Assessment of the Impact of Digital Skills on the Level of Satisfaction with Digital Transformation Processes in Ukraine

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Abstract. The digital transformation of the leading countries towards the neo-economy effectively uses the potential of digital competences, which remain insufficiently explored in Ukraine, but it is already clear that they are the key to the inclusive economic growth of any country, namely the post-war revival and development of Ukraine at a highly competitive level. The purpose of this study was to find the specific features of the influence of the level of digital competences (according to DigComp 2.1) on the evaluation of the prospects for building a digital economy by Ukrainian citizens, and the perception of the processes of digital transformation of the economy by stakeholders. The information base of this study included online survey data, processed using the SPSS package. Found regularities were verified using standard statistical parameters of the relationship. At the first stage, the influence of the level of digital skills on the judgments, attitudes, and expectations of respondents on the prospects of digital transformation in Ukraine and the world was found. Depending on the attitude towards the development of ICT, the archetypes of the respondents were distinguished (optimist, pragmatist, agnostic, rationalist/cautious pessimist, and sceptic). The second stage investigated the impact of digital skills on various aspects of the life of Ukrainian citizens, namely on their daily life, on them as consumers and as workers. It was found that a higher level of digital skills contributes to improving the quality of respondents' everyday life; there is an increase in the share of respondents who use Internet resources in everyday life. The key conclusions are as follows: 1) focused efforts on the development of digital skills will contribute to an increase in the share of optimistic and pragmatic assessments of digitalisation; 2) the detected digital gap between the possession of skills and the need for them (2-3 times) actualises the implementation of policies aimed at overcoming it; 3) the awareness of the impact of the level of digital skills on the development of citizens and satisfaction with the products of the digital economy is growing; 4) the digital transformation of the economy radically changes its structure, the landscape of the labour market, and has a major impact on every citizen. Foremost, those who have an elevated level of digital skills will be able to benefit from digitalisation

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INTRODUCTION

The post-war recovery of Ukraine's economy should be based on the existing achievements and further development of the potential of digitisation of the economy and social life. Successful examples of countries gaining high international competitive positions prove the importance of highly developed technological infrastructure and people capable of using it (Lukyanenko *et al.*, 2019). The Marshall Plan and similar strategies made provision for the renewal of the technological potential of countries – this refers to Germany and France, Japan, and South Korea. Therefore, it is the mass digitalisation of all aspects of life that can become a powerful factor in recovery and restructuring of the economy of Ukraine; will allow removing spatial limitations of involvement of the entire circle of stakeholders (employees, partners, consultants, investors); will ensure the acceleration of the development and implementation of innovative solutions and technologies. The prerequisite for these processes is the proper level of digital skills of Ukrainian citizens – both consumers and employees of government bodies, civil society, economic entities, and businesses.

In the conditions when digitalisation processes are a factor of international competitiveness for Ukrainian enterprises, and for the state – a prerequisite for the adoption and implementation of modern tools for ensuring socially oriented sustainable economic development, their impact on employees and consumers turns out to be understudied. Research support for the implementation of the necessary transformations, namely the study of Ukrainian cases in scientometric databases (Scopus, Web of Science), is insufficient. There are no publications investigating the digital competences of Ukrainian citizens, assessing the influence of the level of proficiency in digital skills on the perception of digital transformation processes.

The questions discussed above can be divided into several groups. How objectively necessary and useful are projects and programs aimed at promoting the development of digitalisation for all interested parties? What determines the social and business benefits of digitisation and the development of digital skills? How can the perception of the usefulness of digital skills be increased, which would motivate individuals to actively acquire and improve them; employers, state and public institutions – to support these processes, specifically by taking part in the financing of relevant programs and activities? The search for answers to these questions is of interest to many researchers.

Digitalisation has a positive effect on economic growth, which has been proven in the EU based on a study of the relationship between the Digital Economy and Society Index (DESI) and the macro indicators of their manufacturing sector (using linear correlation coefficients and multiple regression analysis) (Lastauskaite, & Krusinskas, 2021). The level of skills is recognised as a critical factor in dynamic digitalisation, and it is also statistically confirmed that as their level increases, so does the rate of development of the neo-economy.

Technological development offered the world community the opportunity to promptly minimise pandemic risks. One can agree that the spread of the COVID-19 pandemic has demonstrated the relevance of digital competence at all educational levels (Núñez-Cana *et al.*, 2022). If before the pandemic, the spread of digital competences was most actively taken care of in developed countries, now such interest can be observed in most countries.

Many researchers emphasise the vital role of teachers, which I. Darazha *et al.* (2021) update on the example of adaptation to pandemic conditions, and V. Siddoo *et al.* (2019) – employee competencies. However, digital competence should be supported, so training should also include lifelong learning, personal development, teamwork, reliability, and IT fundamentals.

The European Framework for the Digital Competence of Educators proposed in 2017 showed the complexity of digital competence (22 components grouped into 6 groups and 6 levels of proficiency) on the example of educators who perform the function of spreading and improving the contribution of the digital economy to social development (Punie & Redecker, 2017). Therewith, its content continues to develop, becoming an integral part of professional, social, and personal life.

Differences in countries' assessment of sectoral development priorities can lead to digital divides and international confrontations. This can be proved by many examples. First, Russia's military aggression against Ukraine has a competence dimension because the former hoped that Ukraine would not have enough qualified specialists, namely in the digital sector, to defend its sovereign territory. Secondly, if the risks of digital inequality and the inability to ensure cybersecurity were considered by the experts of the World Economic Forum (WEF) as such that they could become critical in a period of up to two years, then the issue of physical security, in their opinion, has now lost its relevance because geo-economic confrontations had to be delayed for 5 years (McLennan *et al.*, 2022). Thirdly, the development of high-tech industries, e.g., the space sector, can balance the digital and material dimensions because it involves the simultaneous and balanced consideration of digital and physical competencies. That is why digital security is now receiving much more attention than physical security, which dominated before.

The processes of digital transformation rely primarily on the entrepreneurial activity of many individuals, and therefore it is important to understand what factors most contribute to the fact that a person resorts to entrepreneurship. The use of sociological approaches allowed approaching such an understanding and revealing the existence of differences between countries. An analysis of respondents from Spain, Taiwan, and Kosovo found that personal attitudes and behavioural content

are the main determinants of entrepreneurial intentions in the digital economy (Liñán, & Chen, 2006).

Digital transformation faces sectoral and industry specificities that determine the effectiveness of this process and consumer satisfaction. Factors deciding customer behaviour in mobile retail U. Akram *et al.* (2021) refer to ease of use, trust, mobility, and consumer engagement rather than usefulness or customisation. At the same time, conclusions often arise not only about the critical impact of the digital divide, but also about the age gap, which should be overcome primarily by managing the literacy and digital competencies of the population (Soroya *et al.*, 2021). As noted by I. Denisov *et al.* (2021) in the higher education sector, the dissatisfaction of teachers and students with the quality of digitalisation processes led to the radical digitalisation of university management processes. On the other hand, digitalisation processes in certain industries and attitudes towards them remain understudied, as evidenced by the practices of the agricultural sector, namely regarding pesticides, nanotechnologies, cloning, etc. (Pfeiffer *et al.*, 2021). Therewith, the practices of rendering social services with the use of digital technologies indicates that service providers should have better digital skills than consumers who trust them (Schlenger *et al.*, 2022).

One of the examples of evaluating the manifestations and benefits of digitalisation at the level of individual organisations is the study of relationships between business process management (BPM) models and direct and indirect benefits of digitalisation. Y. Antonucci *et al.*, (2020) based on data obtained from 165 BPM professionals from 4 continents, empirically studied the relationships between 8 groups of conventional and dynamic business process management capabilities and 20 benefits of digitalisation. Using the Kendall correlation coefficient, a positive but varying degree of relationship between BPM capabilities and the benefits of digitalisation is proven, digitalisation has different effects on increasing employee efficiency and improving employee engagement.

One of the digitalisation scenarios is the active implementation of artificial intelligence, which has sectoral differences. For the safe and effective development of this process, it must be preceded by a study of the attitude of employees towards these processes. For instance, procurement employees have a positive attitude towards innovative digital technologies. Therewith, there is a need to support such an attitude with certain factors (Blessing & Kiefer, 2021). C. Meske and I. Junglas (2021) proved that a positive attitude towards digital transformation increases as employees are convinced of the need to be more autonomous, competent, and communicatively connected to the workplace.

The positive dimensions of digitisation are recognised as one of the prerequisites for achieving the UN Sustainable Development Goals. M. Mondejar *et al.* (2021) described the possibilities of digitalisation to build a sustainable society of the future based on elements of the food-water-energy nexus, as well as ways to solve the planetary problems of climate change and endangered biodiversity; the advantages of digitisation as a catalyst for the transition to sustainable production methods and improving the health of citizens through the digitisation of medical services are determined. Thus, ideas about the positive impact of digitalisation on the formation of a fair, ecologically sustainable, and healthy society are outlined. However, all the above is currently possible only based on an adequate level of digital skills.

Research on the digital competences of various social groups is becoming relevant and widespread, along with the growth of the share of the digital economy in GDP (6% in the narrow sense of the digital economy and 20-30% in the broad sense of the neo-economy). Therewith, the level of proficiency in digital competences is one of the signs according to which social groups with different attitudes towards phenomena and processes can be formed.

The gender dimension is quite clear even in the digital economy, although digital transformation has significant potential to reduce the gender gap. However, the share of female researchers in most countries and their dynamics reduce optimism on this issue (Kurchenko *et al.*, 2021). Furthermore, attitudes and beliefs, as well as self-perceptions of management skills and the effectiveness of digital competences, vary significantly across genders, even among those with higher education (Bandrés *et al.*, 2021).

Therefore, in society and business, there is a growing awareness of the need to consider the interests of all stakeholders, which can be achieved both through sociological research and theoretical research and applied experiments. Digital competencies are being studied at all levels – international organisations, national governments, companies and educational institutions. It will suffice to mention the International Computer and Information Literacy Study, which has been conducted since 2010 by the International Association for the Evaluation of Educational Achievement, and the PISA 2021 ICT Framework, which will be conducted in 2022 at the initiative of the OECD.

Individual researchers are limited to an extremely narrow base of respondents or subject of research. An example is a recent focus group survey of 251 professors of business administration at the universities of Madrid, which was limited to the characteristics of educators and their attitudes towards technology (Núñez-Cana *et al.*, 2022), or the study of the opinion of 300 exclusively representatives of Generation Z (Tolstikova *et al.*, 2021). Therewith, the attitude of even ordinary employees towards digitalisation processes can have a decisive influence on the development of supply chains (Ruiner & Debbing, 2021).

Sometimes researchers resort to testing hypotheses for which there is a lack of objective data, and

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therefore conclusions are drawn based on the opinion of limited groups of respondents. In the study of M. Vasilescu *et al.* (2020), conducted based on Eurobarometer 87.1 survey data, the subject of analysis was the self-assessment and perceptions of respondents (citizens, employees) regarding the digitalisation of the economy and various spheres of life. Based on the use of a joint methodology that includes several statistical and econometric methods, two-stage cluster analysis (TSCA), the following hypotheses were tested and statistically confirmed:

— H1. The digital divide can lead to the creation of digitally vulnerable groups and even digitally vulnerable countries.

— H2. The effective use of modern technologies (both in everyday life and at work) depends on perception and skills, which are primarily determined by the level of education and income.

— H3. The general perception of digitalisation among EU citizens is positive, but some categories feel insufficiently prepared to master modern technologies, especially in the workplace.

— H4. People are generally positive about robots, but there are serious concerns, especially about the impact of digitalisation on the labour market and jobs.

Proceeding from this, further research should consider that among digitally vulnerable groups (elderly, low-educated, manual workers or unemployed, with relatively low income, who do not use the Internet much, and possess minimal digital skills), pessimistic attitudes predominate assessments and moods, predict the possibility of job loss and difficulties in performing everyday tasks. Accordingly, digitally vulnerable countries should include those with a high proportion of the population that does not possess digital skills. In addition, specific regularities of the perception of digitalisation and their impact on the formation of a "smart" labour market, which would ensure a better match between supply and demand, as well as increase people's confidence in their qualifications and create the prerequisites for the widest possible development of the digital ecosystem, were revealed. An important conclusion of the researchers is that for the rapid and effective mastering of digital skills, the development of a positive attitude towards digitalisation in general is of paramount importance. The research results presented above were considered when figuring out the purpose, tasks, and choosing the methodology of this study.

The purpose of this study is to find the specific features of the influence of the level of digital competences on Ukrainian citizens' assessment of the prospects for the development of the digital economy, as well as to identify stakeholders' perception of the processes of digital transformation of the economy. To fulfil this purpose, *the following tasks were defined:*

– to identify the influence of the level of digital skills on the judgments, attitudes, and expectations of Ukrainian – citizens regarding the future of digitalisation in Ukraine and the world by identifying certain archetypes of respondents;

– to investigate the impact of the level of digital skills on the lives of Ukrainian citizens, namely in terms of 3 aspects: on their daily life, on them as consumers and as employees.

MATERIALS AND METHODS

The information base of this study was the answer bank of respondents to the survey *"Digital economy, impact of ICT on human capital and formation of future competencies",* which was conducted in November 2020–February 2021 within the framework of the research project of KNU – HUAWEI "Digital economy, impact of ICT on human capital" capital and formation of future competencies".

The survey was conducted online using a specially designed questionnaire that was posted on the Google Forms online survey platform. The survey was conducted anonymously using the Computer Assisted Web Interviewing (CAWI) method using the functionality of the Google forms survey toolkit. 1,181 experts took part in the survey (representatives of the academic community, civil service, business and entrepreneurship, the public sector, and the temporarily unemployed), which allowed obtaining the necessary set of data (13 general and 40 special questions), which comprehensively represent the features of the development of the digital economy in Ukraine. Detailed information on the content of the questions and answers is presented in (Antoniuk *et al.*, 2021). Quantitative and qualitative characteristics of the respondents (socio-demographic profile, territorial distribution) ensured the relevance of the research and the validity of the conclusions. Statistical processing of empirical data was carried out using the Statistical Package for the Social Sciences (SPSS).

One of the key questions of the second block was self-assessment by respondents of the level of digital skills, which are determined according to the European Digital Competence Framework DigComp 2.1 (Carretero Gomez *et al.*, 2017). It is known that it distinguishes 5 areas of digital skills – information literacy and skills for working with data; communication and cooperation; creation of digital content; problem-solving; cybersecurity. Based on the self-assessment of the level in each of the defined areas, the overall indicator of the level of digital skills was calculated, which was calculated as the lowest score among the defined areas of digital skills, regardless of the level of proficiency in other areas. Thus, a "hard approach" is applied, which is based on the principle of balanced proficiency in all areas of skills and the importance of each area to ensure quality mastery, as well as the ability to use the gains and advantages of ICT in full.

RESULTS AND DISCUSSION

Digital archetypes. At the first stage of the research, the impact of the level of digital skills on the judgments, attitudes, and expectations of the respondents regarding

the future of digitalisation in Ukraine and the world was identified. Depending on the confirmation of the attitude towards the development of ICT in Ukraine (the questionnaire holds 5 meaningful statements that describe the attitude, the sixth statement is undecided), 5 archetypes of respondents were selected (optimist, pragmatist, agnostic, rationalist/cautious pessimist, and sceptic). (Antoniuk *et al.*, 2021). Analysis of the cross-tabulation results showed that the level of digital skills has a positive effect on attitudes towards ICT development (Table 1).

Table 1. *Cross-tabulation and assessment of the interrelationship of factors "archetypes of respondents – digital skills", %*

Respondent archetype	Questionnaire statement	Level of digital skills				On average	Statistical parameters for assessing the interrelationship of factors		
		Minimum	Low	Basic	Above basic		Pearson's chi-squared test	Test of homogeneity (chi-squared probability)	Cramér's V (φc)
Optimist	I expect positive consequences for the economy (society, myself personally)	77.6	82.5	83.3	76.2	80.5	15.134	0.019	0.080
Pragmatist	ICT development is inevitable, Ukraine must use its own advantages	67.5	74.1	80.3	85.7	73.5	23.675	0.001	0.097
Agnostic	The impact of ICT on the economy and society is exaggerated	44.0	46.9	50.4	52.4	46.8	15.805	0.015	0.082
Rationalist/ cautious pessimist	The development and use of ICT is associated with many problems	24.2	28.1	25.4	33.3	26.4	11.638	0.071	0.070
Sceptic	This question is irrelevant	16.8	14.5	13.6	12.7	15.1	11.748	0.068	0.071

Source: *calculated by the authors using SPSS*

As can be seen from the following cross-tabulation results:

1) the optimism of the assessment of the consequences of digitisation for the economy of Ukraine depends on the level of digital skills. Respondents with basic and higher levels of digital skills are more optimistic than respondents with no or low skills – respectively: 81.8% vs. 77.6%.

2) pragmatic assessments of the positive consequences of digitisation for the economy of Ukraine also clearly correlate with the level of digital skills. It is possible to follow a direct relationship that the higher the level of digital skills, the higher the share of pragmatists among the respondents. If, on average, 73.5% of respondents have pragmatic expectations, then for respondents with a basic level of digital skills, this indicator is 80.3%, with a higher level of skills – 85.7%.

3) respondents with a higher level of digital skills more actively express an agnostic position, supporting the statement that the impact of ICT on the economy and society is exaggerated. If, on average, this position belongs to 46.8% of respondents, then it is shared by 50.5% of respondents with a basic level of digital skills and 52.4% with a level of digital skills above the basic level. This is probably since an elevated level of digital skills allows them to more realistically and diversely assess the positives and expected consequences of digitalisation for the economy and its individual sectors.

4) higher professional awareness in the field of ICT causes a greater prevalence of pessimistic assessments. If on average 26.4% of respondents support the thesis "The development and use of ICT is associated with many problems", then among people with basic competencies the level of support for this statement is lower – 25.4%, and among people with digital skills it is higher basic level, reaches 33.3%.

5) sceptical assessments decrease as the level of digital skills increases: 13.6% – basic level of digital skills, 12.7% – above the basic level, against 15.1% – on average for the population.

Named trends and regularities were verified by conducting an examination of the statistical parameters of the relationship (Table 2). The presence and closeness of the connection is not proved and depends on the archetype of the respondent, namely regarding the "rationalist" and "sceptic" archetypes, the connection is not statically significant; null hypothesis about the independence of the variables "in question".

Table 2. *The results of the examination of the statistical parameters of the interrelationship of the factors "archetypes of respondents – digital skills"*

Respondent archetype	Pearson's chi-squared test	Test of homogeneity (chi-squared probability)	Cramér's V (φc) according to Rea&Parker recommendations
Optimist	Significant relationship at p=0.05	Rejected – the relationship is available	The relationship is insignificant
Pragmatist	Significant relationship at p=0.01	Rejected – the relationship is available	The relationship is insignificant
Agnostic	Significant relationship at p=0.05	Rejected – the relationship is available	The relationship is insignificant
Rationalist	Non-significant relationship	Difficult to determine	The relationship is insignificant
Sceptic	Non-significant relationship	Difficult to determine	The relationship is insignificant

Source: compiled by authors according to criteria defined in (Rea & Parker, 2014)

The second stage of the research was the study of the impact of the level of digital skills on the lives of citizens. The impact was investigated in terms of 3 aspects: on everyday life, on survey respondents as consumers and as employees.

Digital life of citizens. The availability and level of possession of digital skills is a source of demand for goods and services offered in the digital economy and is a factor in its growth. As the research confirmed, the presence and level of digital skills helps improve the quality of life of the respondents (Table 3).

Table 3. *Share of respondents who regularly use ICT opportunities in everyday life, %*

Manifestation of influence	Level of digital skills				On average	Statistical parameters for assessing the interrelationship of factors		
	Minimum	Low	Basic	Above basic		Pearson's chi-squared test	Test of homogeneity (chi-squared probability)	Cramér's V (φc)
Information sources	54.4	62.7	68.0	79.4	61.6	75.516	0.000	0.179
Search for information, goods, and services	66.6	76.5	81.6	88.9	74.5	35.993	0.000	0.123
Electronic communications	66.6	79.6	87.3	92.1	77.0	70.297	0.000	0.173
Cloud services	30.4	48.0	63.6	74.6	46.0	113.787	0.000	0.219
Online purchases of goods, tickets, food, etc.	37.1	51.1	61.4	71.4	49.0	69.291	0.000	0.158
Electronic payments, transactions with cryptocurrencies, etc	31.8	44.7	56.1	73.0	43.7	73.117	0.000	0.176
Entertainment	19.6	32.9	38.6	66.7	30.9	96.23	0.000	0.202
Distance learning	21.4	35.3	43.4	60.3	33.1	35.05	0.000	0.122
Online access to government services	26.7	39.9	41.2	60.3	36.4	55.368	0.000	0.153
Organisation and self-organisation	21.4	35.3	43.4	60.3	33.1	82.746	0.000	0.187

Source: calculated by the authors using SPSS

The availability of digital skills positively affects the level of demand for digital economy products. A stable trend towards an increase in the share of respondents who use Internet resources in everyday life was found, depending on the level of possession of digital skills, namely:

1. The share of respondents who always use ICT as a source of information (any, including news) is 68% for

respondents with basic skills, 79.4% for respondents with above-average skills, which is substantially above the average level (61.6%) or the level of use by people without skills (54.4%); a similar situation exists in relation to the search for information, goods, and services.

2. Respondents with a higher level of digital skills more often use electronic communications as a means of communication (with family, with authorities, social infrastructure, etc.). If only 66.6% of people without skills use electronic communications, the share of respondents with skills above the basic level is 92.1%. A comparable situation, but with a lower share of respondents, also occurs regarding the use of cloud services: 63.6% (basic level of digital skills), 74.6% (above the basic level), 30.4% (by people without skills) with an average prevalence of use – 46%. Less activity regarding cloud services can be explained by the relative novelty of this opportunity and the current low demand for the corresponding services (so far, there is a lack of awareness of the need and potential for further use of this opportunity).

3. The dependence of the frequency of use on the level of digital skills was also found in relation to the intensity of Internet purchases (goods, tickets, food), which considerably speeds up the implementation of these transactions, allows freeing up time, choosing goods and services of a more acceptable value, etc. Respondents with skills above the basic level do this twice as often as people without skills: 71.4% and 37.1%, respectively. An analogous situation was found regarding the implementation of electronic payments and other financial transactions: 73% of respondents with skills above the basic level against 31.8% – respondents without skills.

4. The presence and level of digital skills contributes to the development of individuals, as they are more likely to use distance learning opportunities, which are becoming more widespread and in demand, especially in the context of the COVID-19 pandemic. In Ukraine, there is a stable direct relationship between the level of digital skills, and the growth of the share of respondents who will systematically use ICT for distance learning: 55.8% – respondents without skills; 81.0% – respondents with skills above the basic level.

5) The increase in the level of digital skills substantially eases and accelerates online access to government services, helps to save time and effort in obtaining them. Thus, 60.3% of respondents with skills above the basic level use electronic capabilities (bots, websites, mobile applications) for communications with state structures, while only 26.7% of respondents with minimal skills do so, which is 2.25 times less.

Organisation and self-organisation of everyday life is improved through electronic services and other ICT. A direct relationship between the growth of the level of digital skills and the systematic use of ICT opportunities for the organisation and self-organisation of everyday life was revealed: 60.3% (respondents with digital skills above the basic level) compared to 21.4% (respondents without digital skills). People with skills above the basic level are almost 3 times more likely to use ICT for entertainment compared to people without such skills – 66.7% vs. 19.6%, respectively. The identified trends and regularities are confirmed by the assessment of the statistical parameters of the relationship between the considered manifestations of the impact of digitalisation on the everyday life of Ukrainians and their digital skills according to the rules defined in (Rea & Parker, 2014):

1. A check was made for a statistically significant relationship (by comparing the real value of Pearson's χ^2 with critical values, a significant relationship was confirmed at p=0.01 for all manifestations of influences.

2. Hypotheses about the independence of variables based on the homogeneity test (the chi-square probability is rejected for all manifestations of influence.

3. The evaluation of the correlation coefficient V according to Kramer suggests a weak relationship regarding all manifestations of influence

Digital consumers. There is a strong connection between the level of digital competences of people and consumer choice. The conducted research allowed obtaining statistical confirmation of the positive impact of the level of digital skills on respondents as consumers, their consumer behaviour, and priorities in consumption (Table 4).

Table 4. *The share of respondents who note the maximum impact of digitalisation on themselves as a consumer (in terms of the consequences of the impact), %*

| Manifestation of influence | Level of digital skills | | | | On average | Statistical parameters for assessing the interrelationship of factors | | |
	Minimum	Low	Basic	Above basic		Pearson's chi-squared test	Test of homogeneity (chi-squared probability)	Cramér's V (φc)
Development of digital skills	32.49	42.76	45.61	52.38	40.05	50.562	0.000	0.146
Higher quality of services received	39.40	44.74	52.19	65.08	45.30	13.922	0.001	0.101

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Table 4, Continued

Manifestation of influence	Level of digital skills				On average	Statistical parameters for assessing the interrelationship of factors		
	Minimum	Low	Basic	Above basic		Pearson's chi-squared test	Test of homogeneity (chi-squared probability)	Cramér's V (φc)
Improving the quality of communication	47.00	52.63	58.77	60.32	52.16	21.39	0.002	0.095
Increase in choice, ease of customisation of products	47.24	54.39	60.09	73.02	53.85	36.917	0.000	0.125
Decrease in consumer prices	12.44	14.69	17.11	22.22	14.73	13.922	0.031	0.077
Emergence of new goods and services	41.01	49.56	57.02	58.73	48.35	29.737	0.000	0.112
Speeding up access to products and services	48.39	59.21	63.16	65.08	56.31	23.908	0.001	0.101

Source: *calculated by the authors using SPSS*

The obtained results allow outlining the specific features of the impact of digitalisation on consumers. The following dependences and influences were identified and statistically confirmed:

1. A stable relationship between the level of digital competences of respondents and the share of respondents who feel the maximum impact of digitalisation on the formation of new digital skills was found. Thus, if for respondents with a minimum level of skills, this share is 32.5%, then for respondents with skills above the basic level, it increases to 52.5%.

2. The dependence between the level of digital competences and the possibility of obtaining higher quality services was confirmed. The share of respondents who note the impact of changes in the quality of services systematically increases with the increase in the level of digital skills: from 39.4% for respondents with a minimum level of skills to 65.1% for respondents with skills above the basic level. Digital skills also have an impact on the assessment of the quality of communication: 60.3% of respondents with digital skills above the basic level mark it as maximum; among respondents with a minimum level of skills, the share of such respondents is only 47%.

3. With the growth of digital skills, respondents increasingly feel the positive consequences of digitalisation, specifically in terms of increased choice, ease of customisation of products (goods, services). The share of respondents who experience for themselves as a consumer the maximum impact of this consequence of digitalisation, but have the minimum level of digital skills, is only 47.2%. Among respondents with skills above the basic level, 73% of respondents note the positive effect of the increase in choice and ease of product customisation.

4. Respondents with a higher level of digital competence also receive more benefits from digitalisation in terms of lower consumer prices. If on average less than 15% of respondents determined the maximum impact

of this factor for themselves as a consumer, then the share of such respondents with basic digital skills is 17.1%, and among respondents with skills above the basic level – 22.2%. As the level of digital competences increases, the share of respondents who note the maximum positive impact of such a consequence as "acceleration of access to products and services" increases: 48.4% (minimum level) – 65.1% (above basic level).

5) A positive assessment of the impact of digitalisation on the expansion of consumer supply, the emergence of new goods and services also depends on the level of digital skills. A constant increase in the share of respondents who determined the impact of this consequence of digitalisation on themselves as the maximum, with the increase in the level of their digital skills, was revealed. It is confirmed by only 41.0% of respondents with a minimum level of digital skills, and among respondents with skills above the basic level, the share of support is already 58.7%.

Identified trends and regularities are confirmed by the assessment of the statistical parameters of the relationship (Pearson's chi-squared test); testing of the hypothesis about the independence of variables based on the test of homogeneity (Test of homogeneity (chi-squared probability); (Cramér's V (φc) according to the rules defined in (Rea & Parker, 2014)) between the considered manifestations of the impact of digitalisation on consumers and their digital skills, except for such manifestations as "improvement of communication quality" and "reduction of consumer prices". The hypothesis regarding the dependence between the level of digital skills and these manifestations of digitalisation was statistically rejected.

Digital economy employees. The increase in the level of digital skills substantially influence the respondents as employees (Table 5). It contributes to improving the flexibility of labour relations, as it positively affects the possibility of using new forms of employment:

remote employment, the advantages of which have become well understood in the context of the COVID-19 pandemic; freelancing is important for creative professions and individuals; women with children and other people who combine work with social responsibilities or have special work needs. However, the sectoral structure of the neo-economy can considerably affect both the demand for digital skills and the valuation of workers.

Table 5. *The share of respondents who note the maximum impact of digitalisation on themselves as an employee (in terms of the consequences of the impact), %*

Manifestation of influence	Level of digital skills				On average	Statistical parameters for assessing the interrelationship of factors		
	Minimum	Low	Basic	Above basic		Pearson's chi-squared test	Test of homogeneity (chi-squared probability)	Cramér's V (φc)
Emergence of new employment opportunities	41.3	40.9	50.0	25.8	41.7	9.277	0.159	0.101
Job loss	7.6	8.1	7.5	7.9	7.8	4.057	0.669	0.041
Emergence of new forms of employment (remote, freelance, etc.)	50.0	58.1	68.9	65.1	57.6	59.944	0.000	0.159
The possibility of a flexible work schedule	48.4	60.1	64.0	68.3	57.0	32.004	0.000	0.116
Development of new digital skills	49.1	60.7	65.8	55.6	57.2	64.956	0.000	0.234
Expansion of the scope of professional duties	39.9	45.6	48.7	42.9	43.9	26.092	0.000	0.105
Increase in labour productivity	35.0	43.2	50.9	52.4	42.2	37.78	0.000	0.126
Decrease in labour productivity	35.0	38.2	43.9	38.1	38.1	20.554	0.002	0.093
Increase in load intensity	25.8	25.9	25.4	28.6	25.9	7.993	0.239	0.058
Change of work environment brings new challenges	35.0	38.2	43.9	38.1	38.1	12.277	0.056	0.072

Source: *calculated by the authors using SPSS*

Digital transformation brings new opportunities for the employment of employees. Thus, if, on average, 41.7% of respondents noted the emergence of new employment opportunities, then for respondents with a basic level of digital skills, this indicator increases to 50%. Unexpectedly, there are lower ratings in other groups (only 25.8% of people with digital skills above the basic level rated the impact of this factor on themselves as maximum), which can probably be explained by the relatively small number of positions that specifically require digital skills above the basic level and can be of interest to respondents with this level.

On average, 7.8% of respondents noted the risk of job loss because of digital transformation. Respondents with a basic level of digital skills, as well as with a basic and higher level of digital skills, feel more protected (only 7.5% and 7.6%, respectively). The same level (7.6%) is possessed by the respondents who lack digital skills, probably because their positions do not require it. Without digital competencies, only 50% of respondents feel the maximum impact on themselves as an employee, and the growth of digital skills to the basic level leads to an increase in the share of respondents to 68.9%; for respondents with a basic and higher level of digital competence, it is 68%. A clear trend of increasing the

share of respondents who feel a positive impact of ICT with increasing level of digital skills also occurs regarding the possibility of a flexible work schedule (48.4% – people without skills, 68.3% – respondents with skills above the basic level).

Respondents with a higher level of digital skills benefit more from digitalisation in terms of "building new digital skills". 60.7% of respondents with a low level of skills and 65.8% with a basic level of skills noted this effect for themselves, i.e., with the increase in the level of skills, mastering new ICT opportunities becomes easier and faster. A variety of special educational literature, videos, and webinars are available to users on the Internet, which substantially ease the process of acquiring digital skills. The share of respondents with a level of digital skills above the basic level who noted for themselves the positive impact of "forming new digital skills" is somewhat lower (55.6%), probably considering the greater difficulty of mastering professional versions, tools, software, etc., compared to those who are widely used.

The active use of ICT also leads to conditional negative consequences. One of them can be the expansion of the range of professional duties, if this does not lead to an adequate increase in the level of material reward. The prevalence of this factor is directly related to

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the level of digital skills. 39.9% of respondents without digital skills noted the maximum impact of this factor, among respondents with a basic level of digital skills, their share increases to 48.7%, basic and higher – 47.4%. As the level of digital skills increases, work becomes (or has every reason to become) increasingly diverse; better opportunities for career growth appear, which, in the case of positive circumstances and financial prerequisites, creates a better potential for salary growth.

The growth of digital skills of employees has a definite positive impact on increasing their work productivity. The share of respondents who noted the maximum impact on themselves as an employee increases from 35% (minimum level of digital skills) to 52.4% (digital skills above the basic level). The share of respondents who noted a decrease in labour productivity because of digitalisation tends to decrease, but only to the basic level of digital skills (8.1% – minimum level, 5.3% – basic level). The opposite situation was found among respondents with digital skills above the basic level: 19% of respondents noted this negative circumstance as having an impact on them. This can probably be explained by the expansion of their professional responsibilities, excessive administration of activities or the need to duplicate information in digital and paper form, etc. A final understanding of the reasons requires more research.

Attention should also be paid to such a factor as the increase in load intensity. The fact that almost 80% of respondents assessed the impact of this factor on themselves as average and maximum deserves awareness and in-depth analysis; 25.9% is the maximum. It is a genuine problem that needs recognition and a solution. Analysis of the prevalence of maximum exposure by level of digital skills does not reveal a clear relationship. The increase in the level of digital skills to the basic level is somewhat counteracted by the increase in the intensity of the workload (the share of respondents decreases to 25.4%), but for the group of respondents with skills above the basic level, the share of respondents who feel the maximum impact is higher than for respondents with an average level. The level and variation of the indicator cause interest in further research to find out the reasons and develop management measures for such situations.

A third of employees (38.1% of respondents) consider the impact on themselves of such a factor as "change in the working environment, which causes new challenges" to be maximum, which indirectly characterises their uncertainty in their future (possibility of continuing to work and performing job duties) due to new elements of work environment that should be learned and/or adapted to. Among respondents with basic and above basic levels of digital skills, the share of such respondents is substantially higher – 43.9% and 42.6%, respectively.

Identified trends and regularities are confirmed by evaluating the statistical parameters of the relationship (Pearson's chi-squared test); test of homogeneity (chi-squared probability); Cramér's V (φc) according to the rules defined in (Rea & Parker, 2014)) between the considered manifestations of the impact of digitalisation on the personnel of organisations and their digital

skills, except for such manifestations as "emergence of new employment opportunities", "job loss", "increase in load intensity", "the change of working environment brings new challenges". The hypothesis regarding the dependence between the level of digital skills and the conditional negative perception of digitalisation is statistically rejected.

Thus, the conducted research is relevant because it is part of the general global flow of research aimed at finding features and regularities of satisfaction with digital transformation processes and attitudes towards their components (Darazha *et al.*, 2021; Punie & Redecker, 2017; Siddoo *et al.*, 2019). The research methodology was developed based on a creative combination and development of methodological approaches to assessment, namely those that were used (Ben Youssef *et al.*, 2014; Liñán & Chen, 2006; McLennan *et al.*, 2022) and prescribed by EU regulations (such as the European Digital Competence Framework DigComp 2.1 (Carretero Gomez *et al.*, 2017). However, the obtained conclusions and tested hypotheses are more representative compared to (Núñez-Cana *et al.*, 2022; Tolstikova *et al.*, 2021) due to a wider range of respondents (1181 representatives of the academic community, public service, business and entrepreneurship, public sector and temporarily unemployed) and questions (13 general and 40 special), which comprehensively represent the peculiarities of the development of the digital economy in Ukraine. Conducting such a study in Ukraine once again proves that countries where the share of the digital economy is significant tend to more actively study citizen satisfaction because trust in the authorities is consciously identified as an essential part of social capital.

CONCLUSIONS

Based on the results of the statistical testing of the put forward hypotheses about the dependence of factors, targeted efforts to form digital skills will contribute to an increase in the share of optimistic and pragmatic assessments regarding the perception of the consequences of digitalisation in Ukrainian society.

The discovered differences (sometimes 2-3 times) in the frequency of use of certain digital services depending on the level of digital skills prove a digital gap between the possession of skills and the need for them (based on self-assessment of their importance). This requires the implementation of a targeted policy to eliminate it.

Future research should also look for explanations for the phenomenon of digital pessimism, which is observed in numerous instances. Even among archetypes such as the optimist and the sceptic, individuals with above-basic levels of digital skills have more pessimistic views than those with lower levels of competence. Moreover, such digital pessimism is often observed among workers regarding employment issues, new forms of employment, competencies and professional responsibilities, work productivity and work environment.

There is a clear relationship between the level of digital skills, and the share of respondents who feel a considerable impact of digitalisation on personal

development, education, and satisfaction with the digital economy products. An increase in the level of digital skills enables better experience of the positives of digitalisation, provides positive effects, improves consumer attitudes and contributes to the development of a higher quality consumer basket at a more reasonable price and with less time spent because the following effects take place: an increase in learning and development opportunities, an increase in quality and variety of goods and services, price reduction, reduction of time costs.

Thus, on the example of Ukraine, it was confirmed that the digitalisation of the economy radically changes not only its macroeconomic structure and the landscape of the labour market, but also has a considerable impact on every employee and consumer. The intensity of the impact of digitalisation and the share of people who experience it are dictated by the level of digital skills.

The clearest advantages of digitalisation and the development of digital skills are that it enables better solutions for security issues, increases the defence capability of the country and the competitiveness of the economy, influences the quality of life, work in any epidemiological situation, reduces resource consumption, improves social equality, and brings closer other ideals of sustainable development.

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Оцінка впливу цифрових навичок на рівень задоволеності процесами цифрової трансформації в Україні

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Анотація. Цифрова трансформація країн-лідерів у напрямку неоекономіки ефективно використовує потенціал цифрових компетенцій, які в Україні залишаються недостатньо дослідженими, але вже зараз зрозуміло, що вони є запорукою інклюзивного економічного зростання будь-якої країни, зокрема післявоєнного відродження і розвитку України на високому конкурентному рівні. Метою дослідження є виявлення особливостей впливу рівня цифрових компетенцій (відповідно до DigComp 2. 1) на оцінку українськими громадянами перспектив розбудови цифрової економіки, сприйняття стейкхолдерами процесів цифрової трансформації економіки. Інформаційним базисом роботи є дані он-лайн опитування, оброблені з використанням пакету SPSS. Виявлені закономірності перевірені за допомогою стандартних статистичних параметрів взаємозв'язку. На першому етапі ідентифіковано вплив рівня цифрових навичок на судження, настрої та очікування респондентів щодо перспектив цифрової трансформації в Україні та світі. Залежно від ставлення до розвитку ІКТ виділено архетипи респондентів (оптиміст, прагматик, агностик, раціоналіст / обережний песиміст та скептик) Доведено, що оптимістичність оцінки наслідків цифровізації залежить від рівня цифрових навичок. На другому етапі вивчався вплив цифрових навичок на різні аспекти життя українських громадян, зокрема на їх повсякденне життя, на них як на споживачів та як на працівників. Виявлено, що вищий рівень цифрових навичок сприяє покращенню якості повсякденного життя респондентів; спостерігається зростання частки респондентів, які використовують інтернет-ресурси у повсякденному житті. Ключовими висновками є: 1) цілеспрямовані зусилля з формування цифрових навичок будуть сприяти збільшенню частки оптимістичних та прагматичних оцінок цифровізації; 2) виявлений цифровий розрив між володінням навичками та потребою в них (2−3 рази) актуалізує реалізацію політики, спрямованої на його подолання 3) зростає усвідомлення впливу рівня цифрових навичок на розвиток громадян та задоволеність продукцією цифрової економіки; 4) цифрова трансформація економіки кардинально змінює її структуру, ландшафт ринку праці та чинить домінуючий вплив на кожного громадянина. Отримати корисний ефект цифровізації зможуть передусім ті, хто має високий рівень володіння цифровими навичками

Ключові слова: ІКТ, цифрова економіка, цифровий розрив, компетенція, працівник, споживач, соціальна стратифікація, DigComp