Reduction of transaction costs in the process of business informatization

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Abstract. The purpose of the article is to analyze the change of transaction costs in the context of business informatization. Business informatization is accompanied by the speed of information exchange and an increase in the volume of processed information. This changes the transaction costs associated with the information search, storage, transfer, and protection. The methodology of finding ways to reduce transaction costs includes several steps. First, it is necessary to classify the transaction costs that an organization faces. Second, to analyze the level of informatization of business. Third, to analyze the impact of information technologies on the performance of the company. Fourth, it is necessary to track the relationship between transaction costs and the level of business informatization. The use of this method has led to the following conclusions. Increasing the volume of processed information makes it urgent to use information technologies. The use of information technology allows to optimize information flows within and outside your organization. In addition, the introduction of information systems in the activities of organizations increases the reliability of information used for management decision-making. Increasing the level of reliability of information, in turn, 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 increased reliability of the information database, as well as due to increased transparency of information flows of the organization. This allows to optimize the process of making management decisions in conditions of uncertainty, reduce the cost of doing business and eventually increase the efficiency of the organization.

1 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
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 use of the resource potential of organizations.

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


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

2 Methodology

2.1. Types of transactional costs

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

![Fig. 1. Types of transactional costs.](image-url)
For analysis purposes, the transaction costs of the organization are proposed to be divided into external and internal costs. External transaction costs include the cost of seeking and processing external information, the cost of negotiating and contracting, and the cost of opportunistic conduct. Internal transaction costs include costs of internal information, storage and analysis, coordination costs, control support (including costs of opportunistic behavior of employees).

2.2. Analysis of the level of 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 [17], the use of software in the organizations of the Russian Federation for doing business remains not very high (Figure 2).

![Use of software in business sector organizations (percentage of total business sector organizations)](image.png)

If we consider some of their these indicators in a section of types of the organizations of the business sector [18], 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).
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 use of information technologies, 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 use of the organization’s resources. 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. The use of 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 [18], 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).

![Fig. 4. Use of ERP, CRM, SCM systems in Russian Federation organizations (as a percentage of the total number of business sector organizations).](image)

As the statistics of use of 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.
2.3. Impact of information technology on the performance of the company

According to research [19], the introduction of ERP systems allows to increase efficiency of information exchange, as well as efficiency of various types of organizational activities (Figure 5).

Fig. 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.

2.4. Relationship between transaction costs and the level of 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.

<table>
<thead>
<tr>
<th>Performance indicator</th>
<th>Mean value of:</th>
<th>Transaction costs</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction in inventory</td>
<td>21%</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Reduction in material costs</td>
<td>15%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction in production expenses</td>
<td>15%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction in cost of produced products</td>
<td>9%</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Increase in output</td>
<td>32%</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Increase in production productivity</td>
<td>27%</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Reduction in equipment downtime</td>
<td>22%</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction in a manufacturing defect</td>
<td>21%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Increase in inventory turnover</td>
<td>23%</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Reduction of receivables</td>
<td>20%</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Acceleration of order processing</td>
<td>62%</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Reduction of order execution times</td>
<td>23%</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
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<tr>
<td>Reduction of operational and administrative costs</td>
<td>16%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Increase of profit</td>
<td>13%</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction of labour costs in different departments</td>
<td>26%</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
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</tbody>
</table>

Since the use of the information 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).
According to statistics [17-18], the priority areas of use of the Internet by the organizations of the business sector are the use of e-mail, searching for information in the Internet, as well as banking and other financial transactions.

3 Suggestions and conclusions

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 transaction costs of the organization increase in several times due to the need to make a management decision in conditions of uncertainty. The implementation of the global information system is intended to reduce these costs by obtaining reliable information by all its participants (users).

Maintaining the operation of any information database requires the expenditure of resources on wages of employees, on purchase and operation of information technical means of management, information technologies. But use of modern information technology in the form of a system 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 of 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.

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.

References

1. J.R. Commons, American Economic Review 21(4), 648-657 (1931)