Transaction Costs in the New Age of Digital Economy

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Abstract. The present article is devoted to peculiarities in the formation of transaction costs in a period of increasing influence of digital technologies on economy and transaction practices. The integrated concept of transaction costs themselves is reported, while their classification is updated. The present article is meant for specialists in the fields of economy, education, science and technology transfer.

Keywords: transaction costs, digital economy, transformation, technology, institutions

1. Introduction
The digitalization of economy has become pertinent as the result of major breakthrough occurring in society. Current processes testify a new age for the management of the production and commercialization of goods, works and services, as well as in the main processes due to the end-to-end application of innovative information technologies, ranging from artificial intelligence to technologies of the industrial Internet of things. The interaction models based on the connection of electronic platforms lead to the implementation of new economic technologies. New means and methods of data elaboration for a task-oriented creation, transmission, conservation and presentation of content (data, ideas, knowledge) influence the volume of transaction costs in the interaction of economic agents.

In the digital segment of the economy of developed countries, the transaction sector accounts for more than 70% of the national GDP. This sector includes: public administration, information services, consulting, wholesale and retail trade, provision of different social and public services, finances. In those spheres which depend on the Internet, such as transport, commerce, logistics and others, the share of the transactions sector roughly accounts for about 10% of the GDP.

The improvement of the classification system of transaction costs, which should guarantee a proper approach to their management, is a crucial task for science, which has to provide consultative support of current economic processes, as well as of processes related to the conversion to digital economy.

The aim of the present research consists in the search for specific mechanisms aimed at simplifying the economy conversion process towards the introduction of innovative technologies and the possibility to reduce transaction costs in the new digital institutional environment.

2. Research methodology
The systematization of knowledge was obtained through a system of regulatory principles, procedures and methods through which an objective view can be obtained as regards the study of the influence of the spread rate of digital technologies on the availability of methods and possibility to reduce the volume of transaction costs.
Three main methods of scientific and educational activity were applied while carrying out the present research. Among the so-called universal methods of enquiry, the following ones were applied: analysis – in the characterisation of certain elements of the digitalisation process; synthesis – in the classification of transaction costs; generalisation – in the determination of the general properties and characteristics of transaction costs; induction and deduction – in the elaboration of a structure for this category of costs for a specific sector of economy, which can be recommended for application in other sectors as well.

Empirical methods were used in order to obtain practical knowledge while studying the process of the activity of economic subjects in digital economy based on target-oriented observation and experiments within the institutions.

All the applied methods are consistent with the following underlying principles: the principle of objectiveness (estrangement of the researcher from the object at study); the principle of continuity (research was carried out from 2005 to 2020); the principle of replicability (all the steps and phases of the research process can be replicated and verified by other researchers).

In order to determine the conceptual framework of the research the main paradigms of transaction costs were studied: I. Barzel, J. Commons, R. Coase, C. Ménard, R. Nelson, P. Milgrom, D. North, K. Polanyi, R. Richter, J. Roberts, O. Williamson, J. Wallis, E. Furubotn, T. Eggertson; methodology for the assessment of transaction costs at the level of economy in general: D. North and J. Wallis; the quantitative assessment of transaction costs on specific market: H. Demsetz and T. Loeb; issues related to the interconnection of information and transaction costs in economic systems: A.A. Auzan, S.B. Abdasheva, V.G. Belolipetsky, B.L. Inozemtsev, O.V. Inshakov, R.I. Kapelyushnikov, S.G. Kirdina, G.B. Kleiner, V.E. Kokorev, V.A. Kundius, D.S. Lvov, A.K. Lyasko, S.V. Malakhov, A.A. Migryanyna, A.D. Nekipelov, A.N. Oleinik, V.M. Polterovich, V.V. Radaev, I.A. Strelets, V.F. Stukach, V.L. Tambovtsev, A.E. Shastitko, A.A. Yakovlev and others.

Among the paradigms of scientific knowledge, the concept of positive dialectical cognitive theory can be considered the most fitting and appliable in the present research, being the study of system, which consists of interconnected elements and opposed aspects. This system should be described as logically and consistently as possible, by creating behavioral models along the binary opposition between objectivism and humanism, by facing and integrating the aims of society development and competence development in economic subjects.

The theoretical and methodological foundation of the research is composed of scientific works and conceptions elaborated by domestic and foreign scientists, in which issues related to the development and transformation of economic sectors and on the consequences of mass digitalization on social life are taken into consideration.

3. Transaction costs in a neo-institutional environment

Occurring transactions are represented by the exchange of data and their interpretation, which determines the character of subsequent interactions; on its turn, this leads to the formation of relations among participants, the elaboration of behavioral rules, the change of behavioral motives, the transformation of the set of values, including behavioral rules, in the new circumstances of spreading of the results of information and communication technologies (hereafter, ICT).

The concept of transaction costs emerged within the framework of neoinstitutionalism, which developed as the negation of neoclassical models. Its principles are defined in the works of scholars such as Coase [1], Arrow [2], Kornai [3], Davis, Word. Problems related to transaction costs first appeared in the 1960-70s in the USA and Western Europe in works by scholars such as Demsetz [4], Jay, Paily, Olson [5] and others. This approach was more comprehensively elaborated by Williamson [6]. The empirical implementation of the theory of transaction costs was presented in works by the American scholars J. Wallis [7] and D. North [8]. In Russian scientific literature, such problems were faced while attempting to interpret costs which configure themselves as transaction costs in terms of interests, behavioral models, cultural traditions, previous social experience. Therefore, the works were dedicated to problems of business ethics, bureaucratization and corruptibility of the authorities, formation of a Russian business elite, social sources for the reinforcement of entrepreneur groups. Attempts to
introduce the term “transaction costs” into use are present solely in the development of scientific categories in economic theory. Rare exceptions are represented by the works of scholars such as V. Kokorev, R. Kapelyushnikov [9], V. Kurchenkov [10] and V. Radaev [11]. The digitalization of economic processes finds broad support in scientific circles, in particular among supporters of institutionalism.

4. Results
Institutional theory, applying information theory with the help of the synthetic method, analyzes transaction costs and enables a search for ideal economic relations. Russian economy, if compared to other countries, is characterized by a high level, in particular in the field of the statement and protection of ownership rights, which is quite often discussed in scientific literature [12].

Transaction costs in a narrow sense include expenses for the collection of information and its elaboration, the conduct of negotiations, the monitoring of the compliance of contract relations. However, due to the major breakthroughs occurring in society, production and commercialization of goods, works and services related to the spread of the application of innovative end-to-end and information technologies, this requires a transformation in the conceptual and categoric system, in particular – changes in the key definition. In the digital age, transaction costs in a broad sense should be understood as the economic assessment of losses emerging as a result of the implementation of market transactions between economic agents, in particular based on digital partnership networks, the efficiency of which is guaranteed by a set of fitting institutions which carry out transactions in traditional and remote ways as well.

The complexity of the assessment of transaction costs is determined by the fact that the minimum level of transaction costs cannot be established (for example, as a result of the impossibility in different cases to draw a boundary between transformation, organization and transaction costs) and can change in time [13]. One of the most popular interpretations of transaction costs within the framework of institutionalism is part of the theory of P. Milgrom and J. Robertson [14]. They consider the shortcomings of coordination between economic agents as their source (for example, the incompleteness of information). This shortcoming can be exponentially decreased by introducing digital certificates and blockchain technologies. Such hybridization of services in transactions and the rejection of the uncoordinated provision of goods are of crucial interest in the new economy based on electronic platforms, banks and digital partnership networks. New institutional structures in the corporate ecosystem, by integrating the informational, organizational and material resources of economic subjects and blending the distinct boundaries between markets, create favorable conditions for the minimization of transaction costs for the transaction parties [15].

The advantages of ICT can be acknowledge with a good command of computer work, in particular using the cyberspace, and developing a specific mindset which can be called “open-mindedness”. The rejection of the traditional approach to the management of the activity of any economic subject from house management to major corporations shows the tangible positive effects of the application of ICT – the reduction and simplification of time procedures for the preparation, arrangement, registration and tracking of transactions, the mitigation of risks in the conclusion of a transaction, which reduces transaction costs.

Institutional units which are well-informed, “advanced” in a communicational sense, mobile and striving to improve their position on the market, having an enhanced access to data content, can autonomously switch from one sector of the market to another and at the same time improve the structure of the market itself and the composition of transaction costs. However, in the Russian economy the amount of economic subjects with the stated characteristics is unsufficient and unable to have a material impact on the market. The causes can be identified in the following phenomena: in the inertness (conservatorism) of economic behaviour; in the lack of receptivity to the instruments of digital economy which allow for rational organization in the solution of any issues (due to the absence of opportunities

\(^1\) As proposed by the author.
or skills for their application); in the aversion to spend time for the acquisition of new products; in the low degree of trust in ICT (risk of fraud, disclosure of confidential information); in the insufficient familiarization with such services. The fact that the consumer determines the competitive position of the production in conditions of information asymmetry complicates the forecasting process [16].

The detractors of overall digitalization point at the following issue: the existing state information resources are not always completely available for all the subjects of the market, which can be explained by the absence of an integrated regulatory basis that might control their creation at federal, regional and local levels. This way, the amount of transaction costs increases in the exchange of information, for example, at interinstitutional level due to the low updating operativity, the weak relevancy and accuracy of the information provided settle the information asymmetry while making any particular managerial decision.

Numerous instances of empirical and practical research have proven that interaction on the present-dat market, meant as the sum of all the participants and the relations among them, is accompanied by a growth in transaction costs. In order to broaden the markets of merchandising and reduction of expenses, a system for the management of transaction costs for the participants of the corporate ecosystem consisting in the sequential realization of stages (the first of which is the necessity to classify the category of costs) is needed, as schematically shown in Figure 1.

![Classification of transaction costs diagram](image)

**Figure 1. System for the management of transaction costs for the participants of the corporate environment**

The whole classification set of transaction costs as evidenced through long-term research requires a systematic updating in the condition of digital economy against the background of the development and cheapening of personal and industrial electronics (computers, laptops, tablets, mobile phones, servers, telecommunication devices) as well as development and spreading of online services. As part of the research, the peculiarities of the performance conditions of economic subjects have been determined, while the composition and form of each type of transaction costs have been specified. The results are shown in Table 1.

| Classification of transaction costs |
|-------------------------------------|
| Determination of the potential to decrease or increase the element of transaction costs |
| Analysis of the business processes occurring in the corporate ecosystem |
| Creation of a system for monitoring transaction costs |
| Assessment of transaction costs |

The structure of transaction costs includes all the possible expenses related to the settlement of a transaction within the corporate ecosystem in the conditions of digital economy. The organization of all the field of activity in the process of interaction with market subjects (institutions) accounts for transaction costs. The diversification in the form, essence and sources of transaction costs must be taken into account while introducing a mechanism for their management.

Only the systematic collection of information for subsequent analysis gives the possibility to determine the measures necessary to reduce the costs of each type. Transaction costs allow for a significant reduction in the scale of activity. The development of an infrastructural settlement as a consequence of the efficient management of transaction costs in “digital circumstances” minimizes their impact, increasing the benefits of the interactions among participants of the market and corporate ecosystem.
Table 1. Classification and composition of transaction costs in the conditions of digital economy

| Type                     | Peculiarities in the new age                                                                 | Elements / components                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Information retrieval costs | Simplification in the collection and elaboration of information                              | Expenses in terms of time and resources for the formation and management of databases |
|                          | Correction of information distortion through mechanisms of consumer assessment and feedback | Expenses for information sourcing (specialized publications, traditional mass media, Internet, online services) |
|                          | Online search services                                                                     | Expenses in terms of time for competitive intelligence, in particular using paid marketing services |
|                          | Target-oriented advertising                                                                | Expenses for IT outsourcing                                                           |
|                          | Marketplaces                                                                               | Expenses for advertising and promotion                                                |
|                          |                                                                                             | Losses due to the commercialization of products, works and service at prices against self-interest |
|                          |                                                                                             | Expenses for the participation to exhibitions, trade fairs, expositions, conferences, congresses, forums, sales pitches and briefings |
| Negotiation costs        | Conduct of negotiations using the World Wide Web from any place on earth by means of audio and video conferences | Expenses for the allowance of contract negotiation managers                            |
|                          | Reduction of transport expenses                                                             | Expenses for digital services and facilities: access to the Internet, mobile communication, local and long-distance telephony |
|                          | Online trade systems allowing the automatization of communication                           | Legal outsourcing, including consulting services                                         |
|                          | E-commerce in the consumer sector                                                           | Representational expenses                                                             |
|                          | Chat bots for client communication                                                          |                                                                                       |
|                          | Threat of competitive IT “wars” among providers (anonymous spread of misinformation)       |                                                                                       |
| Measurement costs        | The volume of transaction increases due to a range of specific features                    | Reimbursable financial loss as a result of qualitative factor mismatch                  |
|                          | Bots as software simulators and wastage of advertising budgets of advertisers when using “one-click payment” pricing models | Extra costs to increase the level of customer orientation in the production of goods, execution of works and provision of services |
|                          | Accumulation of measurement methods form big volumes of information to recognize and integrate end-to-end big data technologies | Expenses for warranty repair and maintenance                                             |
|                          |                                                                                             | Expenses for the compulsory compilation of goods quality certificates                  |
|                          |                                                                                             | Expenses for the acquisition of the documentation for quality control systems           |
|                          |                                                                                             | Expenses for the acquisition of measuring instruments                                  |
|                          |                                                                                             | Expenses for the allowance of the administrative subdivision responsible for quality control |
|                          |                                                                                             | Non-material damage due to the low quality of production which has consequences on the entreprise reputation |
|                          |                                                                                             | Substitution of faulty production                                                     |
| Contracting costs | Possibility to draft standard contracts  
| Payment for the services of specialized institutions (standardization, metrologic and other centers)  
| Expenses for the formation and maintenance of intermediate institutions for project implementation  
| Expenses for the external design of final documentation on e-commerce platforms  
| Expenses for the preparation of contract documentation, including outsourcing  
| Expenses for project lobbying (expenses for the creation of social awareness, gifts)  
| Brokage  
| Exchange rate fluctuations  
| Payment for legal and notary services  
| Losses due to incorrect legal compilation of the arrangement – complaints, fees and others  
| Loan interests  
| Missed profit due to uncollected contracts, overspending, failure to meet project deadlines, failure to obtain support for grant applications  
| Participation to tenders | Preponderance of informal institutions in the digital environment  
| Ownership right statement and protection (coordination) costs  
| From the legal point of view, specific digital objects are not objects of ownership rights  
| Without formal institution in the redistribution of ownership rights, transaction costs increase | Reimbursement of complaints to third parties  
| Government fees  
| Expenses for the registration of a juridical person in audit and oversight authorities, for license acquisition, for banking account opening  
| Expenses for the allowance of outsourced security providers  
| Insurance expenses  
| Production labelling with conformity marks which are counterfeit-proof  
| Losses in the physical volume of production (beside natural loss rates) in the commercialization process | Risks related to risk and trust in technologies on part of the society, state authorities and other institutions  
| Opportunistic behavior (motivation, protection from third parties, “politicization”) costs  
| Development of the field of IT and cyber security  
| Lock out of IP addresses, domain names, protocols, messengers, social networks and other services as the end of the age of free Internet | Expenses for the correction of compliance risks  
| Expenses for the allowance of specialists of the (accounting and legal) subdivision responsible for the exaction of debts or accounting and legal outsourcing  
| Expenses for the allowance of the legal department  
| Expenses for the exaction of debts – legal expenses, wages of negotiators, payment for debt recovery services  
| Losses due to workers’ negligence  
| Charges of paid fees, penalties, as well as interests provided by contracts in case of non-compliance with their conditions | Corruption-ridden expenses in business processes  
| Expenses for double-entry bookkeeping |
5. Conclusion

The present article has solved the problem of generalization of behavioral features of transaction costs in the age of the increasing impact of digital technologies on economy and transactional practices. As a result of research, the integrated concept of transaction costs themselves has been reported and their classification has been updated, the conceptual and categoric system for the execution of procedures for the control of the assessment of the transaction costs of economic subjects has been transformed. This proposition should be taken into account in the decision-making process at an intermediate management layer. The efficiency of the subject functioning is influenced both by the rational use of resources and by the establishment of efficient economic connections with external contractors (producers and consumers), with the monetary and financial system using end-to-end technologies and ICT.

There is a reason to assert that not only the level of transaction costs, but also their structure and distribution among the participants of an economic exchange are relevant, since all this reflects the specific configuration of the institutions, therefore the task before state authorities consists in the creation and support of a functioning new digital infrastructure, in the provision of digital economy with acting regulatory acts, guaranteeing the statement and protection of ownership rights with minimal expenses, as well as in the development of digital skills in the population.

An important trend in the development of the corporate ecosystem is represented by the introduction of the principles of digital economy, which enables the formation of an institutional environment in compliance with the current requirements and circumstances, as well as a decrease in transaction costs and a general increase in economic efficiency.

As a result of the research, the propositions of the scientific bases of the mechanism of the formation of transaction costs in the structure of interaction among economic subjects in the conditions of the general digitalization of the categories of institutional economy have been refined.

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