

Strategic Management of Worker-Computer Interaction

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Abstract. Global threats, such as COVID-19, lead to the necessity to develop techniques that allow people who have to be isolated from each other to operate at full capacity, to produce goods, to provide services, to purchase goods and services, to study, to communicate, to have fun etc. Information and communication technology is a cornerstone for this. However, the effective usage of digital technologies depends on the competences of their users that is Worker-Computer interaction. Therefore, the article is devoted to the strategic management of the worker-computer interaction based on the digital potential of employment that is developed through the interaction of digital competence of an employee and digital components of a workplace. By conducting an extensive literature review about definitions and frameworks of digital competences presented by the European Parliament, the Organisation for Economic Cooperation and Development, the European Commission (DigComp), the National Research Council, the World Economic Forum, Japan Telework Association, the Skills for Employment Global Public-Private Knowledge Sharing Platform, the author broadens the scope of the concept of the digital potential of employment and gives the enhanced definitions of digital competence of an employee and digital components of a workplace. The author also scrutinizes the factors that influence the development of digital competences of an employee and digital components of a workplace, and suggests approaches to regulating and strategizing the digital potential of employment which can help to increase the effectiveness of the usage of digital technologies, labour productivity, human capital impact and to minimize the risks from the consequences of such a threat as coronavirus as well.

Key words. Strategic Management, Worker-Computer Interaction, the digital potential of employment, digital competence of an employee, digital (information) components of a workplace.

Introduction

The high degree of the interaction between digital competence of an employee and digital technologies is a key to the business effectiveness nowadays. It is especially relevant in the context of global threats, such as coronavirus, when people are forced to stay isolated and to operate remotely through digital technologies.

To estimate this degree and its efficiency and to develop the criteria of its strategical management, such a new economic category as the digital potential of employment which is developed through the interaction of digital competence of an employee and digital components of a workplace is introduced. The assessment of the digital potential of employment and strategizing of its development are essential to make more effective strategic decisions both at global and personal levels. Any mistakes in the evaluation of this core indicator and its management result in the underutilization of either labour force or digital technologies; therefore, it slows down the economic development and decreases the investment efficiency.

According to the *European Parliament*, “Digital competence includes not just digital skills, but a set of skills, knowledge and attitudes concerning the nature and the role of information technologies and the opportunities they offer in everyday contexts, as well as the related legal and ethical principles. It also includes critical and reflective attitudes towards the information available and its responsible use [3]”. *The European Parliament and the European Council* defined a digital competence as follows: “Digital competence involves the confident and critical use of information society technology (IST) for work, leisure, learning and communication. It is underpinned by basic skills in ICT: the use of computers to retrieve, access, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet [10].”

In its background report on Skills for the digital world, the *Organisation for Economic Cooperation and Development (OECD)* distinguishes several types of ICT-related skills necessary at a workplace. These are:

- technical and professional skills, including ICT specialist skills;
- ICT generic skills for workers and citizens alike to be able to use digital technologies;
- ICT complementary “soft” skills.[9]

The Digital Competence (DigComp) Framework distributes available indicators for measuring digital competence into the following areas:

- information;
- communication;
- content creation;
- safety;
- problem-solving. [1]

The National Research Council (“21st century skills”) identified three domains of skills (competence):

- cognitive;
- interpersonal;
- intrapersonal. [4]

Skills research system introduced at the *World Economic Forum* (Report ‘The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution’) identifies the following modern skills expected from employees:

Abilities:

- cognitive abilities;
- physical abilities;

Basic skills:

- content skills;
- process skills.

Cross-functional skills:

- systems skills;
- complex problem solving skills;
- social skills;
- technical skills;
- resource management skills.[12]

Relevant Body of Work

Taking into account international experience and national researches in ICT, we can give the following definition.

Digital competence of an employee (EDC) *is a part of human potential reflected in labour potential which is applied through the use of information and communication technologies. EDC is the skills of an employee (created and changing) that enable the employee to function in the economy, use information and communication technologies in his/her activities. [7]*

Digital competence of an employee profile *is the characteristic of digital competence of an employee core skills required for his/her functioning under conditions of the development of new employment forms and the increasing application of information and communication technologies which interaction can produce either positive or negative multiplicative effects.*

Based on the digital society's development trends and, consequently, the necessity for an employee to meet the demands of this digital society, we can conclude that digital competence of an employee has the vector of the development that shows how the skills change from its minimum to its maximum.

The more widespread information and communication technologies become, the more this potential of an employee grows increasing not only one's income but also social inequality.[11]

There are various factors that have an impact on changing the level of digital competence of an employee. One group of factors include internal factors (a person's inner world) which depend on the psychological type of an individual, his/her basic education and intelligence, cultural development and mentality. The second group covers external factors determined by a person's background and environment: the state educational policy, the cultural development of a society, existing legislation and state regulations, information security maintenance, ICT distribution and availability, openness to the global world and technology.

Digital competence of an employee is a basic element of the strategic management of employment which determines perspectives and opportunities for the development of a national economy and its place in the global digital labour market. The examination and evaluation of digital competence of an employee is essential for matching it with digital components of a workplace and estimating digital potential of the employment.

It is also necessary to reveal the basic components of a workplace, taking into account the changes of the employment system based on a workplace transformation. The workplace is studied as a certain set of functions from the viewpoint of its organizational and technological content. The author's opinion is that the basic components of the digital economy are workplace digital components.

Workplace Digital components (WDCs) *are social and economic indicators of constituent elements and requirements to organization and functioning of a workplace that contribute to implementation of digital competence of an employee's.[6]*

There is a number of internal and external factors which influence the development of workplace digital components.

External factors:

- Formed information and communication environment;
- Workplace environment;
- Legal maintenance of ICT implementation;
- Openness to the global ICT world;
- Government policy on digital society development, etc.

Internal factors:

- Digital competence of the top management of an organization;
- ICT equipment;
- ICT implementation into the economic activity and/or business operations;
- The speed of the ICT modernization and the implementation of new programs;
- The maintenance of ICT security at a workplace.

It is necessary to outline the fact that, if a workplace is created by a worker, or if a person is a freelancer, all the internal factors of the development of workplace digital components depend on this employee.

Digital competence of an employee can be realized only if there are certain workplace digital components. It corresponds to the effective digital potential of employment.

Digital potential of employment is a social and economic potential developed through the interaction of digital competence of an employee and workplace digital components.[6]

Types of the building of the digital potential of employment are presented on Figure 1.

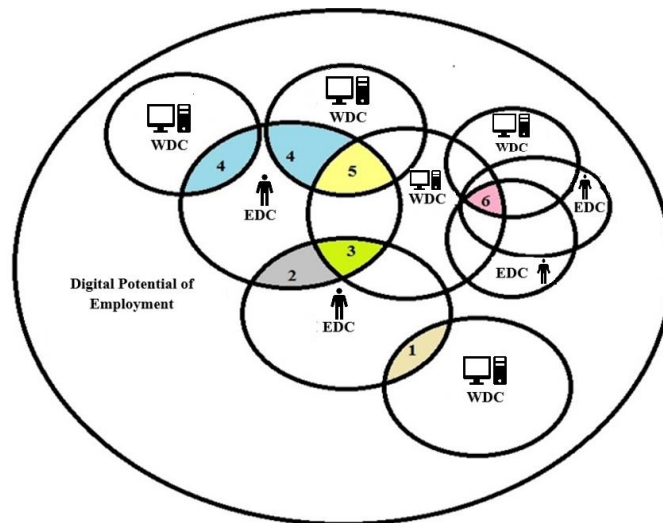


Figure 1. Digital potential of employment [5]

WIC (Workplace Digital Component)
EIC (Employee's Digital Competence)

- Form 1 (basic DPE) – the interaction between digital competence of an employee and digital components of a workplace;
- Form 2 – the interaction between digital competence of one employee and digital competence of the other employee regardless of digital components of a workplace;
- Form 3 – the interaction between digital competence of two or several employees and digital components of one workplace;
- Form 4 – the interaction between digital competence of an employee and different digital components of two (several) workplaces;
- Form 5 – the interaction between digital competence of one employee with similar digital components of two (several) workplaces;
- Form 6 – the simultaneous interaction between digital competences of two or several employees with digital components of two (several) workplaces.

Bilateral forms of the interaction are the basis for building more complex forms. The interaction of digital competence of an employee and a digital component of a workplace has a multiplier effect, which can develop digital competence of an employee and expand the digital components of a workplace.

Based on the understanding of the digital potential of the employment system as a complex subject of the strategic management, the author presents the formation and development of this category through the coordinate system (Figure 2).

The basic digital potential of the employment system (BDP) that is formed as result of the interaction of basic profiles of digital competence of an employee (EDC) and the digital component of a workplace (WDC) is at the point of the intersection of the coordinate system.

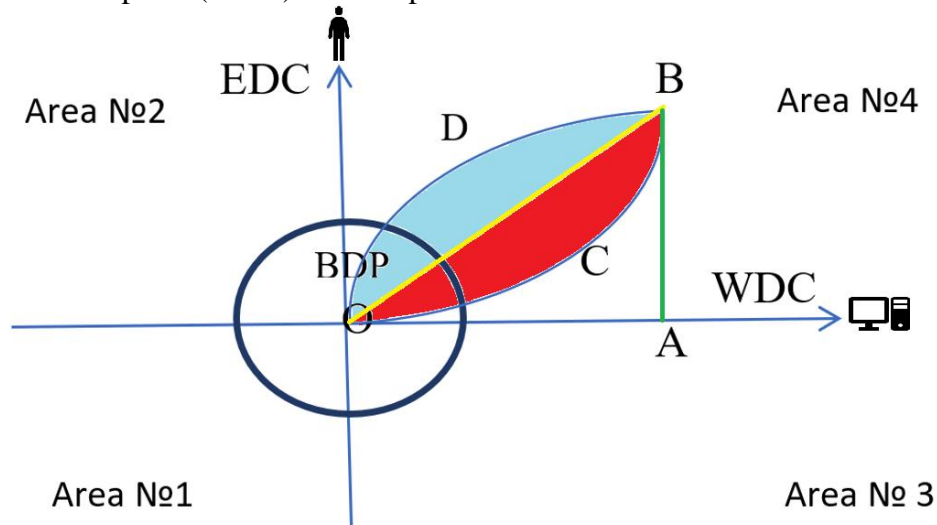


Figure 2. Graphic image of digital potential of employment model [8]

The points in Area 1 reflect the absence and underdevelopment of digital competence of an employee and digital components of a workplace. This segment includes permanent workplaces without usage of information and communication technologies.

Area 2 covers occupations where digital competences of an employee are not provided

with digital components of a workplace. This is the area where digital competences of an employee are underutilized.

Area 3 covers occupations where digital components of a workplace are not used because of the lack of digital competences of an employee. This area shows the underutilization of digital components of a workplace.

Area 4 covers occupations where a digital competence of an employee interacts with digital components of a workplace. Each point is a form of a certain interaction.

The OB bisector represents the optimal interaction of these components. The BA segment represents the absolute inequality in this distribution. The ODB and OCB lines reflect the inequality in the interaction of digital competence of an employee and digital components of a workplace. In order to optimize this interaction, ODB and OCB should tend to approach the OB bisector.

To estimate digital potential of employment, one should find out if any combinations of criteria which are considered as a part of digital competence of an employee and digital components of a workplace belong to one of the above mentioned areas.

There are six possible outcomes:

- 1) EDC criteria do not belong to the digital potential of employment;
- 2) WDC criteria do not belong to the digital potential of employment;
- 3) EDC criteria belong to the digital potential of employment but do not interact with WDC criteria;
- 4) WDC criteria belong to the digital potential of employment but do not interact with EDC criteria;
- 5) Both WDC and EDC criteria belong to the digital potential of employment but do not interact with each other;
- 6) Both WDC and EDC criteria belong to the digital potential of employment and interact with each other.

Current Implications

Digital potential of employment evaluation method suggested by the author highlights that the strategic management of employment has its specific features in different areas.

If formation of the digital potential is in Area 1, the strategic management of employment should be carried out by specialized government organizations free of charge as it is the government's duty to comply with its minimal guarantees.

The strategic management of employment in Area 2 is aimed at encouraging employers to modernize workplaces, introduce new forms of employment including workforce sharing, zero hour contract work, everyday work, multi position jobs, voucher work etc. This area involves commercial and non-commercial forms of regulations of specialized employment services both remote and stationary.

Area 3 outlines that the strategic management of employment encourages the development of digital competence of an employee. Labour force training, retraining and upgrading the skills of the labour force programs are to be developed and implemented. Up-to-date forms of employment are to be introduced, e.g. co-employment and strategic workforce sharing. Remote and stationary (both commercial and non-commercial) forms of providing information by specialized employment regulation services and the Internet community are to be

used. Non-standardized forms of regulation, the Internet manipulation and ICT are to be actively applied.

Area 4 shows that both workplace digital components (WDC) and digital competence of an employee (EDC) are available. However, the levels of their development can vary (Figure 3).

		EDC development levels		
		1	2	3
WDC development levels	1	A	D	E
	2	F	B	G
	3	I	K	C

Figure 3. Options of digital potential formation in Area 4 [8]

According to Figure 3, the interaction between workplace digital components and digital competence of an employee can be described as:

- full compliance with development levels of EDC and WDC (A, B, C);
- underutilization of WDC (F, I, K);
- underutilization of EDC (D, E, G).

If WDC is underutilized, the strategic management of employment complies with the strategic management of employment in Area 3. If EDC is underutilized, the employment policy complies with the employment strategic management in Area 2. The full compliance with development levels of EDC and WDC means that the strategic management of employment includes the regulations which encourage the development of both WDC and EDC while excluding their underutilization.

The gaps in digital competence of an employee and digital components of workplaces impede the implementation of new technologies and the growth of business [13], reduce productivity and demotivate labour force. When there is a risk of an emergency, including pandemics, the highly developed digital potential of employment (the full compliance of EDC and WDC) can guarantee the rapid and low-cost adaptation of employment to new circumstances.

Conclusion

Digital potential of employment develops during a certain period of time. The gap between digital competences of an employee and digital components of a workplace may be temporary till it is identified and, then, all necessary competences and components are developed. A well-developed strategy and the corresponding strategic management of employment that can maximize digital potential of employment should to be timely implemented. [8] The author tends to think that the theory of the strategy and strategizing methodology developed by Vladimir L. Kvint (Doctor of Economics) is the most effective [2] in this case. The fundamental point of the methodology is coordinating and satisfying the interests

of all parties involved, providing all the strategic priorities with the necessary resources and improving the quality of life as a result of the implementation of such a strategy.

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