOMY

Tatiana Lapina – Tatiana Stuken – Olga Korzhova

Abstract

The article considers digital competencies of employees necessary in the digital economy, in individual organizations. We evaluated these competencies based on the questionnaire "DigComp 2.0: The Digital Competence Framework for Citizens". The data of the authors' research of employees of industrial enterprises of the Omsk region were used as an information base. The hypothesis of the study was that the demand for digital competencies exceeds their supply, and both the demand and supply of digital competencies differ by competence groups. The method of analysis was descriptive statistics and the ANOVA modulus averages. In the study, we compared the actual and required level of development of digital competencies of employees. The hypotheses of the study were confirmed. As a result, there were identified groups of digital competencies, the demand for which is relatively high, as well as groups of competencies, the demand for which is lower compared to other competencies. There were also identified groups of the most developed digital competencies. It was concluded that there is no symmetry of supply and demand for digital competencies.

Key words: competences, digitalization, labor market

JEL Code: J24, J23

Introduction

Each economic structure imposes its own requirements on employees. The fourth industrial revolution, the core of which is digitalization, assumes that employees will be the primate of technology and, accordingly, must have competencies that will allow them to perform work in conditions of digitalization. The central idea of this approach is employees' ability to use artificial intelligence in their activities. Only this orientation will allow the employee to remain competitive in the labor market. Modern scientific research records the strong influence of the development of digital competencies on the labor market (Mrnjavac et al., 2020, Ignatieva et al., 2023), workplaces (Cascio et al., 2016), development of other competencies (Elliott et al., 2017), and social transformations (Sharma et al., 2023, Nagy et al., 2022), and digital

competencies themselves as a subject of scientific analysis are no longer in doubt (Murawski et al., 2017).

Traditionally, the study of compliance with the development of competencies and the requirements of the labor market is carried out at two levels. These are macro level (analysis of the needs of the labor market and the demand for competencies in general at the level of the economy) and the level of organizations (analysis of the needs of an individual organization in competencies and assessment to what extent these needs coincide with the level of development of these competencies among employees).

Similarly, there are studies conducted to assess the demand for digital competencies. For example, Zhao et al. (Zhao et al., 2023) present the results of a study of the demand for digital competencies in one of the China regions. Gurieva et al. (Gurieva et al., 2023) present estimates of the demand for digital competencies in Russia. That is, the assessment of digital competencies at the macro level is in demand. At the same time, it is of interest to assess how much the requirements for the level of digital competencies and their development coincide within each individual organization. This is what our research is aimed at.

1   Methodology

To assess the level of digital competencies development, it is necessary to determine the methodology. Currently, various methods for assessing digital competencies are presented in the literature. In particular, Oberländer et al. (Oberländer et al., 2019) provide an overview of approaches to assessing digital competencies. The works of Sánchez-Canut et al. (Sánchez-Canut et al., 2023) and Canina et al. (Canina et al., 2021) present tools for assessing the development of digital competencies.

In our study in order to assess the supply and demand for digital competencies, we used the questionnaire "DigComp 2.0: The Digital Competence Framework for Citizens" (Vuorikari et al., 2016). This questionnaire has already been tested and its improved version is already being used at the moment. In this questionnaire, all digital competencies are divided into 5 groups: Information and data literacy, Communication and collaboration, Digital content creation, Safety, Problem solving. Each group is represented by three to six competencies. Each competence was evaluated on a five-point scale from 1 to 5. The questionnaire was filled out by employees who assessed the development of their own digital competencies, and also assessed how much their competencies are needed by the organization in which they currently work. That is, supply and demand were assessed by self-assessment. Of course, this approach

in assessing competencies has certain limitations, since it is self-assessment. At the same time, only the employee himself knows the specifics of his workplace and therefore can competently assess the requirements that are imposed on his competencies. Therefore, such a bottom-up approach is also informative enough to assess the supply and demand of digital competencies.

The study tested the following hypotheses. First is that the demand for the level of development of digital competencies exceeds the supply. That is, the actual digital competencies of employees are less developed than required. The second hypothesis is that the demand for digital competencies and their supply are differentiated by groups of competencies and by individual competencies. To test hypotheses, we used descriptive statistics and the ANOVA modulus averages (F-criterion).

As part of the study, we also conducted a survey of employees of industrial enterprises in the Omsk region. There were interviewed 993 employees, 960 questionnaires were accepted for analysis. The study was conducted in August-September 2023. There were interviewed managers and specialists of administrative and management departments.

2   Results

To test the first hypothesis, we calculated the average scores for each competence and evaluated the statistical significance of the differences by the F-criterion. The results of the comparison of supply and demand are shown in Fig.1.

Figure 1 shows that demand exceeds supply for all competencies.The figure shows only competencies with statistically significant differences in average estimates of supply and demand. The largest gap between supply and demand is observed for Programming (0.95) and Managing digital identity (0.9) competencies. Regarding the requirements of the organization, these two competencies are less developed than the others. Figure 1 shows only 12 competencies, which means that for about half of the competencies, the estimates of supply and demand coincide (there are no statistically significant differences).It is noteworthy that in the Digital content creation block, demand for all competencies statistically significantly exceeds supply. That is, we can conclude that in this area there is the greatest gap in the development of competencies and demand for them. Therefore, this block of competencies can be considered as an essential development zone.

Thus, we can conclude that the first hypothesis has been partially confirmed – for most digital competencies, demand exceeds supply. At the same time, there are quite a lot of competencies for which there are no statistically significant differences in the estimates of

supply and demand, which means that employees already currently meet the requirements of the labor market. This conclusion suggests the possibility of the economy's transition to other more advanced digital technologies.

Fig.1: Supply and demand of digital competencies[1]
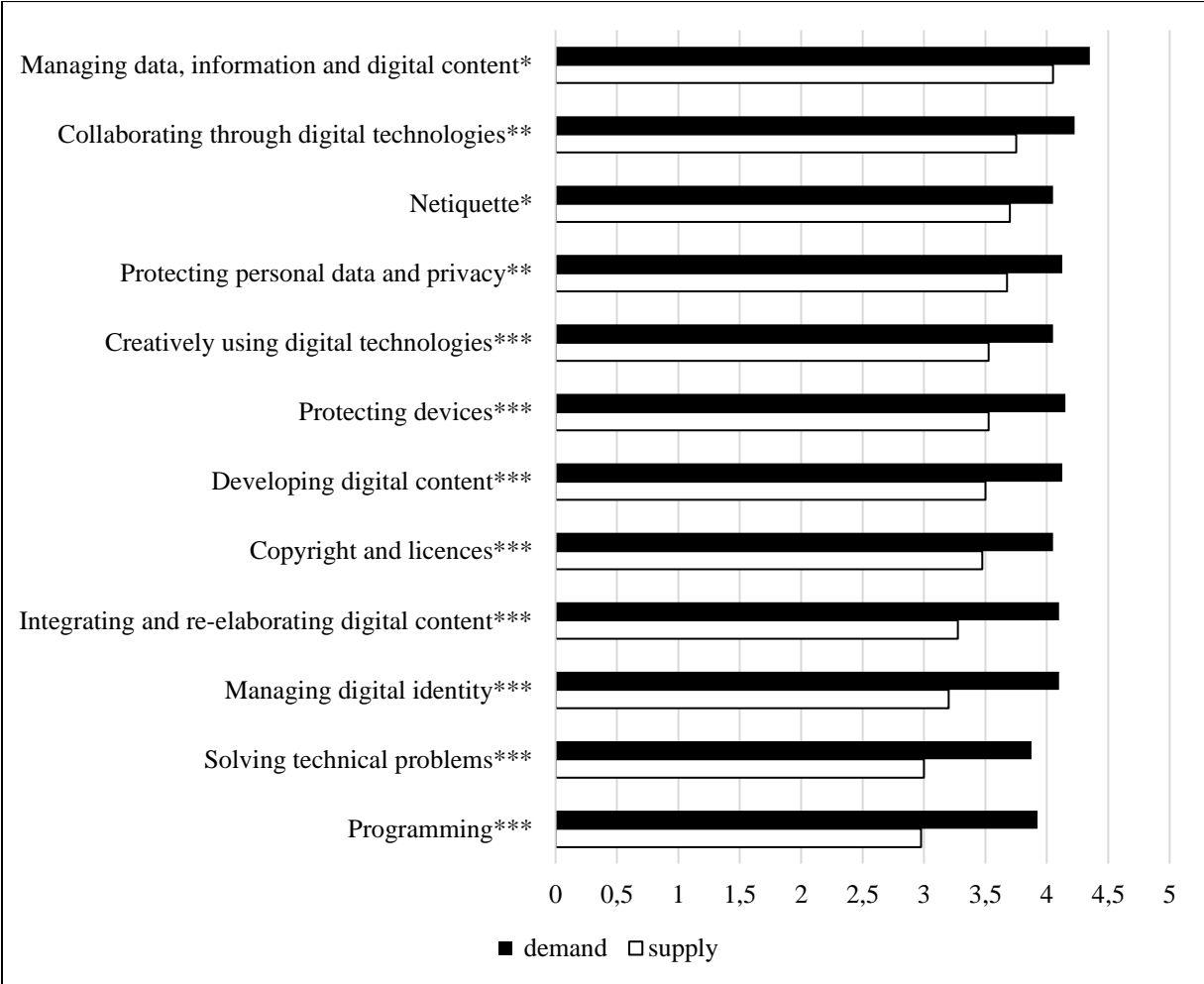
Source: authors' calculations

To test the second hypothesis, let us turn to figure 1. It shows that the estimates of supply and demand differ for each competence. Thus, Managing data, information and digital content have the maximum value of demand (4.35 points), and the maximum development is observed in the competence of Sharing through digital technologies (4.25 points). At the same time, the minimum value of demand is Engaging in citizenship through digital technologies (3.6 points), and Programming competence is least developed on average (2.9 points). That is, we observe

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[1] Notes: The signs ***, **, * in the names of the indicators of supply and demand of digital competencies mean the statistical significance of the differences in the F-criterion: *** - $p<0.01$, ** - $p<0.05$, * - $p<0.1$

both differentiation of the development of digital competencies among employees (a spread from 2.9 to 4.25 points) and differentiation of demand for digital competencies (a spread from 3.6 to 4.35 points). At the same time, the heterogeneity of employees in the development of their digital competencies is higher than the heterogeneity of workplace requirements (StDev for supply is 0.38, and StDev for demand is 0.2).

If we analyze the requirements for digital competencies and their development in the context of competence groups, we will get the following result (Tab.1).

Tab. 1: Supply and demand for digital competencies of personnel, point[2]

Competence areas	supply of digital competencies	demand for digital competencies	gap between supply and demand
Information and data literacy	4.08	4.28	0.2
Communication and collaboration	3.83	4.06	0.23
Digital content creation	3.31	4.05	0.74
Safety	3.59	3.96	0.36
Problem solving	3.58	4.04	0.46

Source: authors' calculations

Table 1 shows that currently the most developed competencies are from the Information and data literature block (Browsing, searching and filtering data, information and digital content, Evaluating data, information and digital content, Managing data, information and digital content). The demand for this group of competencies is maximal. At the same time, the development of this group of competencies is the closest to the amount of demand for it (the gap between supply and demand is the smallest among the five groups of competencies). According to the employees' estimates, they have the least developed competencies from the Digital content creation block (Developing digital content, Integrating and re-improving digital content, Copyright and licenses, Programming) – 3.31 points on average. For this group of competencies, there is also a maximum gap between the requirements of supply and demand (0.74 points), while the requirements from the demand side are not the highest relative to other groups of competencies. On the part of employers, the development of the Safety competence

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[2] Notes: The results of comparing the average supply and demand of digital competencies are statistically significant according to the F-criterion (F=7.938, p=0.023)

group is the least in demand (Protecting devices, Protecting personal data and privacy, Protecting health and well-being, Protecting the environment) - 3.96 points on average.

Thus, the second hypothesis is confirmed.

Conclusion

Finally, we can draw the following conclusions. First of all, the study records the demand for digital competencies, and for all types of competencies, which indicate the transition to the digital economy of Omsk industrial enterprises. The presence of demand contributes to the development of these competencies, and hence the development of their supply in the labor market. At the same time, the peculiarity of the demand for digital competencies is that it does not require the maximum level of competence development – the average value of the development of all digital competencies is fixed at 4.07 (with a maximum score of 5 points), and for six competencies out of twenty-one, the average score is below four points. On the one hand, this is due to the specifics of workplaces. On the other hand, the lack of maximum demand indicates that some digital competencies are not fully used in companies and this may be a resource for the development of jobs in the future. The analysis of the supply of digital competencies also revealed their heterogeneity and the relative higher development of individual groups of competencies. On average, the level of development of digital competencies among employees is lower than the requirements on the demand side, but there are competencies (Sharing through digital technologies & Engaging in citizenship through digital technologies) that are developed on average more than is required in organizations. Thus, in order to perform labor functions at their workplaces effectively, employees need to develop their digital competencies, since at present, with the current level of development, competencies do not reach the requirements of organizations. This means that the development of the digital economy is slowing down. Consequently, the main requirements in the digital economy will be the development of digital competencies, but not to the maximum values, but to certain levels, and these levels differ by groups of digital competencies.

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