

**THE ISSUES OF THE PROCESS OF EDUCATION AND BUSINESS
INFORMATIZATION**

***AS QUESTÕES DO PROCESSO DE EDUCAÇÃO E INFORMATIZAÇÃO DE
NEGÓCIOS***

***LAS CUESTIONES DEL PROCESO DE EDUCACIÓN E INFORMATIZACIÓN
EMPRESARIAL***

Elina A. GURIANOVA¹

Artem I. GURIANOV²

Svetlana A. MECHTCHERIAKOVA³

Albina D. KHAIRULLINA⁴

ABSTRACT: The purpose of the article is to analysis the issues of the process of education and business informatization. Education and Business informatization is accompanied by an increase in the volume of processed information and the speed of information exchange. To meet the aim of the study, the analytical method is utilized and numerous relevant studies are taken into account. Based on the results, increasing the level of reliability of information reduces the transaction costs of the company, reducing the probability of errors and risks in the management of the organization. The results of the study make it possible to draw the following conclusions. The introduction of modern information technologies in the activities of organizations leads to reduced transaction costs due to the increased reliability of the information database, as well as due to increased transparency of information flows of the organization.

Keywords: Education informatization. Business informatization. Information technologies. Information database.

RESUMO: *O objetivo do artigo é analisar as questões do processo de educação e informatização empresarial. A informatização da Educação e Negócios vem acompanhada do aumento do volume de informações processadas e da velocidade de troca de informações. Para cumprir o objetivo do estudo, o método analítico é utilizado e numerosos estudos relevantes são levados em consideração. Com base nos resultados, aumentar o nível de confiabilidade das informações reduz os custos de transação da empresa, diminuindo a*

¹ Associate Professor, Candidate of Economics Science, Department of General Management, Kazan Federal University, Kazan, Russia, elinagur@mail.ru, Scopus ID 56381597400, ORCID ID <https://orcid.org/0000-0002-5467-7039>

² Student, Higher Institute of Information Technology and Intelligent Systems, Kazan Federal University, Kazan, Russian Federation, artemgur01@gmail.com, ORCID ID <https://orcid.org/0000-0002-9870-7973>

³ Associate Professor, Candidate of Economics Science, Department of General Management, Kazan Federal University, Kazan, Russian Federation, s-lanam@mail.ru, Scopus ID 56381563800, ORCID ID <https://orcid.org/0000-0002-9344-9637>

⁴ Associate Professor, Candidate of Economics Science, Department of General Management, Kazan Federal University, Kazan, Russian Federation, halbi@mail.ru, Scopus ID 56150808800, ORCID ID <https://orcid.org/0000-0002-5501-6347>

probabilidade de erros e riscos na gestão da organização. Os resultados do estudo permitem tirar as seguintes conclusões. A introdução de modernas tecnologias de informação nas atividades das organizações leva à redução dos custos de transação devido ao aumento da confiabilidade da base de dados de informações, bem como ao aumento da transparência dos fluxos de informação da organização.

PALAVRAS-CHAVE: *Informatização da educação. Informatização de negócios. Tecnologias de informação. Banco de dados de informações.*

RESUMEN: *El propósito del artículo es analizar los problemas del proceso de informatización educativa y empresarial. La informatización de Educación y Negocios va acompañada de un aumento en el volumen de información procesada y la velocidad del intercambio de información. Para cumplir con el objetivo del estudio, se utiliza el método analítico y se tienen en cuenta numerosos estudios relevantes. Con base en los resultados, aumentar el nivel de confiabilidad de la información reduce los costos de transacción de la empresa, reduciendo la probabilidad de errores y riesgos en la gestión de la organización. Los resultados del estudio permiten sacar las siguientes conclusiones. La introducción de tecnologías de la información modernas en las actividades de las organizaciones conduce a costos de transacción reducidos debido a la mayor confiabilidad de la base de datos de información, así como debido a una mayor transparencia de los flujos de información de la organización.*

PALABRAS CLAVE: *Informatización educativa. Informatización empresarial. Tecnologías de la información. Base de datos de información.*

Introduction

The problem of determining changes in the level of transaction costs of the organization requires special attention and in-depth research at the current stage of development of education and economic systems, characterized by an increase in the volume and speed of information exchange between subjects of market relations.

The problem of optimizing transaction costs at the current stage of economic development leads to the need to use an investment tool that make it possible to reduce the relative weight of transaction costs in the total increasing volume of transactions, the growth of which is caused by such world trends as globalization of the economy and change of technological paradigm.

The problem of optimizing transaction costs in the context of global business informatization was caused by the increasing complexity of social and economic interactions, as well as the increase in the volume and speed of information exchange. In these circumstances, the management of companies should analyze the structure, dynamics and

sources of growth of transaction costs. That will allow the most efficient using of the organizations resource potential.

Market transaction costs as opposed to intra-firm costs are described in detail in the literature.

Investigated questions of the theory of transactional costs Commons (1931), Coase (1937), Stigler (1961), Arrow K (1969), Alchian and Demsetz (1975), Jensen and Meckling (1979), Barzel (1982), , North (1987), Jones and Hill (1988), Eggertsson (1990), Nicholson (1992), Cheung (1992), Milgrom and Roberts (1992), Williamson (2000), Furubotn and Richter (2005), Menard and Shirley (2008).

Intra-firm costs, however, resulted in losses resulting from the inefficiency of the management system.

Methodology

Types of transactional costs

For ease of definition and analysis, the following classification of transaction costs will be used (Figure 1).

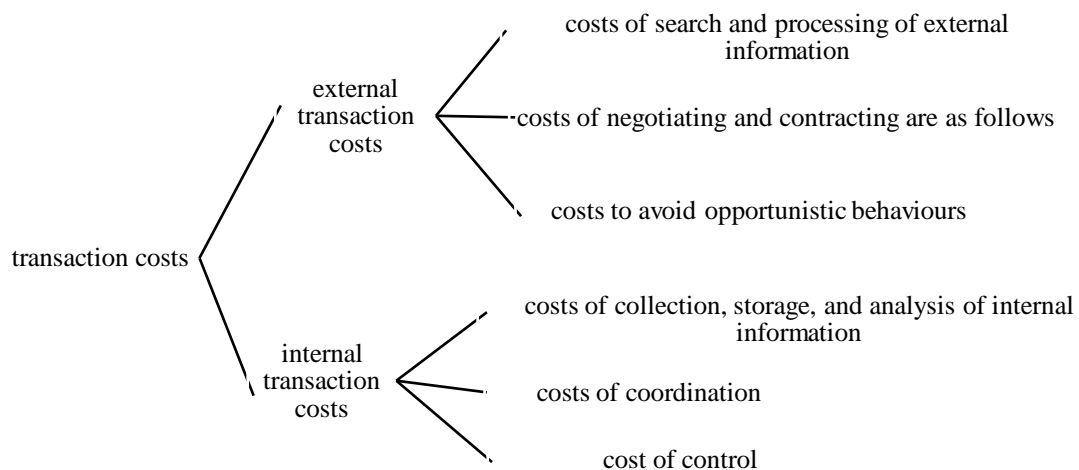


Figure 1. Types of transactional costs.

For analysis purposes, the transaction costs of the organization are proposed to be divided into external and internal costs. External transaction costs include the seeking and processing external information cost, the cost of negotiating and contracting, and the

opportunistic conduct cost. Internal transaction costs include costs of internal information, storage and analysis, coordination costs, control support (including costs of opportunistic behavior of employees).

Results and Discussion

Analysis of the level of education and business informatization in the Russian Federation

The introduction of information technologies at the current stage of economic development has become a necessary condition for ensuring the efficiency of economic activities of organizations, ensuring their sustainability in the market and ensuring high rates of economic growth. The informatization of organizational activities was no longer seen as a competitive advantage, but as a prerequisite for the conduct of business at the current level. However, according to statistical reports (Abdrakhmanova, 2019), the software using in the organizations of the Russian Federation for doing business remains not very high (Figure 2).

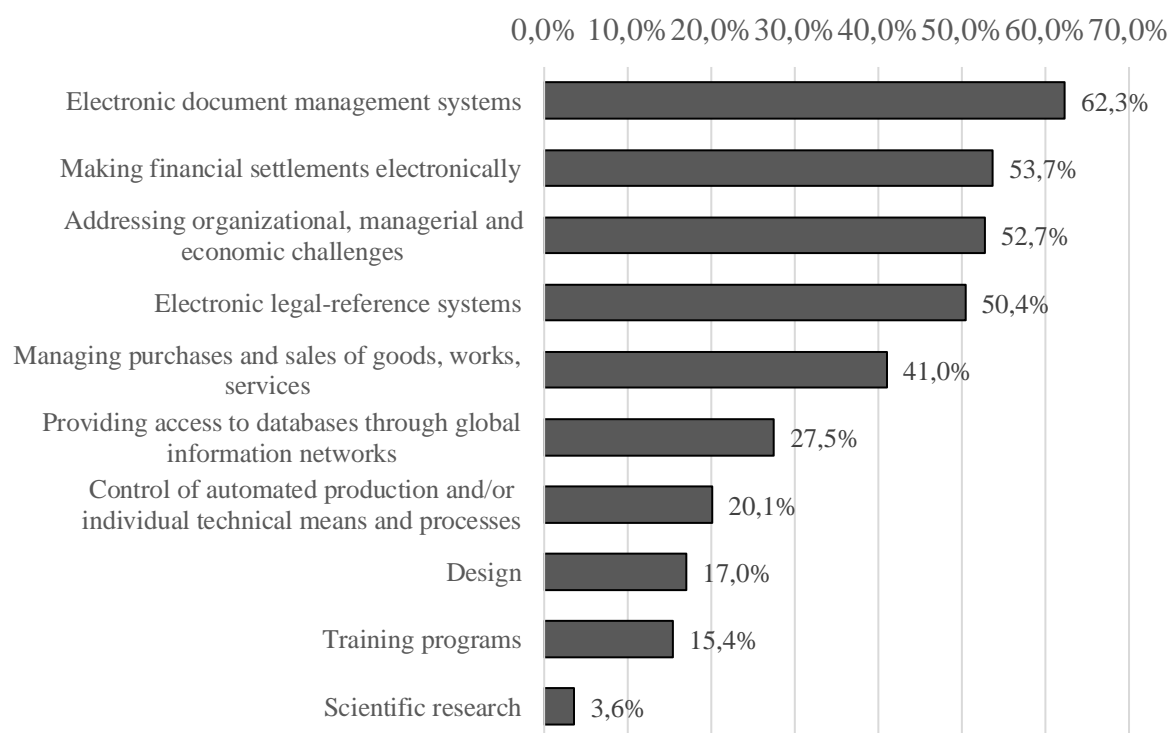


Figure 2. Software using in business sector organizations (percentage of total business sector organizations)

If we consider some of these indicators in a section of types of the organizations of the business sector (Abdrakhmanova, 2020), it is possible to tell that the digitalization of financial calculations is most widespread in manufacturing industry, the solution of organizational, administrative and economic problems using information technologies - in telecommunications, and the provision of access to databases through global information networks - in wholesale and retail trade (Figure 3).

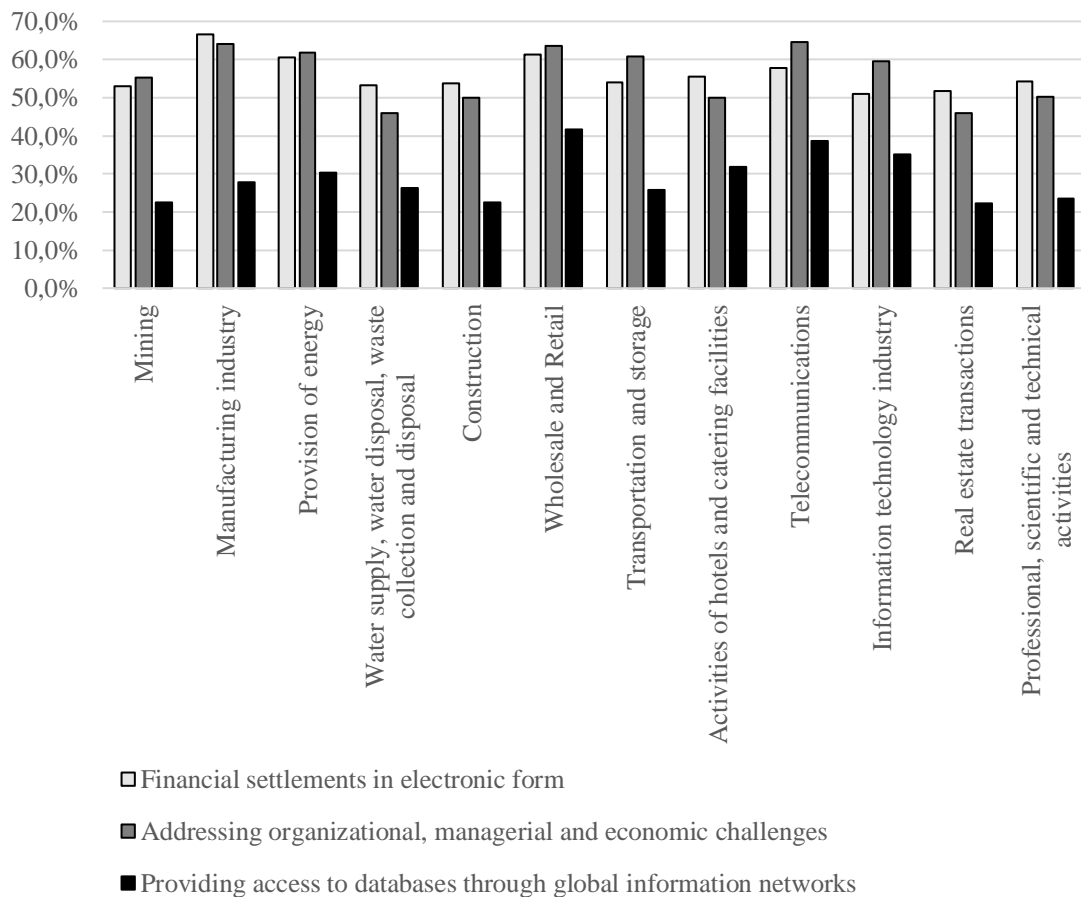


Figure 3. Using software in organizations for doing business (as a percentage of the total number of business sector organizations).

In business, the application of information technology occurs through the development and introduction of information systems, which can have different purposes. Information technologies in organizational activities are a means of searching, transforming, storing data, as well as a way of forming internal and external information flows. The information system of an organization is an environment in which modern information technologies are implemented, and many different information technologies are generally used in one information system.

The information systems of different companies have significant differences in functional purpose, structure and types of information technology used, but in any case they must have the following mandatory characteristics.

Firstly, since any information system is ultimately designed to collect, transmit, process and store data, it is necessary to ensure its smooth operation. It is important to ensure the information security of the enterprise, due to the fact that loss or distortion of information can lead to significant material and non-material losses. At the same time, it should not be forgotten that the cost of operating the information system should not exceed the economic effect of its implementation, just as resources aimed at ensuring information security should not exceed possible losses from distortion or loss of this information.

Secondly, the information system should maximally satisfy the needs of end user, i.e. possess the intuitive and convenient interface, allow the user to perform all necessary functions without resorting to additional means of searching, processing, transferring and storing information.

At present, a great world experience has been accumulated in the introduction and information technologies using, in particular ERP systems. ERP systems provide system informatization of management functions and work processes, involving unified informatization of the enterprises activities at all levels.

ERP systems can be used in mechanical engineering, construction organizations, trade, food and chemical industries. They are designed to maximize the control and the organization 's resources using. CRM systems are best suited for managing customer communication. They best contribute to the optimization of the activities of organizations working in the wholesale trade, in the service sector and in the hotel business. SCM systems are designed to manage all processes from raw material procurement to product distribution. Using these systems is justified in trade and other activities with a large number of suppliers and complex transport chains. SCM systems are also used in holding companies with flow analysis, planning and calculation of flows.

According to statistical studies (Abdrakhmanova, 2020), ERP systems and CRM systems are most actively used in the field of telecommunications (compared to other organizations of the business sector), and SCM systems are actively used by enterprises in wholesale and retail trade, which is related to the specifics of the activities of these companies. (Figure 4).

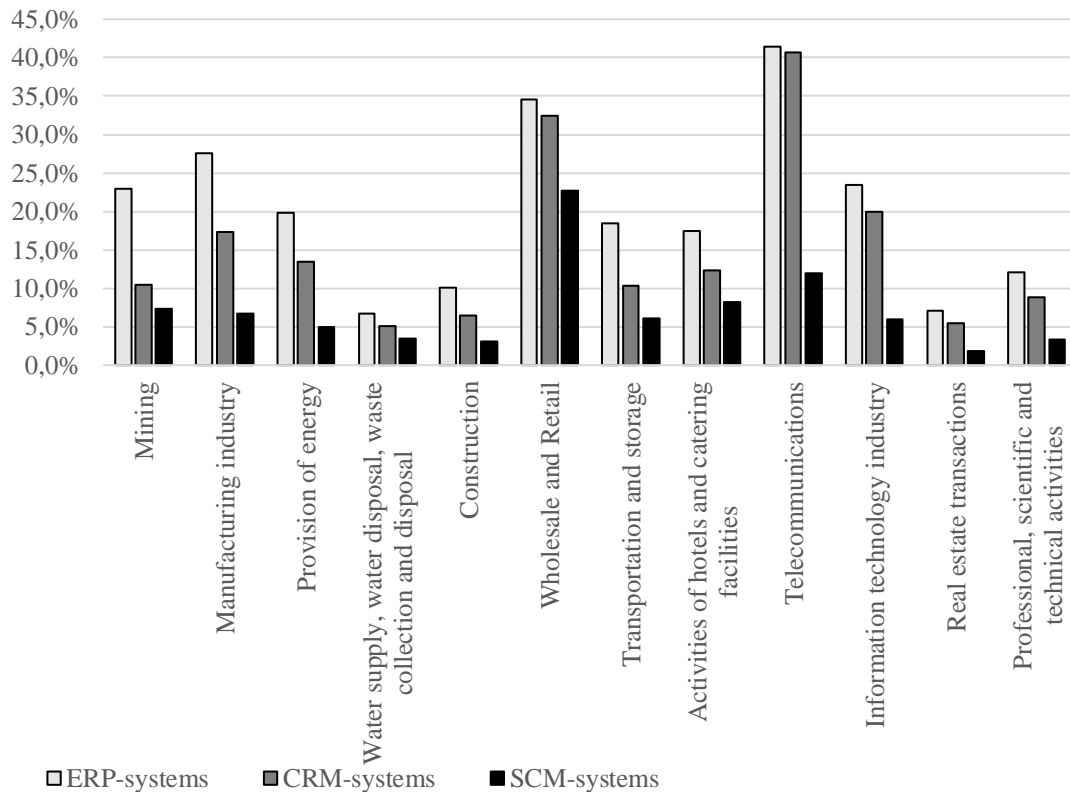


Figure 4. Using ERP, CRM, SCM systems in Russian Federation organizations (as a percentage of the total number of business sector organizations).

As the statistics of using ERP, CRM, SCM systems in the organizations of the Russian Federation show, a large number of domestic companies still keep information in a piecemeal manner, within various divisions. Moreover, these divisions can use different storage systems. This leads to repeated duplication of information within the same organization, while this information can be contradictory and non-identical. The lack of unified approaches to the storage and processing of information makes it difficult to access the necessary information, increasing transaction costs and reducing the effectiveness of the organization. It is particularly important to note that the inconsistency of the data available to the enterprise in the course of business leads to an increase in transaction costs and increases the probability of errors in the management decision-making process.

Impact of information technology on the performance of the company

According to research (1C COMPANY, 2020), the introduction of ERP systems allows to increase efficiency of information exchange, as well as efficiency of various types of organizational activities (Figure 5).

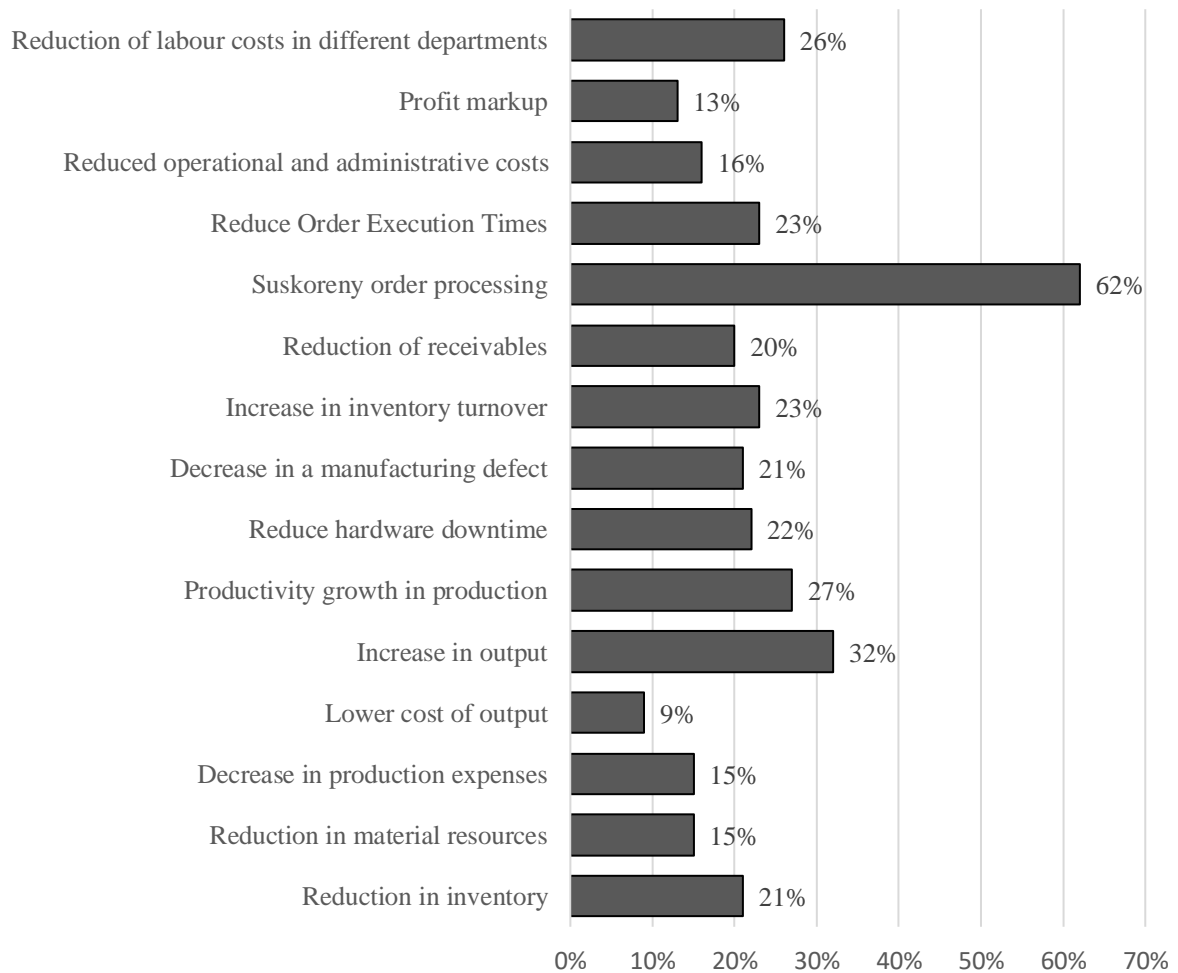


Figure 5. Economic effect of ERP solutions introduction on «1C: Enterprise 8» platform.

The Figure 5 shows that the introduction of an ERP system can lead to reduction in various kinds of costs and an increase in performance. At the same time, it should be noted that this effect in most cases is not related to the implementation of the ERP system itself, but to the fact that its implementation optimizes the business processes that it supports. The introduction of this system into the enterprise management process leads to increased transparency and control of business processes at all levels.

Relationship between transaction costs and the level of education and business informatization

We will determine what effect the optimization of transaction costs caused by the implementation of the ERP system will have on the above indicators, that is, the reduction of which transaction costs leads to the improvement of the above indicators.

Table 1. Impact of the reduction of transaction costs from the introduction of an information system on the performance indicators of the organization.

Performance indicator	Mean value of	Transaction costs					
		search and processing of external information	negotiation and contracting	opportunistic behavior	conception, storage and analysis of internal information	coordination	control
Reduction in inventory	21%	+	+		+	+	+
Reduction in material costs	15%				+	+	+
Reduction in production expenses	15%					+	+
Reduction in cost of produced products	9%	+	+	+	+	+	+
Increase in output	32%	+	+			+	
Increase in production productivity	27%				+	+	+
Reduction in equipment downtime	22%					+	+
Reduction in a manufacturing defect	21%					+	+
Increase in inventory turnover	23%		+		+	+	+
Reduction of receivables	20%		+	+			
Acceleration of order processing	62%	+		+	+		
Reduction of order execution times	23%		+		+	+	+
Reduction of operational and administrative costs	16%				+	+	+
Increase of profit	13%	+	+	+	+	+	+
Reduction of labour costs in different departments	26%	+	+		+	+	

Since the information using management system involves the formation of a unified information environment of the company, its use allows to increase the accuracy of the information used, and therefore to reduce transaction costs of information search both in the internal and external environment of the organization. In this regard, it is of interest to study the use the Internet in organizations of the business sector. (Figure 6).

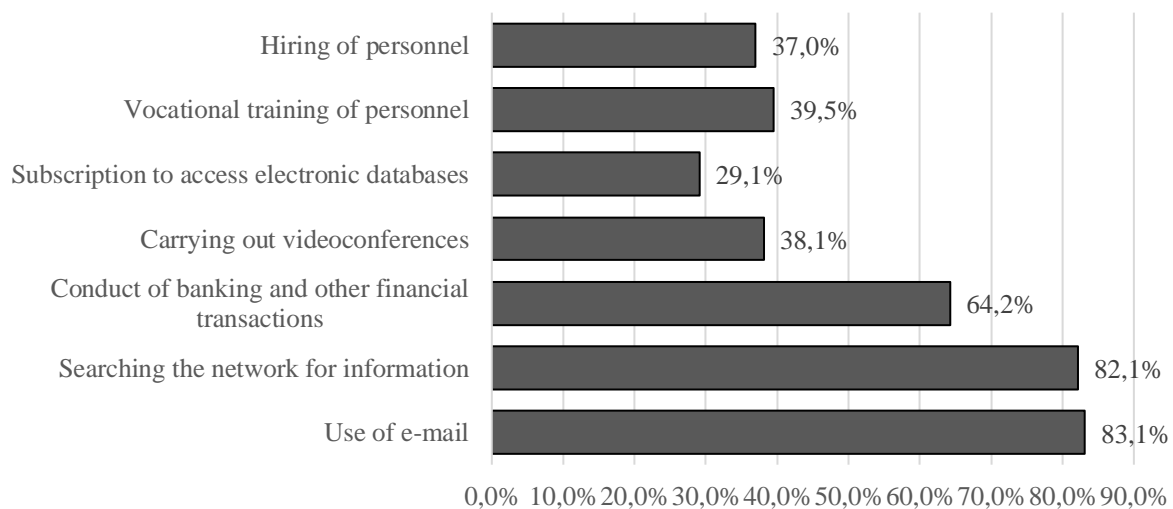


Figure 6. Directions of the Internet use in organizations (as a percentage of the total number of organizations in the business sector)

According to statistics (Abdrakhmanova, 2019), the using priority areas of the Internet by the business sector organizations are the e-mail using, searching for information in the Internet, as well as banking and other financial transactions.

When looking for and processing information in an external environment, companies often face the problem of incomplete information, which often results in a loss or shortfall of profits. In this case, the organization transaction costs increase in several times due to the need to make a management decision in uncertainty conditions. The implementation of the global information system is intended to reduce these costs by obtaining reliable information by all its participants (users).

Maintaining the any information database operation requires the expenditure of resources on employees wages, on purchase and operation of information technical means of management, information technologies. But use of modern information technology in a system form that covers all levels of the organization, helps reduce transaction costs associated with duplicating, searching, and transmitting information.

In the process of doing business, companies also face the costs of negotiating and contracting. These costs are caused not only by the time spent on the negotiation process itself, but also by the information needed to do so. The use of modern information technologies makes it possible to reduce the costs of this kind by holding online conferences and signing smart contracts.

Firms can also incur losses and costs associated with protection against illegal actions by counterparties and government agencies, the so-called costs of opportunistic conduct. The difficulties of controlling the conduct of counterparties can be solved, for example, by using smart contracts, which involve a fully automated process that monitors the proper execution of the contract. Automation of the process also saves time, as personal participation of the parties is completely or partially excluded.

The process of collecting, storing and processing internal information is also costly. Information received through internal communication channels, contrary to expectations, is far from always timely and reliable. This is due to communication barriers that occur in both information transmission and processing. In this case, a unified information and communication system will help to avoid duplication of information, facilitate its search in the common information base, which will make it more accessible at all organizational levels to support the decision-making process.

The process of coordination of intra-organizational issues can also be optimized by the introduction of a unified corporate information system, which in turn will reduce the transaction costs of coordination.

The possibility of reducing the cost of control caused by opportunistic behaviour is also possible by increasing the transparency of information through the use of a single internal electronic document flow.

The introduction of information and communication technologies not only increases efficiency both at the level of corporate management and at the level of the firm's relations with the environment, but also reduces the transaction costs of the organization. Although transaction costs are not related to the value creation process, they can be very large, which leads to the need not only to take them into account in the organizational process, but also to find ways to reduce them.

Conclusion

One of the ways to reduce transaction costs is to develop and implement a business informatization strategy that will change the very mechanism of operation of a particular organization, transforming not only business practices, but in some cases directly and the

product, which can be considered as a combination of goods, services, as well as information provided to consumers.

The use of new information technologies in the activities of organizations allows to improve communication processes, reduce the cost of doing business, optimize the procedure of making management decisions in conditions of uncertainty, which in turn contributes to the construction of an effective organizational structure of management.

Thus, thanks to the successful introduction of information technologies into the activities of organizations, prerequisites are created for improving the efficiency of the organizations. In particular, by improving the reliability and transparency of the information database as a result of the introduction of information technologies, transaction costs are reduced at all organizational levels.

ACKNOWLEDGEMENTS: The work is performed according to the Russian Government Program of Competitive Growth of Kazan Federal University.

REFERENCES

- 1C COMPANY (2020). *Economic impact of implementing "1C" ERP systems*. [Online] Available: <https://v8.1c.ru/erp/ekonomicheskij-effekt/> (April 30, 2020)
- Abdrakhmanova, G., Vishnevskiy, K., Gokhberg, L. et al. (2019). *Indicators of digital economy: 2019: statistical collection*. National Research University Higher School of Economics. Moscow: HSE.
- Abdrakhmanova, G., Vishnevskiy, K., Gokhberg, L. et al. (2020). *Digital economy: 2020: short statistical collection*. National Research University Higher School of Economics. Moscow: HSE.
- Alchian, A., Demsetz, H. (1975). Production, Information Costs and Economic Organization. *IEEE Engineering Management Review*, 62(2), 21 - 41
- Arrow, K. (1969). *The Organization of Economic Activity: Issues Pertinent to the Choice of Market versus Non-market Allocation*. The Analysis and Evaluation of Public Expenditure: The PPB System. Vol. 1. Washington, DC: U.S. Government Printing Office.
- Barzel, Y. (1982). Measurement costs and the organization of markets. *Journal of Law and Economics*, 25(1), 64-78.
- Cheung, S. (1992). *On the New Institutional Economics*. Contract economics. Oxford [u.a.] : Blackwel.
- Coase, R. (1937). The Nature of the Firm. *Economica*. Blackwell Publishing. 4(16): 386–405.
- Commons, J.R. (1931). Institutional Economics. *American Economic Review*, 21(4), 648-657.
- Eggertsson, T. (1990). *Economic Behavior and Institutions: Principles of Neoinstitutional Economics*. Cambridge University Press.

- Furubotn, E.G., Richter, R. (2005). *Institutions and Economic Theory: The Contribution of the New Institutional Economics*. University of Michigan Press.
- Jensen, M. C., Meckling, W. H. (1979). Rights and production functions : an application to labor-managed firms and codetermination. *Journal of business*. 52(4), 469-506.
- Jones, G.R., Hill, C.W.L. (1988). Transaction Costs Analysis of Strategy Structure Choice. *Strategic Management Journal*, 9(2), 159-172.
- Menard, C., Shirley, M. (2008). *Handbook of New Institutional Economics*. Boston-New York-Berlin-Dordrecht: Springer.
- Milgrom, P., Roberts, J. (1992). *Economics, Organization and Management*. Prentice Hall.
- Nicholson, W. (1992). *Microeconomic theory: basic principles and extensions*. 5-th ed: The Dryden Press.
- North, D. C. (1987). Institutions, transaction costs, and economic growth. *Economic Inquiry*, 25, 419-428.
- Stigler, G. (1961). The Economics of Information, *Journal of Political Economy*, 69(3), 213–225.
- Williamson, O. E. (2000). The New Institutional Economics: Taking Stock, Looking Ahead. *Journal of Economic Literature*, 595-613.

Short biography:

Elina A. Gurianova

In 1994 she graduated from Kazan Financial and Economic Institute. In 1997 she defended her thesis on "Features of the formation of holding companies and the formation of a mechanism for their functioning (on the example of the Republic of Tatarstan) ». Associate Professor of Department of General Management, Kazan Federal University.

Artem I. Gurianov

In 2019, he graduated with a medal from Lyceum No. 131 of Kazan. Winner and prizewinner of olympiads in mathematics, physics and biology. At present, he is a full-time student at the Higher Institute of Information Technology and Intelligent Systems of KFU. Scholarship holder of the President of the Republic of Tatarstan scholarship.

Svetlana A. Mechtcheriakova

In 1997 she graduated from Kazan Financial and Economic Institute with a degree in Finance and Credit. In 2002 she defended her thesis on "Development of the integration of production in a market economy." From 2002 to the present day he has been working at the Department of General Management as an assistant professor. Teaches subjects: Management, Resource Management, Organization Theory, etc.

Albina D. Khairullina

PhD in Economics, Associate Professor; Lecturer at the Adizes Academy of Management (USA), member of the Association of Change Management Professionals (USA). Graduated from Kazan Financial and Economic Institute. Associate Professor, Department of General Management, Kazan Federal University, Associate Professor, MBA Program, KFU Higher School of Business. The author of 66 scientific publications, 78 educational publications.