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# DIGITAL TRANSFORMATION OF ORGANIZATIONAL CULTURE UNDER CONDITIONS OF THE INFORMATION ECONOMY

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**Abstract.** This article presents the results of an expert survey as a method of empirical research to identify current problems, barriers, features, trends, and directions of transformation of organizational culture, and applies the concept of "organizational culture" in evaluating the case of Ukrainian enterprises. First, the authors present the methodological approach, using the analytic hierarchy process**,** to evaluate the optimal scenario choice for developing the organizational culture of enterprises based on the twelve most important criteria and their systematization into four groups (adaptability, mission, consistency, and involvement). Second, they test a hypothesis that the optimal direction of transforming organizational culture depends on digital transformation which includes introducing digital technologies, information-powered enterprise ecosystems, innovative business models, and efficiency in B2B and P2P communications. Third, they argue that the key barriers hindering the effective development of organizational culture could be provisionally classified into seven groups: personnel, information, organization, marketing, education, technology, and investment-financial. Fourth, the authors evaluate the expediency of applying an integrated approach as a symbiosis and a constant inter-relation of influencing factors, constituent elements, digital competencies and skills, and information technologies. In conclusion, they summarize the findings of the study and discuss formulas to evaluate the impact of digital transformation on the organizational culture of enterprises in the information economy towards a people-oriented, innovative, customer-centric, and agile system in the case of Ukraine.

***Keywords:*** organizational culture, information economy, features, barriers, components, perspectives, transformation, digital technologies

***JEL Classification:*** C10, M14

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## 1. Introduction

The development of today's information society involves the digital transformation of business processes with the intensive use of digital technologies, forming new requirements including a new level of digital skills and knowledge among the enterprise personnel. Changes in the organizational culture lead to a growing demand for specialists in the field of information and communication technologies (ICT), and to modernization of the education system. Studies on the development of the information society and innovative economy in Belarus, Kazakhstan, Ukraine and some other countries (United Nations Economic Commission for Europe – UNECE, 2012; 2013) suggest that the creation and implementation of national programs should include the development of general and professional digital competencies and knowledge in the context of the lifelong learning concept (LLL), which, in turn, would impact the organizational culture development.

Recent studies of digital transformation demonstrate not only a growth in demand for digital skills in the labor market but also the need to develop and implement a set of measures to transform the organizational culture of enterprises in the context of the information societies' rapid development. For each business entity, digital transformation means modernization of its organizational culture as well as the introduction of digital technologies and communications, permitting it to expand its opportunities and create an ecosystem in collaboration with its contact audiences (Kokorev, 2019). According to McKinsey, productivity increases of 45–55% as a result of the business processes' automation constitute an important prospect for industry development in the information economy (McKinsey & Company, 2016).

The analysis and synthesis of scientific literature indicates the relevance of various aspects of organizational culture development. Scientists pay considerable attention to forming evolutionary views on the conceptual apparatus, studying current trends, justifying scientific and methodological approaches, and elaborating proposals for organizational culture development and management of improvements in the system of enterprise administration in the context of changing corporate culture. At the same time, the versatile, multidimensional, and debatable nature of individual issues on the chosen topic necessitate further scientific research. This topic is especially important as digital transformation comprises cultural, organizational, and social components, and, therefore, it might be the solution to many problems or it might become a cause for challenging conditions in the context of the information economy.

The purpose of the article is to develop methodology for identifying key barriers to the effective development of organizational culture under current conditions, and to assess how digital transformation impacts organizational culture (not only organizational but also operational and communication components) and transforms the information economy, using the case of Ukraine.

To achieve this purpose, the authors adopt a tailored research methodology integrating and systematizing qualitative and quantitative approaches to analyzing organizational culture, and using methods of abstraction and analogy, induction and deduction, analysis and synthesis, economic statistical data, and expert surveys for evaluating impacts of digital transformation on organizational culture.

## 2. Literature Review

Many international studies on the development of the information society and innovative economy in Belarus, Kazakhstan, Ukraine and some other countries (United Nations Economic Commission for Europe (UNECE), 2012; 2013) suggest that the information technologies have been playing an increasingly growing role in promoting innovations and in the transition to the information economy over the past two decades. Business models of many companies are closely dependent on applied information technology (IT) management methods. At the same time, the role of IT in companies has changed significantly. Some scholars suggest (Byrd & Turner, 2001) that information technology is no longer considered just as a tool to support business processes; IT is regarded now as a resource for innovative activity and solving technological problems. In certain circumstances, IT can become a "strategic vehicle" and a source of competitive advantage for a company. Companies are interested in making information technology contribute to the performance in a more measurable, direct, and flexible way (Johannsen & Goeken, 2006). Earlier information technologies used to perform auxiliary functions; today they are the "driving force behind business innovation" (Kieβling et al., 2010). That is, at present, in the developed countries, information technology management has transformed from a business support function to an efficiency improving tool and a driver of business innovation and digital transformation (Nissen et al., 2018).

Business digitalization received considerable attention both from the side of academia and business community, who define digitalization as the companies' focused efforts to use digital technologies actively at all levels to optimize internal processes and to modify the overall business model (United Nations Economic Commission for Europe (UNECE), 2012; 2013).

Digitalization of the economy involves transformation of the technological environment in which companies operate. Researchers and practitioners have not yet reached a common understanding of the term "digitalization" and what aspects of management are affected by this process. As a result, a variety of approaches are applied - from focusing on technology to digital customer involvement in production, new digital business models.

From a company perspective, digitalization affects all structural aspects of a business, including goals, business models, and business processes (Bhattacharya & Seddon, 2009; Bharadwa et al., 2013). The main goal of digitalization is to maximize the use of information technology resources and systems, in particular, to increase productivity and reduce costs. This requires a transformation of the overall philosophy and orientation of the company.

Altogether, investments in ICT are an important factor in determining a success of a new value creation through integrating business and technologies (Haes & Grembergen, 2009). As a consequence, the discussion about the priority of technological or business aspects of digital transformation indicates the need to integrate IT and business (especially strategies) for solving the tasks set (Bharadwa et al., 2013; Kane et al., 2015; Bley et al., 2016; Urbach et al., 2017).

In this context, effective ICT management implies the development of a set of business change management mechanisms that support the goals, strategy, value system, norms, and culture of the company (Weill & Ross, 2004). Initially, the main objectives of IT management were to provide IT services and improve the efficiency of business processes. As IT advanced and consolidated, its role in developing innovative products, creating new business models, and identifying additional sources of profit increased (Hanschke, 2010).

In order to achieve a competitive advantage, modern companies should develop a well-thought-out information policy, have their information priorities clearly identified, establish a corporate culture that takes into account information moments, and have highly-qualified employees able to carry out assigned tasks of informational nature (Strelets, 2008). The term “information proficiency” has been introduced into scientific circulation, which means the company's ability to optimally and systematically use the information to achieve strategic goals - this is a way of combining the company's information skills with those advantages that are provided by electronic forms of exchange (Dearstyne, 2001).

A Japanese economist J. Nonaka draws attention to a need to form a so-called “knowledge-creating company.” It implies that companies should quickly produce new methods of control and management that are in line with changes in modern economic life, apply advanced technologies, and provide close communication links among various departments of the company and a common cognitive basis for the company employees’ interaction (Nonaka, 1998).

Knowledge becomes a key, as an economic model based on nonrenewable resources gives way to ICT-based economic activity (Strelets, 2008). In the information society, the organizational culture changes, particularly - the ethics of the company. The reward system is being modified, since, in the presence of horizontal relationships and highly specialized tasks facing employees, it is difficult, and sometimes impossible, to exercise administrative control. It focuses more on the employees’ internal motivation, that is, on strengthening the position of highly-qualified personnel. American economists R. Kaplan and D. Norton made several assumptions offering indicators for measuring various activity and management actions in a company in the information society. Among them, the role of highly skilled personnel is fundamental (Kaplan & Norton, 1996).

Analysis of specialized literature shows that studies of the concept "organizational culture" lead to different definitions of "organizational culture" (Alvesson, 2002; Sheyn, 2007; Armstrong, 2006; Kharchyshyna, 2011; Simosi, 2012; Robbins & Judge, 2012; Pennington,

2014; Iljins et al., 2015; Gopalakrishnan & Zhang, 2017; Otenko & Chepeliuk, 2018; Fokina-Mezentseva, 2018; Knein et al., 2019; Eniola et al., 2019).

Theoretical, methodological, and applied aspects of managing the enterprises' organizational culture development in a constantly changing and unstable environment are reflected in the research by the following scientists: Didenko, 2012; Lacatus, 2013; Volianska-Savchuk, 2014; Thanomwan & Buncha, 2014; Bavik, 2016; Lee et al., 2016; Dubey et al., 2017; Matinaro & Liu, 2017; Shahzad et al., 2017; Upadhaya & Kumar, 2020; Derhachova & Fedirko, 2018; Ogbeibu et al., 2018; Dai et al., 2018; Androsova, 2019; Schalaile et al., 2019; Balaji et al., 2020.

Over the past two decades, the leading scholars paid significant attention to the organizational culture and identifying factors influencing the enterprises' effectiveness and competitiveness and interdependences between organizational culture and financial results. They also elaborated how the use of ICT impacts organizational culture development, including the improvement of personnel management system (Denison, 1984; Denison, 1990; Yilmar & Ergun, 2008; Millington & Schultz, 2009; Cameron & Quinn, 2011; Hofstede, 2011; Kuznetsov, 2013; Dwivedi et al., 2014; Lapina et al., 2015; Ahmady et al., 2016; Voinarenko & Volianska-Savchuk, 2016; Nam & Kim, 2016; Arditi et al., 2017; Trang, 2017; Tolstykh et al., 2017; Dzwigol, 2017a; 2017b; 2019; Kwilinski, 2018a; 2018b; 2019; Rudenko, 2018; Dasgupta & Gupta, 2019; Suryaningtyas et al., 2019; Tortorella et al., 2019; Martinez-Caro et al., 2020; Upadhyay & Kumar, 2020; Veiga et al., 2020).

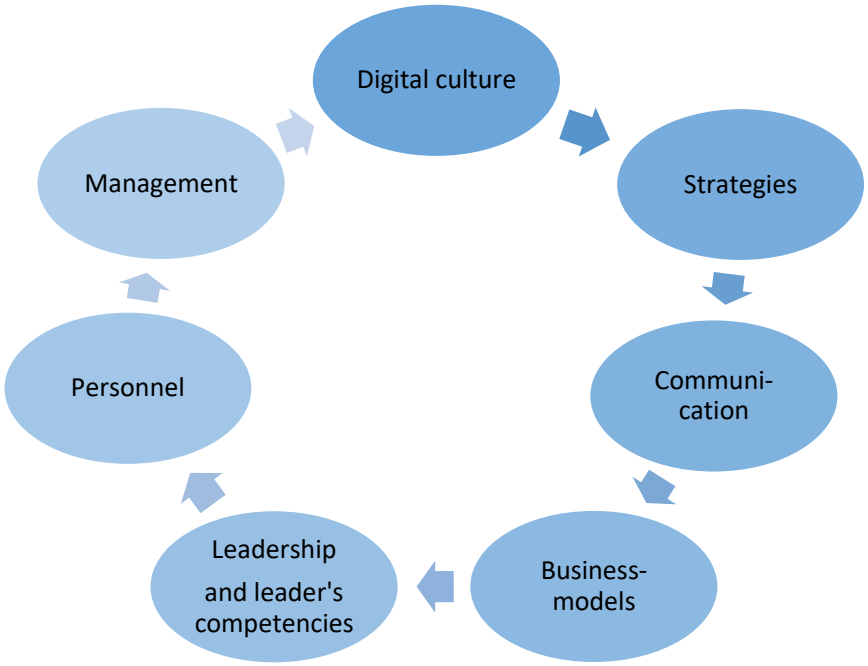


**Figure 1.** Elements of Organizational Transformation in Conditions of the Information Economy
*Source:* adapted and created by the authors based on (Galimova, 2019).

With the introduction of digital technologies, the enterprises' organizational culture has

experienced significant transformational changes, which, in turn, contributed to the formation and development of a new "digital culture" *(Figure 1).*

Many international studies (World Bank, 2015; Abazov, 2015; 2016; 2018) suggested that at least 30 professions will vanish within a decade. But instead of disappearing professions, there will emerge 186 new professions that will require a qualitatively new level of knowledge, that is, the digital one. The European Commission identifies 5 dimensions of a digital entrepreneurship development program (*Figure 2*).

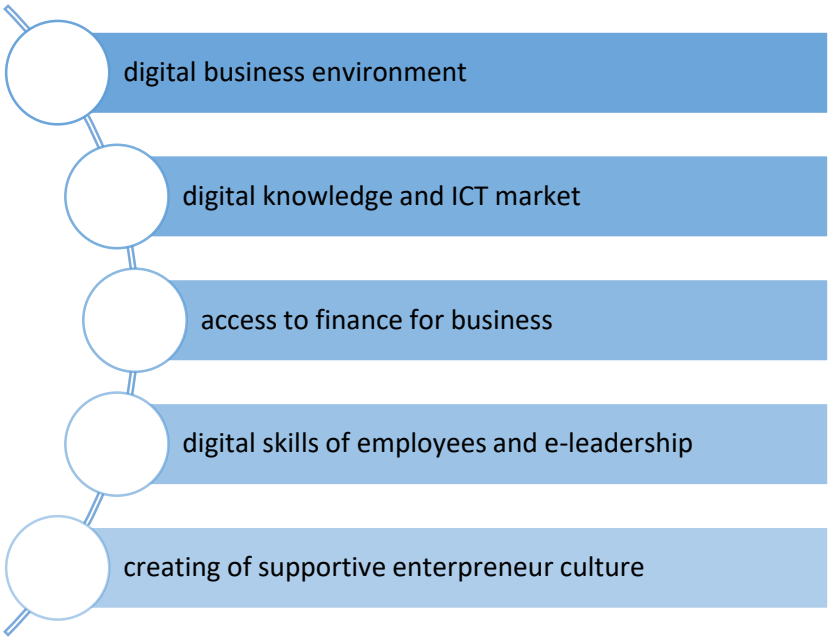


**Figure 2.** Digital Knowledge and Skills in the Context of the Information Business Space
*Source:* Compiled by the authors based on (Autio et al., 2018).

The authors of the empirical study "Digital Business Redefines Talent Management Applications," conducted by the consulting company Gartner, concluded that by 2022, 80% of organizational skills in companies should be reviewed due to digital transformation (Kostoulas, 2018).

Thus, the development of the companies' organizational culture in the information economy includes LLL training, new skills development, and creating favorable conditions for staff development.

## 3. Methods

There is a strong body of evidence that suggests that the key directions of digital transformation include as follows: 1) changes in organizational culture, 2) business models, 3) product transformation, and 4) the growth of enterprise flexibility.

For example, Altimeter's annual research State of Digital Transformation notes that at the present stage the role and importance of organizational culture are growing, which creates opportunities for innovation, modernization, growth, and acceleration, as about 95% of company executives state the need to transform corporate culture (Engert et al., 2019).

Another example is the Cisco Company, whose experts suggest that the impact of digitalization will be 10 times more than of the Internet. International Data Corporation estimates the economic value of digital transformation being at $ 20 trillion, or more than 20% of GDP. According to a survey of more than 400 large companies in various industries conducted by Capgemini Consulting and MIT Sloan Management, enterprises that actively use digital technologies and new management methods (digital leaders – Digirati) on average 26% are more profitable than their competitors. More conservative companies (Digital Conservatives), which improve only management, receive +9% in profit. Organizations that invest a lot in digital technology, but pay little attention to management (Digital Fashionistas), are not able to get a synergistic effect and create a significant added value based on digital applications. Their financial indicators are 11% lower. And companies that don't use sufficiently both the potential of digital technology and the potential of management (Digital Beginners) have a profit of 24% less than their competitors.

The BCG research (Hemerling et al., 2018) found out that about 80% of enterprises – who focused on organizational culture – consistently got high productivity results. Based on an assessment of 40 digital transformations, it was found that the share of companies reporting a breakthrough or strong financial performance is 5 times higher (90%) among those who focused on organizational culture than among those who neglected it (17%). A diagnostics of the organizational culture of 75 public companies shows a clear relationship between the strength of the enterprises' organizational culture and their financial performance. It is proved that, over five years, the TSR (total shareholder return) of companies with a strong organizational culture (24%) was 2 times higher than that of companies with an average culture (13%) and 2.4 times higher than the TSR of companies with weak organizational culture (10%). The productivity effect is also evident in the long-term perspective: companies with a strong organizational culture have 2 times higher ten-year TSR than companies with a mixed culture.

The authors compiled a large number of methods (*Table 1*) that have been developed for evaluating the enterprises' digital maturity and tested an assumption that organizational culture was one of its components.

Indeed, studies conducted by international organizations (the United Nations Economic Commission for Europe (UNECE), 2012; 2013) indicate that one of the most significant obstacles to successful digital transformations is an absence of corresponding organizational culture and the unwillingness of personnel (including managers at various levels of management) to work in new conditions. Thus, CGI Global 1000 research, conducted in 2016 by the CGI Group, showed that a key barrier to digital transformation is a change in the organizational culture through overcoming the company employees' resistance.

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**Table 1.** A Comparative Analysis of Existing Methods to Evaluate Digital Maturity and Business Processes Transformation at the Enterprises

| Title | Content |
|---|---|
| Deloitte company Digital Maturity Model | Evaluating digital capabilities in 5 core dimensions: Customer, Strategy, Technology, Operations, Organization and Culture. They are divided into 28 sub-dimensions, which, in turn, are divided into 179 individual criteria to evaluate digital maturity |
| Digital Transformation Index developed by an analytical agency Arthur D. Little | There are the following directions of assessment: Strategy & Governance; Products & Services; Customer Management; Operations & Supply Chain; Corporate Services & Control; Information Technology; Workplace & Culture |
| Enterprise digital maturity index (Gileva, 2019) | There are 5 enlarged areas of assessment: strategy and business-model; consumers; organizational culture and personnel; operational processes; information technology |
| Digital Business Aptitude by KPMG company | Includes 5 directions of assessment: Vision & Strategy; Digital Talent; Digital First Processes; Agile Sourcing & Technology; Governance.<br>A feature and advantage of this model is a self-assessment diagnostic tool free to access |
| Digitization Piano model developed by Global Center for Digital Business Transformation by the IMD and Cisco company initiative | There are 7 transformation categories, which constitute the most important elements of the organization's value chain: Business Model; organizational structure; employees (People); processes; IT Capability; Offerings; Engagement Model<br>A feature of this model is determining a gap between the current and required levels in each direction |
| Index of digital change, proposed by Ionology company | Includes 5 blocks: Strategy & Culture; Staff & Customer; Process & Innovation; Technology; Data & Analytics |
| Industry 4.0 Maturity Index by Acatech developed by the German National Academy of Sciences and Technology | There are 4 core areas of digital transformation: resources; Information Systems; culture; organizational structure.<br>Particular attention is paid to transforming organizational structure and culture |
| Index of strategic changes in the process of digital transformation, proposed by Russian company Komanda-A (KMDA) | Includes 6 main directions: customer-centricity (digital customer service, omnichannel, digital marketing and communications); collaboration (representing business as an ecosystem, creating and developing a platform for interacting with partners); data (widespread use of analytical tools, the use of data to adapt products and services, behavioral marketing); innovation (innovative culture inside the company, creating a system of continuous improvement and development); value (defining and creating of a value proposition management system); personnel (new approaches to employee engagement and development based on digital culture and thinking) |
| Enterprise's digital maturity index (Savich, 2018) | Directions to evaluate the level of digital maturity are: clarifying and forming a single digital transformation strategy; analyzing and evaluating the effectiveness of applied software services and platforms; assessing the level of digital marketing and communications; participating in the software product development process; implementing Agile IT; analyzing, assessing, auditing digital processes; the level of organizational culture; the level of enterprise's innovative potential; assessing equipment and systems and their subsequent modernization; competitive environment study. |

*Source:* compiled by the authors.

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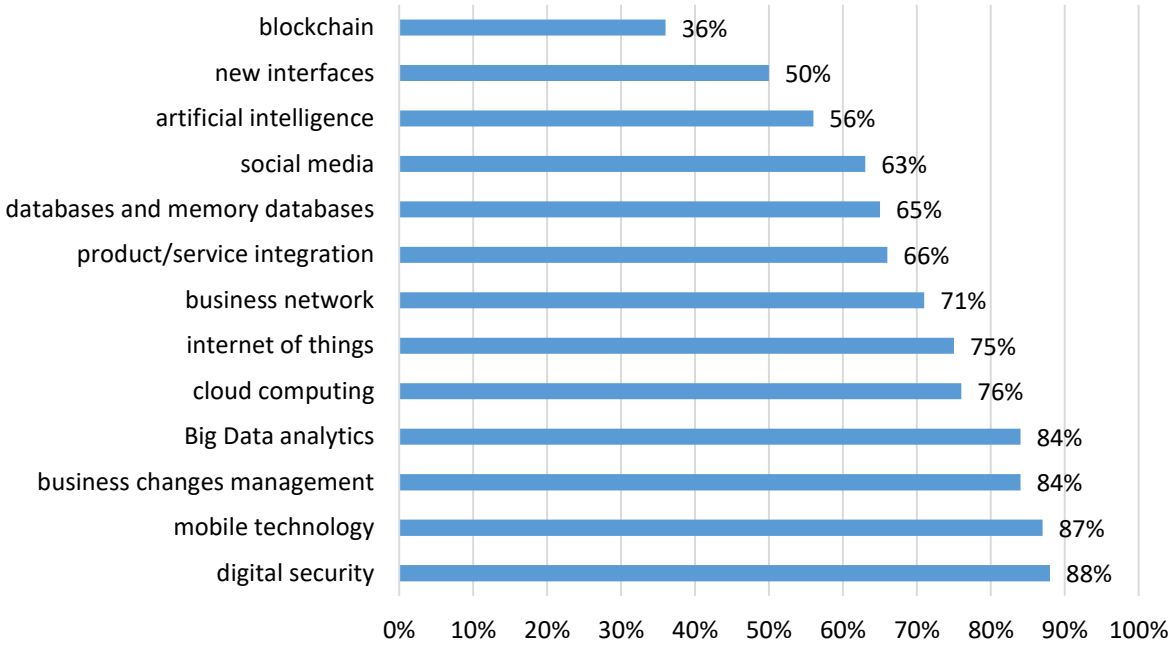


**Figure 3.** Skills Available at Companies for Digital Transformation
*Source:* compiled by the authors based on (Hoberg et al., 2017).

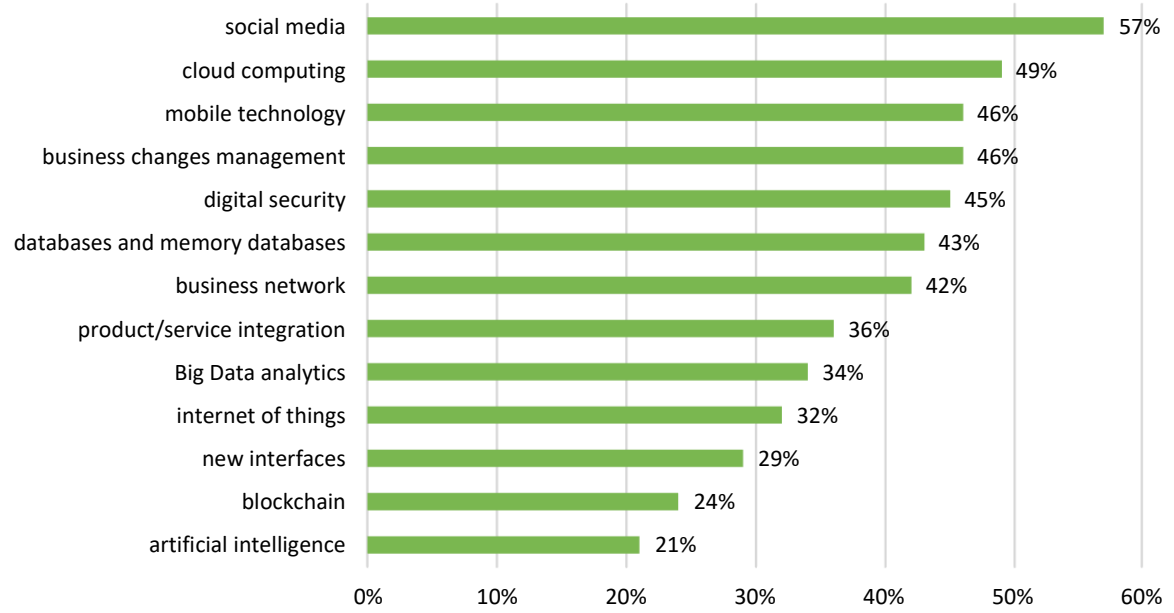


**Figure 4.** Skills Required for Digital Transformation to Improve the Effectiveness of Business Processes
*Source:* compiled by the authors based on (Hoberg et al., 2017).

An expert survey of 116 executives from 18 countries, conducted in 2017 by the specialists from the Technical University of Munich (TUM) together with SAP and IDT (Hoberg et al., 2017), allowed determining that to effectively implement digital technologies for business

innovation the use of technological skills is not enough (Figure 3). This study of "**skills available at companies**" suggests that 84% of respondents believe that "business change management" and 71% believe that "business network" are important for digital transformation (*Figure 3*).

However, the study of "**skills required for digital transformation**" suggested that only 46% of the specialists believe that they require new skills such as "business change management" and "business network" for digital transformation to improve effectiveness (*Figure 4*). 57% believe that they need to have "social media" skills.

According to this study, one of the main factors of successful "digital transformation" is the reduction of the gap between the "available" and "current" digital skills of personnel in companies (figures 3 and 4). Nevertheless, only 16% of the respondents have prepared and implemented special recruitment or training programs to create the base of necessary skills for companies' digital future forming. According to the experts, investing in the employees' education and training is of great importance, since the development of personnel digital knowledge is a prerequisite for the continuous digital transformation of the enterprise's business processes (Hoberg et al., 2017).

The CIO survey in 2018 stated that 39% of organizations need "digital transformation," but only 35% possess skills required for its successful implementation. Business executives fail to guide employees to form "digital culture". They face difficulties in forming "organizational culture", in turn, it negatively affects the level of employees' involvement. In 2018, only 36% of organizations noted that everyone has an opportunity to participate in a discussion of digital initiatives. Employees don't strive to achieve the goals of digital transformation and make efforts for personal development. Most companies are unable to manage changes properly. Clearly defined digital initiatives were stated by 32% of respondents. Only 40% of respondents reported the existence of processes that ensure that digital transformation efforts are aligned with corporate goals. It has been found that only an insignificant part of IT CIOs pays due attention to advanced technologies. For example, only 29% of the respondents invest in the Internet of Things; in artificial intelligence – 17%; in the blockchain – 11%; in augmented reality – 10%.

Russel Reynolds Associates has interviewed more than 2,000 top managers from 15 industries about the impact of digital technology on their business. 90% of businesses have already developed a digital development strategy, but in many organizations, the lack of qualified personnel impedes its implementation. Only 50% of the respondents answered affirmatively the question "Do you have the right people to work on the company's digital strategy?"

A survey of 700 representatives of more than 300 Russian companies from 15 industries conducted by KMDA in 2018 (Ryzhkov et al., 2018) evaluated the main barriers to the digital transformation of enterprises. The study listed barriers as follows: insufficient competencies and knowledge (64.1% of respondents); a lack of qualified personnel (60.9%); a lack of strategy (53.2%); a fear of change (45.3%); insufficient financing (39.1%); a leadership position (31.3%); risks (23.4%).

70.3% of respondents reported that they were looking for new specialists when they see a lack of competencies. A significant part (65.6%) of respondents also noted that they seek to improve the qualifications of currently employed personnel ("old"), as they are confident in their ability to work and loyalty to the company. 15.6% of experts suppose that they don't need to take any steps in this direction, since their company already has enough competent employees. Most of the respondents (21.9%) rated the qualifications of their staff at 6 out of 10 points; 4.7% - 10 out of 10. But most of the assessments (49.9%) were in the range from 1 to 5, which once again proves the existence of problems in the development of digital competencies among employees. The most important digital competencies of employees are: flexibility and ability to learn (61% of respondents); analytical competencies (55%); knowledge of innovative technologies (53%); understanding of methods and processes (51%); wide horizons and creativity (47%); understanding of the essence of digital transformation (42%); the ability to use big data (34%); programming skills (21%).

The research conducted by Oliver Wyman (2019) in January-March 2019 confirmed, on the one hand, the increasing importance of corporate culture as a tool of organizational strategy implementation in the digital era, and on the other hand, the absence of proper management attention to corporate culture issues. As a result of the survey, there were received expert opinions on the following issues:

- "How important is the role of corporate culture in achieving strategic objectives?" - 7.4 points;
- "How does senior management understand the importance of the role of corporate culture?" - 6.1 points;
- "How efficient is the communication process in the company as a whole?" - 3.8 points;
- "How effectively does corporate culture help in implementing transformational changes?" - 6.7 points.

In February 2019, Coleman Services conducted an empirical study "HR Functions: Actual Tasks, Priorities, Challenges" using an online survey of HR specialists from 69 enterprises functioning in the sphere of industry and services. As a result of the survey, the key areas of digitalizing HR functions in companies are identified, among them: personnel administration (77% of respondents); personnel assessment (55%); staff training and development (32%); internal communications (23%); recruitment function (21%).

Many studies suggest that most international companies face a lack of "digital culture". Firstly, this is because of the wrong understanding of the essence of the term "digital transformation". Secondly, most of the employees do not have motivation yet and the necessary digital skills and competencies to participate in qualitative changes in the organizational culture.

This is also proved by the results of the survey "The Digital Culture Problem: Bridging the Gap between Employees and Managers", in which 340 European and American companies from 5 industries took part. 40% of executives believe that their companies already have a digital culture, but only 27% of subordinates agree with them.

A marketing research conducted by the analytical center NAFI and Skolkovo found that the level of digital skills of Russian companies' employees were below average. The research suggests that enterprises generally pay relatively low attention to employees' training in digital technology; High-tech startups show a higher level of activity: educational programs in the field of digital technologies were implemented by 33% of respondents. The low level of digitalization was associated with the fact that enterprises focus on technological modernization and the introduction of information and communication technologies; but they underestimate the organizational aspects, which include digital culture, leadership competencies and human resources (Galimova, 2019).

Indeed, companies' needs for a highly skilled workforce are growing sharply - and especially for specialists in digital technologies, data analytics and employees trained in science, technology, engineering and mathematics (STEM) – new methods of personnel search and training programs formed considering the challenges of Industry 4.0, will be critical in the long term perspective.

Personnel is the central element of digital transformation. However, the Global Digital Operations Survey in 2018 "Digital Champions. How Leaders Create Integrated Operating Ecosystems to Develop Integrated Solutions for Consumers" (PwC, 2018) showed that 2/3 of all companies do not have a clear digital vision and strategy to support the digital transformation process and the corresponding corporate culture. Only 27% of the respondents said that their employees have the necessary qualifications to fulfil the digital future into the company's activities. A survey of 1155 international companies allowed determining how corporate culture and organizational structure contribute to digital transformation:

- failure is considered as a recognized part of the development process (38% of respondents);
- the company has horizontal hierarchies that allow achieving flexibility in work and speeding up the decision-making process (37%);
- the focus is made on providing digital quality of service throughout the entire process of work with customers (35%);
- the company's management has a clear understanding of the digital future and acts as a role model (34%);
- the company encourages culture of innovation by attracting multidisciplinary groups (32%);
- the company selectively attracts expert partners as additional external resources (32%);
- employees have the necessary qualifications for the digital future (27%);
- the company invests a significant amount in educational training in order to prepare employees for digital transformation (26%);
- training groups are created in the company, uniting the digital generation, and experienced employees (22%).

Specialists of MIT Sloan Management Review and Deloitte University Press found that more than 75% of respondents provide their employees with resources and opportunities to develop digital skills and competencies. 71% of companies with a high level of digital maturity claim that they attract new talents using digital technologies and invest them, while only 10% of them can do this at an early stage (Kane et al., 2016).

**Organizational culture in Ukraine.** In June-August 2019, the authors of this article conducted their own empirical research on the specific features of the organizational culture development at the Ukrainian enterprises of various types of economic activity (Trushkina & Rynkevych, 2019a; 2019b; Rynkevych, 2019). The researchers interviewed 115 experts in different spheres of activity: food industry, coal industry, construction, wholesale and retail trade, services (transport, banking, consulting, Internet services, energy, domestic services for the population), education and science, public administration.

They found out that the organizational culture of the enterprises surveyed has the following features and differences:

- top managers have a greater influence on forming organizational culture (63.5% of respondents); middle managers affect the formation of organizational culture less (11.3%), HR department (11.3%), ordinary employees (10.4%) and customers (10.4%);
- organizational culture, as a rule, is formed by the company management (78.3%), the remaining experts (13%) noted that it was formed spontaneously, and 8.7% of the respondents say that there is no organizational culture at all;
- the organizational culture of the company is ineffective (36.5% of respondents) and has several disadvantages: obstruction to functional disunity of data exchange (18.3%); the organization's focus on sales and profits, not on the consumer, that is, the company is not customer-oriented (14.8%); no employees' understanding of what a "customer-oriented approach to the formation of organizational culture" is (12.2%); a lack of a generally accepted definition of customer focus (11.3%); organizational culture not built around the customers' needs (11.3%); a lack of digital platforms to manage data (10.4%); insufficient digital competence of company personnel (8.7%); the inability in the company to maintain marketing communications with customers (5.2%);
- key barriers to transform companies organizational culture in the information economy: a low level of employee involvement (28.7% of respondents); the insufficient amount of financial resources (27.8%); the imperfection of the organizational structure (27%); a lack of a clear vision and leadership support (25.2%); a lack of understanding of digital trends (22.6%); inability to make the necessary changes in organizational culture (20%); underdevelopment of IT infrastructure (20%); a lack of specialists with digital skills and knowledge (18.3%); a lack of databases (3.5%);
- organizational culture affects the financial results of enterprises: absolutely (65.2% of respondents) or partially (24.4%);
- organizational culture of enterprises primarily affects: an increase in sales by improving the quality of logistics services (38.3% of respondents); an increase in profitability (32.2%); reduction of expenditures and, consequently, cost reduction (27.8%).

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Using the research result, the authors came up with a methodological approach proposing to choose the optimal direction of organizational culture transformation at the enterprises, the essence of which is to determine the most significant assessment criteria, which are systematized into four groups:

$$K = K_1(k_{11}, k_{12}, k_{13}) \cup K_2(k_{21}, k_{22}, k_{23}) \cup K_3(k_{31}, k_{32}, k_{33}) \cup K_4(k_{41}, k_{42}, k_{43}), \quad (1)$$

where $K_1$ is adaptability (ability to adapt): the ability to organizational changes ($k_{11}$); customer focus ($k_{12}$); organizational training ($k_{13}$);

$K_2$ is the mission: strategic directions and intentions ($k_{21}$); goal setting ($k_{22}$); vision ($k_{23}$);

$K_3$ is consistency (coherence): coordination and integration ($k_{31}$); ability to reach consensus ($k_{32}$); distribution of key values ($k_{33}$);

$K_4$ is involvement: development of abilities ($k_{41}$); orientation on teamwork ($k_{42}$); responsibility and authority ($k_{43}$).

To evaluate and select the optimal direction of organizational culture transformation at the enterprises, it is proposed to use the analytic hierarchy process (T. Saaty method), which allows quantifying the import criteria taking into account specific features and influences of external and internal factors on the enterprises' organizational culture development. This study considers the main provisions of the analytic hierarchy process (AHP) when choosing the optimal directions of enterprises' organizational culture transformation. First of all, the task is structured, within the framework of which the goal, criteria, and alternatives are determined, and the relations among them are established (*Figure 5*).

As can be seen from *Figure 5*, the goal is the first level of the hierarchy, the second level is the criteria, that is, a quantitative or qualitative characteristic. Alternatives – objects, among which it is necessary to make a choice – are evaluated according to the system of criteria. They make up the third level of the hierarchy. In this article, alternative 1 is the transformation of organizational culture through the introduction of digital technologies (Trushkina, 2019; Trushkina & Rynkevych, 2019c), which will allow optimizing business processes at the enterprise; alternative 2 is personnel development, which will meet the modern requirements of companies' operation (Koev et al., 2019). Alternative 3 is the use of a customer-focused approach to forming and developing the enterprises' organizational culture, that is, the company's customer orientation (Trushkina & Rynkevych, 2019b).

In the process of choosing the best option, the criteria and alternatives are compared in pairs concerning each criterion with the use of special "scale of relative importance" (or "scale 1-9", "Saaty scale"). The Saaty scale numbers are used to show how many times an element with a higher rating of advantage dominates an element with a lower rating according to their common criteria.

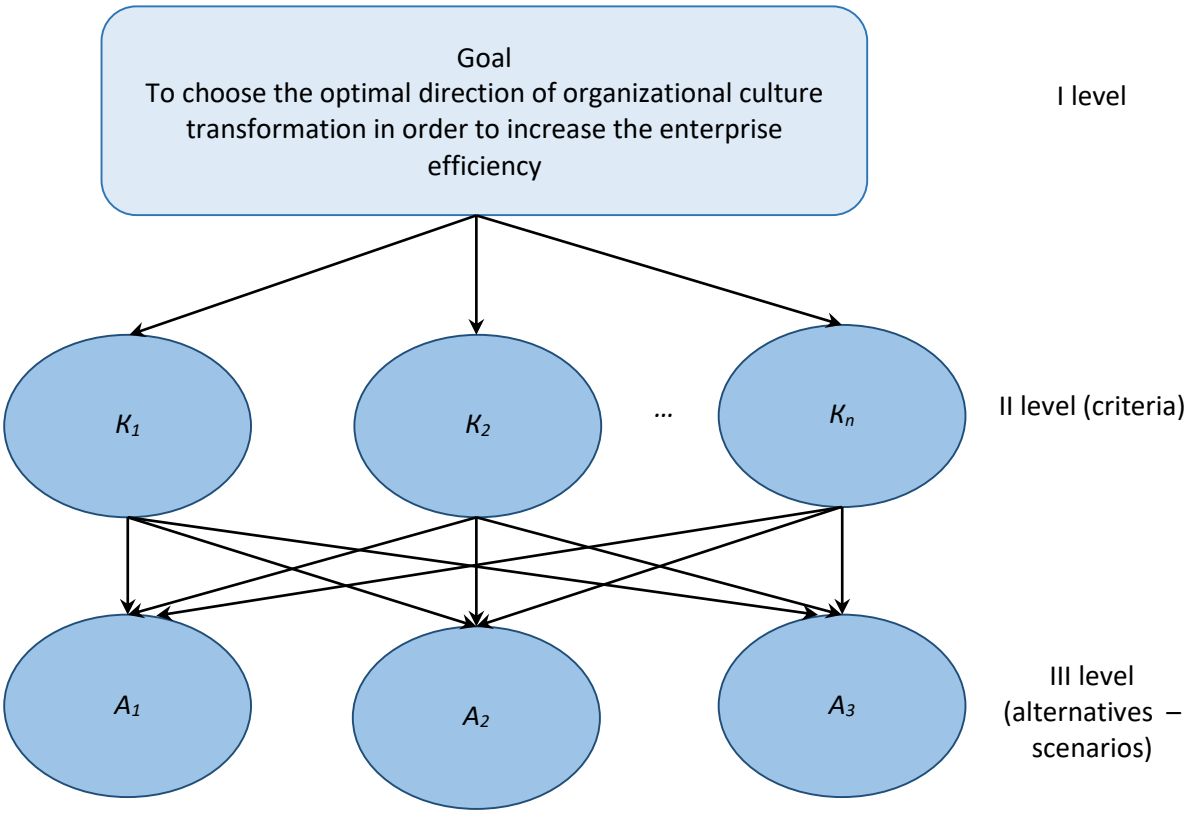


**Figure 5.** A Hierarchical Model for Choosing the Best Option for Transforming Enterprises' Organizational Culture.
*Source:* Compiled by the authors based on (Saati, 1993; Ershova, 2015; Jevstrat & Kushneruk, 2012).

The form of presenting the results of pairwise comparisons is the inverse symmetric matrix:

$$\begin{pmatrix} a_{11} & a_{12} & a_{13} \dots a_{1n} \\ a_{21} & a_{22} & a_{23} \dots a_{2n} \\ . & \dots. & \dots \\ a_{n1} & a_{n2} & a_{n3} \dots a_{nn} \end{pmatrix} = \begin{pmatrix} 1 & a_{12} & \dots a_{1n} \\ \frac{1}{a_{12}} & 1 & \dots a_{2n} \\ . & \dots. & \dots. \dots \\ \frac{1}{a_{1n}} & \frac{1}{a_{2n}} & \dots 1 \end{pmatrix}, \quad (2)$$

where $a_{ij} = \frac{1}{a_{ij}}, i = \overline{1,n};\ j = \overline{1,n}$ refer correspondingly to rows and columns;

$n$ is the number of items to compare;

$a_{ij}$ is the numbers that correspond to certain grades of advantage.

According to the data of this matrix, a set of local priorities is formed by calculating the values of the vector and further normalization of its components according to the following scheme:

$$\begin{pmatrix} a_{11}\ a_{12}\ a_{13}\ldots a_{1n} \\ a_{21}\ a_{22}\ a_{23}\ldots a_{2n} \\ .\quad \ldots\quad\quad \ldots \\ a_{n1}\ a_{n2}\ a_{n3}\ldots a_{nn} \end{pmatrix} \Rightarrow \begin{Bmatrix} \sqrt[n]{a_{11}\quad a_{12}\quad a_{13}\quad \ldots\quad a_{1n}} = d_1 \\ \sqrt[n]{a_{21}\quad a_{22}\quad a_{23}\quad \ldots\quad a_{2n}} = d_2 \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ \sqrt[n]{a_{n1}\quad a_{n2}\quad a_{n3}\quad \ldots\quad a_{nn}} = d_n \end{Bmatrix} \Rightarrow \tag{3}$$

$$\Rightarrow d_1 + d_2 + \ldots + d_n = D \Rightarrow \frac{d_1}{D} = \omega_1; \frac{d_2}{D} = \omega_2; \ldots \frac{d_n}{D} = \omega_n,$$

where $(\omega_1, \omega_2, \ldots, \omega_n)$ is a priority vector.

Similarly, the value $V$ is calculated.

Estimates of the relative importance elements compared must be consistent. To determine the level of consistency of these estimates, the consistency index should be calculated:

$$CI = \frac{\lambda_{\max} \quad n}{n \quad 1}, \tag{4}$$

$$\lambda_{\max} = \left(\sum_{j=1}^{n_1} a_j\right) \quad \omega_1 + \left(\sum_{j=1}^{n_2} a_j\right) \quad \omega_2 + \ldots + \left(\sum_{j=1}^{n_n} a_j\right) \quad \omega_n, \tag{5}$$

where $\lambda_{\max} \geq n$ is the maximum value of the pairwise comparisons matrix.

The consistency ratio is determined by the formula:

$$CR = \frac{CI}{P_n}, \tag{6}$$

where $P_n$ is a random consistency index, the value of which depends on the dimension of the matrix:

| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| $P_n$ | 0 | 0 | 0.58 | 0.90 | 1.12 | 1.24 | 1.32 | 1.41 | 1.45 | 1.49 |

At the last stage, the efficiency ( $S$ ) of alternatives (scenarios) is calculated:

$$\begin{aligned} S_1 &= (\omega_1 \quad V_1^1) + (\omega_2 \quad V_2^1) + \ldots + (\omega_n \quad V_n^1) \\ S_2 &= (\omega_1 \quad V_1^2) + (\omega_2 \quad V_2^2) + \ldots + (\omega_n \quad V_n^2) \\ &\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ S_m &= (\omega_1 \quad V_1^m) + (\omega_2 \quad V_2^m) + \ldots + (\omega_n \quad V_n^m) \end{aligned} \tag{7}$$

Based on this, the optimal direction of transforming the enterprise's organizational culture can be chosen: the alternative with the maximum value of efficiency ($S$) is the best in terms of the set of criteria, taking into account its relative importance.

As a result of the calculations, it was found that the degree of deviation from the consistency of expert estimates of the matrix is acceptable and equals to 17.5%, that is, in the range of 10-20%.

Thus, on the basis of the hierarchy analysis method, it is proved that the introduction of digital technologies is recognized as the optimal way to modernize the organizational culture of the examined enterprises, which will allow optimizing business processes since it has the highest efficiency (0.401) compared to the other two directions.

This is also confirmed by the results of an expert survey that engaged the specialists from a number of Ukrainian enterprises. It was revealed that at the enterprises surveyed a partial (48.7% of respondents) or complete (39.1%) transformation of organizational culture is required.

In their opinion, modernization of organizational culture should involve:

- developing staff qualification (51.3%);
- implementing digital technologies to optimize business processes (43.5%);
- improving the efficiency of communications among employees, increasing funding, eliminating the bureaucratic component in organizing business processes at enterprises (2.6%).

At the same time, even though the customer-focused approach is the key activity of enterprises, only 20% of experts consider it advisable to transform the customer relations management system.

Taking into account all mentioned above, it is found that effective development of organizational culture in the information economy is hindered by many barriers, which can be conditionally divided into 7 groups:

$$X = \begin{cases} X_1(x_{11}, x_{12}, x_{13}, x_{14}); \\ X_2(x_{21}, x_{22}, x_{23}); \\ X_3(x_{31}, x_{32}, x_{33}); \\ X_4(x_{41}, x_{42}, x_{43}); \\ X_5(x_{51}, x_{52}); \\ X_6(x_{61}); \\ X_7(x_{71}) \end{cases} \quad (8)$$

where $X_1$ is *personnel:* a lack of a digital strategy for managing the company's personnel ( $x_{11}$); ignoring the need for cultural change ( $x_{12}$); low employee engagement ( $x_{13}$); a lack of qualified and competent personnel in the context of global economic transformation ( $x_{14}$);

$X_2$ is *informational:* a lack of a unified approach to the definition of categorical-conceptual apparatus (for example, "digital transformation", "information economy") ( $x_{21}$); difficulties with operations covering the digital design of products and services, quick adaptation of operational processes and real-time monitoring ( $x_{22}$); a lack of knowledge in the field of the information economy and work with advanced technologies ( $x_{23}$);

$X_3$ is *organizational:* a lack of a well-defined digital transformation strategy, a vision of the digital future of the company and the weaknesses of leadership ( $x_{31}$); inability to manage organizational change ( $x_{32}$); a lack of a "reasonable" approach to risk management in the digital transformation of business processes (i.e., a low level of the digital readiness of risk management functions for digital transformation) ( $x_{33}$);

$X_4$ is *marketing:* an inefficient use of corporate communications tools ( $x_{41}$); a lack of a generally accepted concept of "customer focus" ( $x_{42}$); insufficient application of a customer-focused approach to the formation of the enterprise's organizational culture ( $x_{43}$).

$X_5$ is *educational:* cross-functional barriers in the knowledge of business leaders and IT specialists (that is, insufficient application of a cross-functional approach, which requires knowledge in the field of strategy development and its implementation as well as the necessary technological knowledge and skills) ( $x_{51}$); deficit of digital skills and qualifications among staff ( $x_{52}$);

$X_6$ is *technological:* archaic IT systems and applications ( $x_{61}$);

$X_7$ is *investment and financial*: insufficient investment in advanced technologies (the Internet of things, artificial intelligence, blockchain, etc.)

## 4. Results

In the context of the information economy, companies can achieve successful development of organizational culture by adhering to the following principles:

- employees and teams work to achieve results: they are committed to their work, goals, and objectives of the organization, ready to do everything necessary to achieve the goal;
- employees and teams work to promote the enterprise strategy;
- organizational environment (leadership, organizational design, performance management, staff development methods, resources and tools, vision and values, informal interaction) is set up to stimulate interaction and promote behavior that will implement the corporate development strategy.

The main components of the organizational culture in the information economy are digital skills and competencies, the type of thinking and behavior, business relations and sources of professional knowledge, career development models (*Figure 6*).

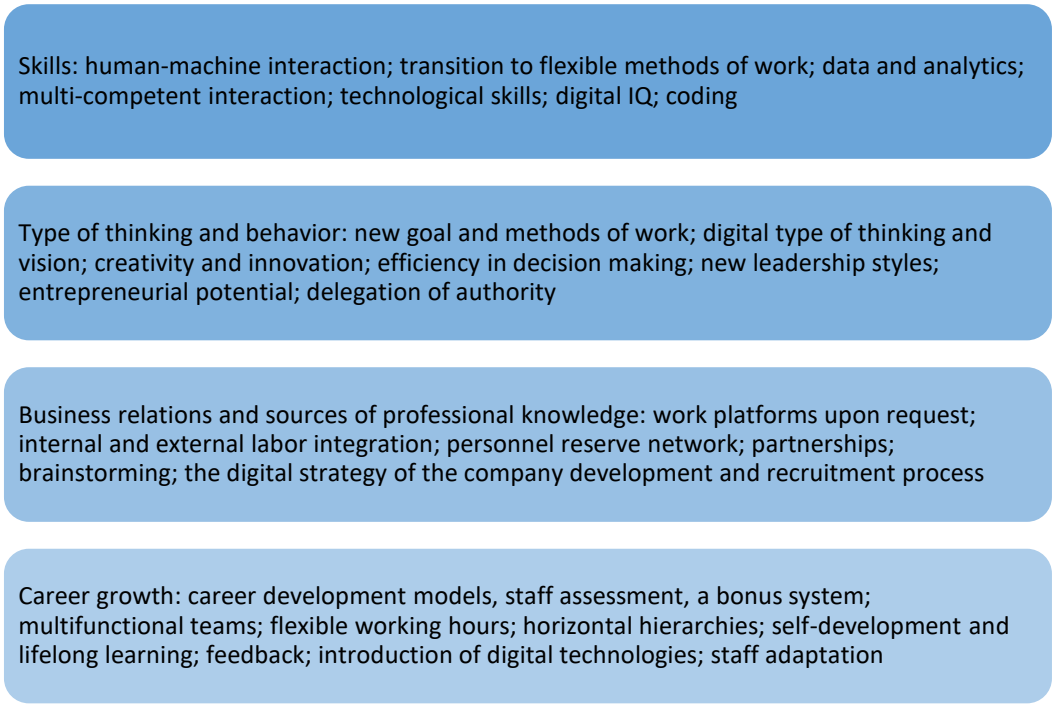


**Figure 6**. The Content Structure of Organizational Culture in the Information Economy
*Source:* elaborated by the authors.

Thus, the specific features of the enterprises' digital culture are:

- encouraging external rather than internal orientation: the organizational culture helps orient employees outside and interacts with customers and contractors to make new decisions. An example of external orientation is customer focus. Employees form product development and improve the quality of customer service, putting themselves in their place;
- delegating instead of control: decision-making extends deep inside the organization. Instead of receiving explicit instructions on how to do the work, employees follow guidelines so that their opinions can be trusted;
- risk incentive: employees are encouraged to take risks, quickly cope with failures and learn from mistakes;
- emphasis on actions instead of planning: supporting the need for speed and promoting continuous iteration rather than improving a product or idea before launching it;
- cooperation valued more than individual efforts: success comes through teamwork and the exchange of information among departments and divisions. The iterative and fast pace of digital work requires a much higher level of transparency and interaction.

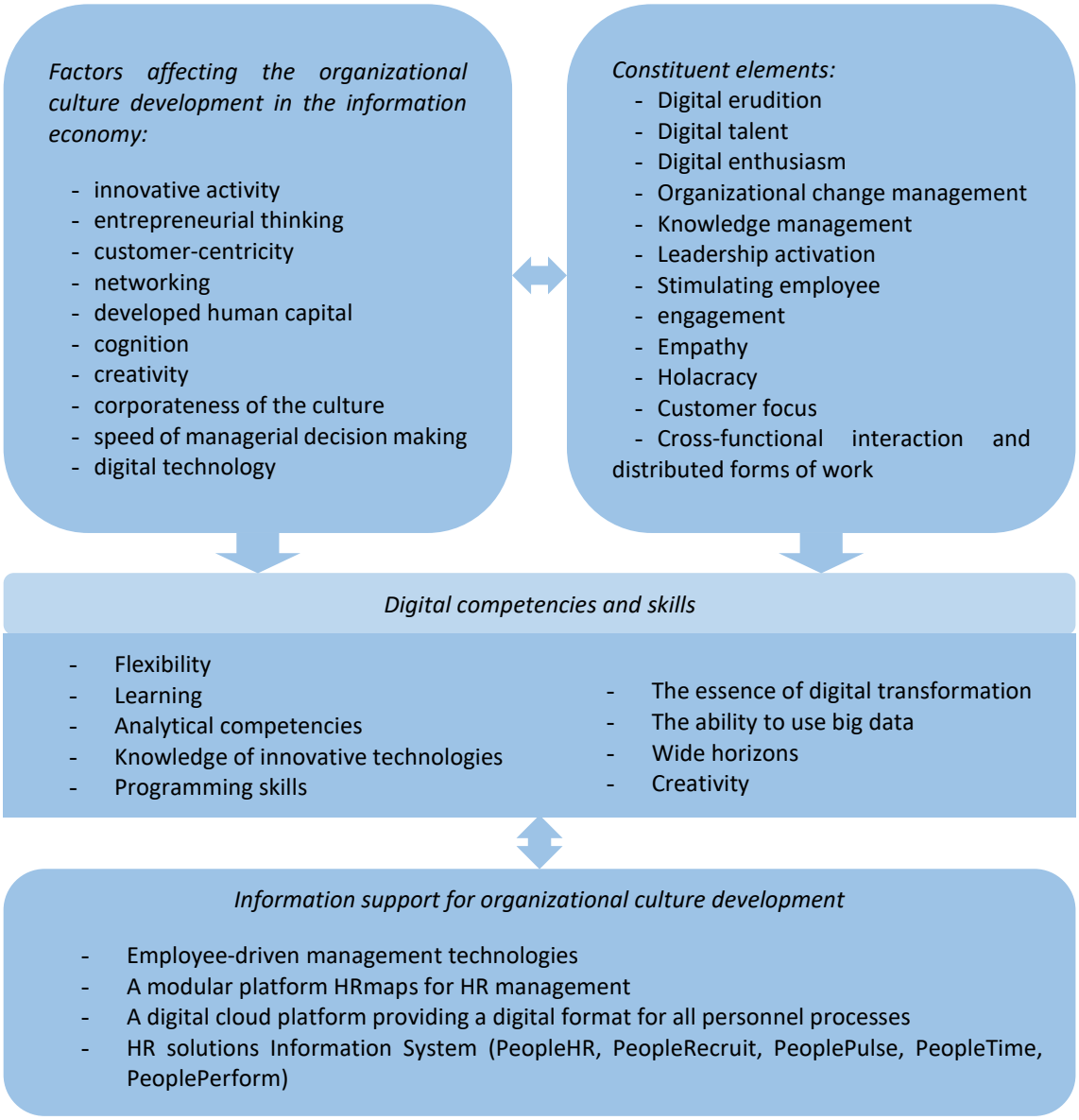


**Figure 7.** A Comprehensive Approach to the Digital Transformation of Enterprises' Organizational Culture in the Information Economy
*Source:* elaborated by the authors.

To increase the efficiency of developing enterprises' organizational culture in the information economy, it is advisable to implement a comprehensive approach, the essence of which is the symbiosis and constant interconnection of influencing factors, constituent elements, digital competencies and skills, and information technologies *(Figure 7).*

HRmaps, a modular personnel management platform, is a comprehensive solution for automation of HR processes, consisting of 4 modules and an HR portal:

- personnel assessment (Measure): the module allows performing different types of assessments, namely, by competencies, goals, KPI; annual assessment, regular interviews, surveys, and tests;
- recruitment and adaptation (Attract): helps to manage the recruitment process, from opening a vacancy to adaptation at a new workplace
- planning and career (Plan): allows drawing up plans of career development and succession, manage potentials and mobility;
- training and development (Succeed): the module allows creating training plans, recording and delivering training, and providing an exercise control.

The introduction of this platform is necessary for an HR specialist to optimize and automate routine personnel processes; for the head of the company to increase the employees' efficiency and productivity; for a business owner to increase control over the company and increase profitability by achieving goals quickly.

Implementation of the HRmaps information system promotes centralizing information for reliable data storage; automating labor-intensive administrative tasks; accelerating and simplifying recruiting and integration processes; forming a talent management system; improving the efficiency of personnel management tasks performance.

The HR solutions information system allows automating HR processes, centralizing all information in one place, keeping the best talents, speeding up recruitment processes, evaluating productivity, carrying out the collaboration between employees, and tracking employee involvement.

This system includes the following:
- PeopleHR – centralization and solution of all HR-tasks providing transparency within the company;
- PeopleRecruit – a recruiting system that helps to find the best talents twice as fast;
- PeoplePulse – creating and planning surveys to monitor and analyze engagement and satisfaction;
- PeopleTime – time tracking for each of the projects and analysis of statistics on aggregated reports;
- PeoplePerform – employee performance and progress tracking through goals and objectives.

The effect from introducing perspective directions of transforming digital organizational culture at the enterprises in the information economy can be calculated using the formula below:

$$E = (y_1 + y_2 + y_3 + y_4 + y_5 + y_6 + y_7 + y_8(y_{81}, y_{82}, y_{83}, y_{84}, y_{85}) + y_9 + y_{10}) \to \max, \quad (9)$$

where $y_1$ is double reduction of time for labor-intensive processes in personnel management;

$y_2$ is an increase of the employee involvement level in the digitization process by 38%;

$y_3$ is competencies and skills management optimization;

$y_4$ is acceleration of new digital solutions launches by 33%;

$y_5$ is an employee productivity increase by implementing the customer-focused approach;

$y_6$ is risk reduction in the selection of personnel;

$y_7$ is customer service and logistics services quality improvement;

$y_8$ is cost reduction for: adaptation and training ($y_{81}$); personnel certification ($y_{82}$); HR management as a result of automation and optimization of HR processes up to 90% ($y_{83}$); due to the efficient distribution of human resources ($y_{84}$); rational investment in employee development ($y_{85}$);

$y_9$ is company employees' average salary growth;

$y_{10}$ is an increase in the number of qualified employees.

## 5. Conclusions

The ICT intensive development has had a significant impact on all areas of business activities, including organizational culture development (UNECE, 2012; 2013). **A comparative analysis of existing methods for assessing digital maturity and business processes transformation confirms that organizational culture development makes a significant impact (both positive and negative) on the effectiveness of businesses**.

The methodological approach (Trushkina, 2019a) is proposed to choose and assess the optimal direction for transforming the enterprises' organizational culture. The essence of the approach is to determine, using the analytic hierarchy process, the most significant criteria that are divided into four groups: adaptability, mission, consistency, and involvement. **This approach hypothesizes that the best option for organizational culture modernization is not only the introduction of digital technologies that would optimize business processes but also "digitalization" of organizational culture transformation (not only organizational but also operational and communication components), which would lead to higher efficiency of entire enterprises.**

The expert survey (Trushkina, 2019a) focused on the **technological aspect of digital transformation (ranging from new forms of communications and information sharing to big data, AI, machine learning, etc.)** and identified factors that hinder the effectiveness of organizational culture development of Ukrainian enterprises in various fields. These factors are as follows: functional fragmentation interfering with data exchange; a lack of digital platforms to manage large databases; insufficient digital competency of personnel; a lack of the generally accepted definition of customer focus; a lack of understanding of the essence of the customer-focused approach to organizational culture formation; and inability to maintain

communication with customers in the company. These assumptions were supported by the results of the expert survey. According to the survey conducted for this research, companies pay more attention to traditional tools for transforming organizational culture: the professional development of employees (51.3%), the introduction of digital technologies to optimize business processes (43.5%) and customer focus (20%). However, sometimes the enterprises surveyed do not pay due attention to applying digital transformation to developing organizational culture, which is recognized as one of the priority directions in the digital era.

This research also assumed **the importance of the human element of digital transformation (agility, P2P collaboration, LLL, ICT empowerment, communication and skills mobility, etc.)** that influences successful organizational culture development through effective digital transformation in the context of the information economy in Ukraine. However, the collected data suggest that successful organizational culture development is possible only at those enterprises where managers have promoted the formation of a distinct "digital culture," by reducing communication barriers between all departments, and establishing effective communication among divisions at different levels. However, the formation of distinct digital culture is hindered by many barriers, which can conditionally be divided into seven groups: information, organization, personnel, marketing, education, technology, and investment and finance. This assumption was tested in the survey, with results indicating that the main obstacles to transforming organizational culture of companies in Ukraine could be grouped into several societal categories: low level of employees' involvement; a lack of financial resources; imperfection of the organizational structure; a lack of a clear vision and leadership support; a lack of digital trends understanding; inability to make the necessary changes in organizational culture; underdevelopment of IT infrastructure; a lack of specialists with digital skills; and a lack of databases. The survey indicated a direct correlation between the organizational culture of enterprises and their financial results.

In addition, the survey also indicated that **digital transformation should use a comprehensive holistic approach in careful integration of technological and human (societal) aspects of digital transformation by adapting capacity building for all employees and involving all employers in transformation of their organizational culture**. In order for the company employees to understand the goals of digital transformation, firms should provide their employees with digital training and education. Such training should, in fact, become a prerequisite for effective digitization of the company's business processes. Enterprise executives should develop and implement programs for digital skills training of staff, using opportunities for distance learning, partnership with academic institutions, universities, and innovative start-ups, as well as various other forms of organizational culture development. The main path of successful transformational changes in the digital era is to bridge gaps between the required special digital skills and those currently held by the company's personnel. In addition, the use of ICT allows cutting the cost of personnel management by reducing risks in selecting personnel, efficient distribution of human resources, automation and optimization of HR processes, and rational investment in employees' self-development; and thereby effective use of ICT contributes to transforming traditional organizational culture to a successful digital culture that meets today's business requirements.

Further research should pay attention to designing the marketing strategy for managing enterprises' organizational culture development in the information economy, and transforming organizational culture with the use of ICT and cognitive technologies.

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