



Transition of Firms from the Traditional to Ecosystem Form of Business: The Factor of Transaction Costs

George B. Kleiner^{1,2,3}  and Venera A. Karpinskaya⁴

¹ Directorate, Central Economics and Mathematics Institute of the Russian Academy of Sciences (CEMI RAS), Moscow, Russia

george.kleiner@inbox.ru

² Department of System Analysis in Economics, Financial University under the Government of the Russian Federation, Moscow, Russia

³ Department of Institutional Economics, State University of Management, Moscow, Russia

⁴ Department of Modeling of Industrial Objects and Complexes, Central Economics and Mathematics Institute of the Russian Academy of Sciences (CEMI RAS), Moscow, Russia

karpinskaya.venera@gmail.com

Abstract. Purpose: Determining the reasons and factors for the displacement of firms of a traditional form of business from the top lines of the ratings of the most expensive companies in the world by firms that implement ecosystem strategies.

Methodology: Based on the theory of transaction costs as a factor in the formation and recombination of value chains and the theory of network production organization, the influence of information and technological development factors on the forms of organization of production and firm strategies in the modern economy is shown.

Results: It was found that an increase in the speed of information processing, a decrease in the cost of computing, communication, information storage, data transfer and processing by economic agents in the Internet Era led to a sharp decrease in the transaction costs of economic agents, and, as a result, the breakdown of some value chains and links of these chains. Further, the creation of economic value not only by producers but also by consumers and the transfer of the created value from these consumers to other consumers caused a subsequent decrease in transaction costs, which, in turn, led to the union of producers and consumers into ecosystems. It has been shown that platform-type ecosystems operate on the basis of the concept of an “inverted firm”, i.e. a company in which, due to network effects, production is located outside the company and external labor is used. These factors lead to a low level of production costs and zero level of marginal costs.

Conclusion: Thus, the leadership of platform-type ecosystems in costs is a key factor in crowding out from the market the firms of a traditional form of business.

Keywords: Ecosystem · Platform · Strategy · Ecosystem strategy · Transaction costs · Value chains · The concept of “inverted firm” · Marginal costs · Network effect

JEL: D23 · L22 · L23

1 Introduction

The recent growth trend in the number of works devoted to the study of such a way of organizing economic activity as the ecosystem (Jacobides et al. 2015) is developing, in particular, against the background of the increasing market capitalization of ecosystems. As noted in Fuller and Jacobides (2019), at the present stage, 7 companies from the 10 largest companies in the world in the S&P 500 Index (Alphabet, Amazon, Apple, Facebook, Microsoft, Alibaba and Tencent) develop their activities within ecosystems, using technologies causing a change not only in the market segments in which they historically functioned, but also in the areas of the economy that are outside these sectors. As noted in Alstyne et al. (2017), the private investment market already in 2016 preferred the Uber firm, created in 2009, representing the so-called demand economy, to the firm General Electric, founded in 1908 and representing the so-called economy offers. As noted by Alstyne, Parker, and Choudary, Uber investors used not only traditional financial indicators and criteria to calculate the value and potential of the company. The authors conclude that the rules for calculating the value of companies have changed.

An ecosystem is a network of collaborating or competing firms offering users related products and services (see Jacobides et al. 2015; Adner 2006; Iansiti and Levien 2004; Moore 1993). We consider the ecosystem as “a spatially localized complex of uncontrolled hierarchically organizations, business processes, innovative projects and infrastructure systems that interact with each other during the creation and circulation of material and symbolic goods and values, capable of long-term independent functioning due to the circuit of these benefits and systems (Kleiner 2018). Ecosystems are developing in different countries. Firms implementing ecosystem strategies are diverse and heterogeneous. Not only the giants of the digital economy mentioned above but also startups can be ecosystems (Jacobides et al. 2019). Traditional business firms, for example, Bosch, Disney, General Electric, Merck, Schneider, and others, are also transforming their business models by creating ecosystems based on digital platforms and developing an ecosystem strategy (Evans 2016).

Ecosystems can successfully function both on the basis of digital platforms and without their use. As noted in Fuller and Jacobides (2019), the Danish pharmaceutical company Novo Nordisk, which entered the Chinese market in 1994, has formed a large-scale non-digital ecosystem whose goal is to solve the problems associated with diabetes. Novo Nordisk attracted as partners the Ministry of Health of the People’s Republic of China, the Chinese Medical Association, various universities, groups of doctors, as well as non-governmental organizations and others. At present, Novo Nordisk is selling nearly \$ 1 billion worth of diabetes products and services in China. Thus, the company’s share in this Chinese market is about 60% (Fuller and Jacobides 2019).

Firms belonging to various sectors (from the financial and health sectors to the media and retail sectors) transform their business models and form ecosystems (Parker et al. 2016). Socio-economic ecosystems are now becoming the central element of the country's socio-economic landscape (Kleiner 2018) and a new significant actor in the economy (see also Karpinskaya 2018a).

According to McKinsey's forecasts, by 2025 a significant proportion of value chains will be combined into several dozen ecosystems, and the boundaries between individual sectors will be blurred (see Aptekman et al. 2017).

With the creation of new alliances and the disappearance of borders between sectors, the approaches of business leaders to the formation of medium and long-term strategies are changing. Under current conditions, market participants applying strategies formed in the industrial era are at risk of failure that can be realized in the future (Fuller and Jacobides 2019). As noted by Fuller and Jacobides, firms should take into account when developing their strategies trends of development of ecosystems as a new way of organizing economic activity.

This article attempts to determine the reasons for the displacement of firms of a traditional form of business from the top lines of the ratings of the most expensive firms in the world by firms that implement ecosystem strategies. The analysis of changes in the factors affecting the formation of strategies by firms as a result of the transition from the Industrial Era development to the Internet Era is carried out.

2 Determinants of the Choice of Strategy by Firms in the Industrial Era

Researchers based on the principles of orthodox neoclassical theory analyzed the firm based on an approach in which the firm was considered as a production function. This approach made it possible to relate the size of the company to the effect of economies from the scale. In this regard, firms of the industrial era, when formulating strategies, took into account the possibility of obtaining the effect of economies from scale with a high level of fixed costs and low level of marginal costs in the production process and, thus, envisaged an increase in output and lower prices for it (Alstyn et al. 2017). At this stage, the unit of economic analysis was the firm. In the economic analysis of the firm, the researchers relied on the theory of profit maximization, according to which the firm produces and sells products with the involvement of resources in a volume that allows obtaining the maximum difference between revenue and costs (Kleiner 2008).

In orthodox neoclassical theory, the market was considered a perfect mechanism, which makes it unnecessary to take into account the service costs of deals. In the article "The Nature of the Company" (see Coase 2007) published in 1937, Coase, as is known, showed the need for such actions in the process of concluding a transaction as negotiating, supervising, establishing relationships with partners, resolving disagreements and etc. (Kapelyushnikov 1998). Initially, Coase defined transaction costs as "costs of using the price mechanism", "costs of performing exchange transactions on the open market", "market costs", and "costs of market transactions" (Coase 2007). Later, the meaning of the concept of transaction costs became wider – any types of costs necessary for the interaction of economic agents both on the market and within

organizations were considered as transaction costs since interaction within the firm is accompanied by friction and loss (see Kapelyushnikov 1998). Williamson considered transaction costs as “the economic equivalent of friction in mechanical systems” (Williamson 1996). In accordance with one of the classifications of transaction costs carried out by supporters of the transaction approach, these costs are divided into information search costs; negotiation costs; the costs of measuring the quantity and quality of goods and services introduced into the exchange; costs of protecting property rights; the costs of opportunistic behavior (Kapelyushnikov 1998). Popov and Konovalov give the following definition of transaction costs: “transaction costs are the main category of institutional economic analysis, including the costs associated with the functioning of a market economic system and necessary to ensure the sustainability of current operations” (Popov and Konovalov 2007). Transaction costs are opposed to the transformation (production) costs arising during the conversion of resources, which are reflected in the financial statements in the form of cost, i.e. including material costs, labor costs, interest on loans and others. In the course of economic development, the value of transaction costs has increased (Wallis and North 1986).

Due to the identification of a firm’s concept with the concept of a production function in the neoclassical theory, the question of the reasons for the formation and development of firms did not arise (Kapelyushnikov 1998). So Hayek, exploring the problem of rational economic organization in the middle of the 20th century, notes: “... in a system where knowledge of significant facts is dispersed among many people, prices can coordinate disparate actions of different people in the same way as subjective values help an individual coordinate parts of his plan” (Hayek 1945). Coase performed an analysis of an economic organization based on a transactional approach. He showed that not only the price mechanism is used as an instrument of coordination in the economic community. The presence of transaction costs determines the creation and operation of firms, “because in a significant number of cases manufacturer spends less money on transaction costs in organizing a process within an firm than in a market-based way of organizing production” (Kleiner 2008). The desire to minimize costs in concluding market transactions explains the creation and functioning of firms in which the distribution of resources is carried out in an administrative way. The firm crowds out the market to the extent that administrative control minimizes transaction costs (Kapelyushnikov 1998). The boundaries of the firm are defined by the boundary where the costs of market coordination are compared with the costs of administrative control (Kapelyushnikov 2007).

In the middle of the 20th century, when defining business strategies, firms relied on the following assumptions. The first assumption is the cost of added value declines by 20–30% for every doubling of the experience gained. The second one is labor productivity increases by 10–15% for every twofold increase in the total production output, or the so-called ‘experience curve effect’ expressed in the growth of a man-hour productivity, according to which the cost of labor reduces by 10–15% for every doubling of the experience gained (Henderson 1974).

Thus, in the middle of the last century, firms built their business strategies on the basis of a combination of economic measures aimed at achieving goals such as effect of economies from scale, minimizing transaction costs, reducing the cost of gaining added value as a result of increased experience, and increasing labor productivity as a result of

an increase in total production, etc. These goals were one of the most significant in the structure of goals that managers take into account when forming strategies in the middle of the last century. At this stage, the unit of economic analysis was the firm. Based on the transactional approach, a firm was considered as a set of contracts between an firm and external and internal counterparties (Kleiner 2008). At this stage, the researchers relied on theories such as profit maximization theory, entrepreneurial (schumpeterian) theory, contract theory.

In the mid-20th century, the development of the information technology sector led to disintegration processes in computer manufacturing (Baldwin and Clark 2000) and industrial production in general (Sturgeon 2002); see also (Jacobides et al. 2015; Bedakova 2016). At this stage, firms built their strategies based on the concept of value chains (see Porter 2016a). Porter showed, “how a narrow area of specialization can serve as a source of competitive advantage if the value chain is appropriately organized; <...> how a wide area of specialization can contribute to gaining competitive advantages if a company can correctly use the relationships between sections of the chain that serve various segments, industries, and even geographical areas” (Porter 2016a). Moazed and Johnson (2019), as well as Inshakov and Inshakova (2017) emphasize the importance of transaction costs as a factor in the formation of value chains. They note that the combination of various activities carried out by the company as part of the value chain in order to reduce transaction costs and increase the efficiency of the company, made it possible to solve the problem of strengthening its competitive position in the market. Noting that the combination of the elements of the value chain in a certain way was due to the goal of minimizing transaction costs in firm’s strategies, Moazed and Johnson conclude that a significant change in the volume of transaction costs leads to a break in the value chain or change in the combination of individual links value chains.

At this stage, the industry was considered as a system-forming unit of economic analysis. During this period, the methodology developed by Porter for analyzing industries and correspondingly building a business strategy dominated (Porter 2016b). The conceptual basis of this methodology is, as is known, a study of five competitive forces operating in the industry: threats of the appearance of substitute products on the market, threats of new players, threats of bargaining power of consumers, threats of bargaining power of suppliers and the level of competition in the industry. To challenge these forces, Porter defines three strategic approaches for competitive advantage. The strategy of absolute cost leadership is based on a cost-effective scale, reduction in experience-based costs, production control, and overhead expenses, and so on. The differentiation strategy of a product or service is focused on the creation of the product perceived by economic agents belonging to this industry as unique. The focusing strategy is concentrated on targeting a specific category of customers, buyers, type of product/service, or geographical sector of the market (Porter 2016b).

When constructing strategies, firms also took into account six sources of barriers noted by Porter to enter the industry, such as economies of scale, cost barriers not related to scale, capital requirements, access to wholesale and retail distribution channels, product differentiation, and government policy (Porter 2016b). Thus, at the end of the twentieth century firms built their business strategies on the basis of a combination of economic measures aimed at achieving goals such as achieving

leadership in costs, in particular, minimizing transaction costs by creating optimal value chains, and obtaining effect of economies from scale; cost reduction through the accumulation of experience, product differentiation, focusing on a specific category of customers, type of product/service or spatial sector of the market and others. At this stage, researchers relied on theories such as profit maximization theory, entrepreneurial (Schumpeterian) theory (Schumpeter 1934), contract theory (Coase 1937), revenue maximization theory (Baumol 1958), theory of maximizing firm value (Modigliani and Muller 1958), cognitive theory (Polanyi 1962), theory of maximizing the growth rate of firm (Marris 1963), behavioral theory (Cyert and March 1963), theory of X-efficiency (Leibenstein 1966), theory of maximizing of utility of manager (Williamson 1964), performer behavior management theory (“principal – agent”) (Jensen and Meckling 1976), the theory of positioning (in the industry, on the territory, in the administrative space) (Porter 1980) (the role of industry positioning), the theory of property rights (Grossman and Hart 1986).

3 Determinants of the Choice of Strategy by Firms in the Internet Era

In the 1990s, local and industry computer networks have been integrated into the worldwide network Internet. By that time, according to Moore’s law (see Kaku 2011), the power of computers had increased many times, the size of computer chips, and the cost of their production had decreased significantly.

As noted by Moazed and Johnson (2019), the development of the Internet has determined the influence on the formation of strategies of such significant factors as commoditization of computers (as a result, individuals’ access to computing power and technologies previously available only to large organizations, as well as the possibility of individuals creating added value at a new level); reduction in the cost of communication (this factor along with the factor of increasing the speed of information transfer led to the joint solution of complex problems by individuals at no additional cost); ubiquitous network access; increased profit as a result of economies of scale in the field of data analysis, the emergence of the possibility of understanding and using significant amounts of data in real time.

As noted by Benkler (2006), the reduction in the cost of computing, communication, and storage of information led to the following changes. The material means of producing information and culture began to belong to individuals, whose number is significant, namely, about a billion people around the world. In an industrial economy, the physical requirements for capital needed for output limited the ability to create products. In the network information economy, the physical capital used for production is widely distributed throughout society.

As noted by Moazed and Johnson, a significant increase in the speed of information processing, a decrease in the cost of transmitting and processing data by economic agents led to a sharp decrease in their transaction costs, which led at the end of the 20th century to the breakdown of some value chains. Due to the reduction in transaction costs, the need to create vertically integrated organizations has disappeared. Small-sized intermediary service providers have begun to “grab” individual links in the value

chain of traditional companies (Moazed and Johnson 2019). At the next stage, these small firms began to refuse to provide intermediary services and offer similar services on the market, the cost of which was lower than the cost of services provided by traditional firms. Thus, the value of the effect of economies from the scale in production has declined. At the next stage of technological development, a shift occurred in the sphere of creating added value – along with business, and consumers began to create economic value. Consumers began to transfer value created to other consumers. Decentralized networks of individuals today carry out some of the activities that vertically integrated companies previously engaged in. Thus, individuals who were previously consumers of products of firms of a traditional form of business turn into competitors of these firms (Moazed and Johnson 2019). This change led to a new significant decrease in transaction costs and further changes in value chains. If at the previous stage, as a result of a reduction in transaction costs, value chains fell apart, then at this stage, the links in value chains began to collapse (Moazed and Johnson 2019).

These changes led to the transformation of the business model of firms. At this stage, ecosystems began to carry out the function of creating economic value as a result of establishing and developing relations between external producers and consumers (in contrast to the firms of the traditional form of business, which created value in the process of production/provision of services within the framework of value chains).

At this stage, the ecosystem has become the unit of economic analysis. During this period, researchers relied on theories such as information theory (Aoki 1986), network society theory (Castels 1996–1998), resource-competence theory (Kleiner 2011), system economic theory (Kleiner 2013), and new sprouts of ecosystem theory (Jacobides et al. 2018; Kleiner 2018).

When analyzing an ecosystem, researchers focus on the symbiosis and co-evolution of the capabilities and abilities of ecosystem participants in the process of creating value. The analysis of ways to establish cooperation with firms that previously acted as competitors of the ecosystem is carried out. The central ecosystem firm establishes relationships with consumers of ecosystem products and supplements (firms providing additional goods and services), coordinates activities to meet the demands of ecosystem customers. Value is created as a result of ecosystem design and in the process of managing it (in particular, in the process of implementing the so-called alignment policy) in order to minimize the risks of implementing problems associated with ecosystem participants. Firms that provide additional goods and services, as well as to provide opportunities for co-creation of products. The capture of value can be carried out as a result of gaining control over critical assets in order to generate additional value (Jacobides et al. 2015; Karpinskaya 2018b).

4 The Concept of “inverted firm”

Strategies of platform-based ecosystems are designed to maximize the usage of the network effect when some users of ecosystem products/services create value for other users. In turn, this situation leads to expanding the number of ecosystem users and, as a result, an increase in the value created by it. The implementation of such strategies has

already led to high growth rates of firms belonging to the sectors of search engines, social networks, operating systems, e-commerce, and mobile technologies (Alstyne 2019). In the medium and long term, Alstyne predicts the dominance of firms from the sectors of architecture, automobile industry, financial, health, industrial Internet, and others.

Many firms of the Internet Era in designing strategies process are based on the concept of so-called an “inverted firm,” or a firm “turned inside out” (Alstyne 2019; Parker et al. 2016). This concept allows company managers to understand which firms in which industries will transform into ecosystems in the first place and how to construct a strategy for responding to such a transformation. Network effects cause a firm to move production outside its borders because of the higher speed of increase in the scale of network effects outside the firm compared to a similar indicator inside the firm. This fact is interconnected with the company’s customers outnumber its employees.

Based on the concept of an “inverted firm”, Alstyne identifies the reason for the high speed of platform-based ecosystem scaling. The placement of production by the firm beyond its borders allows the firm to have zero marginal cost. Companies such as Uber, which does not own its cars that provide service to taxi users, or Facebook, which does not produce its content, are not incurring the cost of production. So, they can scale as fast as they can involve partners.

At this point, the question of comparing the management of Uber’s fleet of vehicles with the management of property leased by any firm rises. The difference is in the costs associated with the use of these types of property. If Uber is not incurring the costs of driving a car, then the firm using leased property should make payments that are included in the cost of production.

One of the significant characteristics of platform type ecosystems with a high level of capitalization is a small number of employees. Such ecosystems in the value creation process use external labor, which is not a traditional workforce. This factor determines transformation in managing the structure of the firm, namely, from vertical integration management to open orchestration, i.e. management of the interaction of ecosystem participants (Alstyne 2019).

The goal of increasing the scale of value determines the firm’s support for users in creating value for other users, in particular in the form of providing them remuneration, which, in turn, also determines the need to move from vertical integration management to the open orchestration (Alstyne 2019).

The network effect means that the value created by the platform-based ecosystem grows by the usage of this value. In contrast, the value of products manufactured by a traditional firm decreases as a result of its use. Alstyne concludes that the value of the product/service supply from platform-based ecosystems (an increase in such value is based on positive feedback) exceeds the value of any static or decreasing supply (Jacobides et al. 2019).

Herein it is necessary to emphasize the difference between the value of products created by an industrial enterprise and the value created by a digital ecosystem, for example, in terms of risks for the population that open up in the process of creating value. As noted in Alstyne (2019), meeting the demand for applications, videos, and buying and selling goods in e-commerce markets by ecosystem users is safe for society. At the same time, the probability of a firm’s transforming into digital ecosystems in the

production of pacemakers or the operation of nuclear power plants causes high risks for the population. Firms operating in these areas implement vertical integration in order to guarantee quality control of products (Alstyn 2019).

In general, a linear business continues to create added value that is significant for the economy and society. At the same time, platform-based ecosystems create new socio-economic activity on a large scale and manage it from the center (Moazed and Johnson 2019).

Special consideration is required for the changes that have occurred in the coordination mechanism in firms of the Internet Era. The problem of the so-called “locality of knowledge” at this stage of technological development is leveled. In the middle of the last century, knowledge of circumstances existed, as Hayek emphasized, “only in the form of scattered particles of incomplete and often contradictory knowledge that all individual individuals possess”, and “... a way to make such knowledge as widely available to everyone as possible, this is exactly a problem for which we must find a solution” (Hayek 1945). If earlier, the coordination mechanism of economic activity within a traditional company was based on information about market prices, then the coordination mechanism carried out by companies at the present stage is based on different abilities. For example, it is based on the ability to collect and track a significant amount of detailed data on a significant number of transactions using technologies such as big data, wireless sensor networks, and others (Moazed and Johnson 2019). Today, it is possible to collect and transmit a variety of information on an almost unlimited scale around the world.

Moazed and Johnson conclude that the formation of platform-based ecosystems means the creation of markets controlled from the center. The ecosystem makes it possible for a significant number of firms and individuals to interact, but these interactions are managed by a certain central firm. The set of characteristics of ecosystems based on digital platforms includes characteristics of both traditional organizations and markets. In their opinion, the platform-based ecosystem is “a synthesis of Coase’s firm and Hayek’s market” (Moazed and Johnson 2019).

5 Conclusion

The main conclusion of the article is as follows. An increase in the speed of information handling, a decrease in the cost of computing, communication, information storage, data transfer and processing by economic agents in the Internet Era led to a sharp reduction in the volume of transaction costs of economic agents, and, as a result, the breakdown of some value chains and links in these chains. In the future, the creation of economic value not only by producers but also by consumers and transfer by the last ones the creating value to other consumers has resulted in a subsequent decrease of transaction costs volume, which, in turn, has contributed to the unification of producers and consumers into ecosystems. Platform-type ecosystems operate on the basis of the concept of an “inverted firm”, i.e. a company in which, due to network effects, production is located outside the company and external labor is used. These factors result in low production costs and zero marginal cost. Thus, the leadership of platform-based ecosystems in costs is a significant factor in crowding out traditional forms of business from the market.

In conclusion, we note the main directions of further research:

- an investigation of the full range of factors of the emergence, functioning, and elimination of ecosystems;
- an investigation of substitution elasticity of effectiveness factors of socio-economic ecosystems functioning;
- an investigation of the specifics of the development of platform, cluster, network and innovation ecosystems;
- the development of the theory of coordination of socio-economic ecosystems.

Acknowledgments. The research was accomplished with the support of the Russian Science Foundation (project No. 19-18-00335).

References

- Adner, R.: Match your innovation strategy to your innovation ecosystem. *Harv. Bus. Rev.* **84**(4), 98–107 (2006)
- Alstynne, M.: The opportunity and challenge of platforms. In: Jacobides, M., Sundararajan, A., Alstynne, M. (eds.) *Platforms and Ecosystems: Enabling the Digital Economy*. Briefing Paper, World Economic Forum. https://www3.weforum.org/docs/WEF_Digital_Platforms_and_Ecosystems_2019.pdf. Accessed 26 Sept 2019
- Alstynne, M., Parker, D., Choudary, S.: The network effect as a new engine of the economy. *Harv. Bus. Rev.* (2017). <https://hbr-russia.ru/management/strategiya/a18781>. Accessed 27 Sept 2019. (in Russian)
- Aoki, M.: Horizontal vs. vertical information structure of the firm. *Am. Econ. Rev.* **76**, 971–983 (1986)
- Aptekman, A., Kalabin, V., Klintsov, V., Kuznetsova, E., Kulagin, V., Yasenovets, I.: Digital Russia: a new reality, *Digital/McKinsey* (2017). <https://www.mckinsey.com/~/media/McKinsey/Locations/Europe%20and%20Middle%20East/Russia/Our%20Insights/Digital%20Russia/Digital-Russia-report.ashx>. Accessed 1 Oct 2019. (in Russian)
- Baldwin, C.Y., Clark, K.B.: *Design Rules: The Power of Modularity*, vol. 1. MIT Press, Cambridge (2000)
- Baumol, W.: On the theory of oligopoly. *Economica* **25**, 187–198 (1958)
- Bedakova, M.S.: *Management of Integration and Disintegration Processes of Industrial Enterprises and Complexes: Abstract of the Dissertation for the Degree of Candidate of Economic Science: 08.00.05 (place of defense – South-West state. un-t), Kursk* (2016). (in Russian)
- Benkler, Y.: *The Wealth of Networks: How Social Production Transforms Markets and Freedom*. Yale University Press, New Haven (2006)
- Castels, M.: *Information Age: Economy, Society and Culture*, vols. I–III, Blackwell Publishers, Oxford (1996–1998)
- Coase, R.H.: The nature of the firm. *Economica* **4**(16), 386–405 (1937)
- Coase, R.: *The Firm, the Market and the Law*. New Publishing House, Moscow (2007). (in Russian)
- Cyert, R.M., March, J.G.: *A Behavioral Theory of the Firm*. Prentice-Hall, Englewood Cliffs (1963)

- Evans, N.: Digital business ecosystem and platforms: 5 new rules for innovators (2016). <https://www.cio.com/article/3045385/digital-business-ecosystems-and-platforms-5-new-rules-for-innovators.html>. Accessed 8 June 2019
- Fuller, J., Jacobides, M.: The Myths and Realities of Business Ecosystem (2019). <https://sloanreview.mit.edu/article/the-myths-and-realities-of-business-ecosystems/>. Accessed 8 June 2019
- Grossman, S., Hart, O.: The costs and benefits of ownership: a theory of lateral and vertical integration. *J. Polit. Econ.* **94**, 691–719 (1986)
- Hayek, F.: The Use of Knowledge in Society. Site of the library of electronic literature (reprinted from *American Economic Review*, XXXV, no. 4, September, 1945) (1945). <https://litresp.ru/chitat/ru/%D0%A5/hajek-fridrih-avgust-fon/individualizm/4>. Accessed 8 Oct 2019. (in Russian)
- Henderson, B.: Examining the Experience Curve: Why Does It Work? The Site of the Publishing House “Mann, Ivanov and Ferber” (1974). <https://www.mann-ivanov-ferber.ru/assets/files/bookparts/004/B0.pdf>. Accessed 8 Oct 2019. (in Russian)
- Iansiti, M., Levien, R.: The Keystone Advantage: What the New Dynamics of Business Ecosystems Mean for Strategy, Innovation, and Sustainability. Harvard Business School Press, Boston (2004)
- Jacobides, M., Cennamo, C., Gawer, A.: Industries, ecosystems, platforms, and architectures: rethinking our strategy constructs at the aggregate level. Working Paper, London Business School (2015). <https://www2.uwe.ac.uk/faculties/BBS/BUS/Research/CENTIENT/ESRC%20seminar%204%20-%20UWE,%20Bristol/Michael%20G%20Jacobides.pdf>. Accessed 26 Sept 2019
- Jacobides, M., Cennamo, C., Gawer, A.: Towards a theory of ecosystems. *Strateg. Manag. J.* **39**(8), 2255–2276 (2018)
- Jacobides, M., Sundararajan, A., Alstynne, M.: Platforms and ecosystems: enabling the digital economy. Briefing Paper, World Economic Forum (2019). https://www3.weforum.org/docs/WEF_Digital_Platforms_and_Ecosystems_2019.pdf. Accessed 26 Sept 2019
- Jensen, M., Meckling, W.: Theory of firm: managerial behavior, agency cost and capital structure. *J. Financ. Econ.* **3**, 305–360 (1976)
- Inshakov, O.V., Inshakova E.I.: Technology platforms in Russian nanoindustry: problems and prospects of development. *Sci. J. Volgograd State Univ. Glob. Econ. Syst.* **19**(3(40)), 7–20 (2017). <https://doi.org/10.15688/jvolsu3.2017.3.1>
- Kaku, M.: *Physics of the Future: How Science Will Shape Human Destiny and Our Daily Lives by the Year 2100*. Doubleday, New York (2011)
- Kapelyushnikov, R.I.: Theory of Transaction Costs (1998). <https://www.libertarium.ru/10623>. Accessed 4 Oct 2019. (in Russian)
- Kapelyushnikov, R.I.: Ronald Coase, or creation of markets. In: Coase, R. (ed.) *The Firm, the Market and the Law*, pp. 202–219. New Publishing House, Moscow (2007). (in Russian)
- Karpinskaya, V.A.: Ecosystem as a unit of economic analysis. In: Kleiner, G.B. (ed.) *System Problems of the Domestic Meso-economics, Microeconomics, Enterprise Economics: Materials of the Second Conference of the Department for Modeling Production Facilities and Complexes of the CEMI RAS, Moscow, 12 January 2018, vol. 2*. CEMI RAS, Moscow (2018a). (in Russian)
- Karpinskaya, V.A.: On the question of units of economic analysis: ecosystem, platform, network or cluster? In: Bazhenova, E.Yu. (ed.) *Interdisciplinarity in Modern Socio-Humanitarian Knowledge – 2018 (Academic World and the Problems of the Digital Society Formation): Materials of the Third International Scientific Conference, T. 3/Southern Federal University, Rostov-on-Don, 20–22 September 2018, pp. 33–45*. Publishing House of the Southern Federal University, Rostov-on-Don (2018b). (in Russian)

- Kleiner, G.B.: Enterprise Strategy. Publishing house ANH “Delo”, Moscow (2008). (in Russian)
- Kleiner, G.: The resource-based view and the system organization of economy. *Russ. Manag. J.* **9**(3), 3–28 (2011). (in Russian)
- Kleiner, G.: System economics as a platform for development of modern economic theory. *Voprosy Ekonomiki* (6), 4–28 (2013). <https://doi.org/10.32609/0042-8736-2013-6-4-28>. (in Russian)
- Kleiner, G.B.: Socio-economic ecosystems in the light of system paradigm. In: *System Analysis in Economics – 2018: Proceedings of the V International Research Conference, Biennale*, 21–23 November 2018, pp. 3–13. Prometheus Publishing House, Moscows (2018)
- Leibenstein, H.: Allocative efficiency vs. “X-efficiency.” *Am. Econ. Rev.* **56**, 392–415 (1966)
- Marris, R.: A model of the managerial enterprise. *Q. J. Econ.* **7**, 185–209 (1963)
- Moazed, A., Johnson, N.: Platform. The Practical Application of a Revolutionary Business Model. Alpina Publisher, Moscow (2019). (in Russian)
- Modigliani, F., Muller, M.H.: The cost of capital, corporation finance and the theory of investment. *Am. Econ. Rev.* **48**, 261–297 (1958)
- Moore, J.: Predators and prey: a new ecology of competition. *Harv. Bus. Rev.* **71**(3), 75–86 (1993)
- Parker, G.G., Alstyne, M.W., Choudary, S.P.: Platform Revolution. How Networked Markets Are Transforming the Economy — And How to Make Them Work for You. W. W. Norton Company, New York (2016)
- Polanyi, M.: *Personal Knowledge – Towards a Post-Critical Philosophy*. Routledge & Kegan Paul Ltd., London (1962)
- Popov, E., Konovalov, A.: Assessment of institutional effects in the field of economic information. *Montenegrin J. Econ.* **5**, 59–66 (2007). (in Russian)
- Porter, M.: Competitive advantage: Creating and Sustaining Superior Performance. Alpina Publisher, Moscow (2016a). (in Russian)
- Porter, M.: Competitive Strategy: Techniques for Analyzing Industries and Competitors. Alpina Publisher, Moscow (2016b). (in Russian)
- Porter, M.: Competitive Strategy: Techniques for Analyzing Industries and Competitors. Free Press, New York (1980)
- Shumpeter, J.: *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle*. Transaction Publishers, New Brunswick (1934)
- Sturgeon, T.: Modular production networks: a new American model of industrial organization. *Ind. Corp. Change* **11**(3), 451–496 (2002)
- Wallis, J., North, D.: Measuring the transactional sector in American economy, 1870–1970. In: Engerman, S.L., Gallman, R.E. (eds.) *Long-Term Factors in American Economic Growth*. University of Chicago Press, Chicago (1986)
- Williamson, O.E.: *The Economic Institution of Capitalism: Firms, Markets, Relational Contracting*. Lenizdat, CEV Press, Saint Petersburg (1996). (in Russian)
- Williamson, O.: *The Economics of Discretionary Behavior: Managerial Objectives in a Theory of the Firm*. Prentice-Hall, Englewood Cliffs (1964)