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Using digital platforms for strategic development of industrial companies

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Abstract
Digital platforms significantly transform the activities of industrial companies opening up wide opportunities for increasing labor productivity in the organization and the level of cooperation between various companies in creating value for the consumer, including innovations, entering new markets among which are also foreign ones. At the same time, the level of use of digital platforms for the designated purposes varies. This article will consider the advantages of using digital platforms for enterprises, and also determine the level of use of digital platforms for the purposes outlined above among Russian industrial companies.

Keywords: digital platforms, cooperation, digital transformation, end-to-end technologies, labor productivity, industrial companies.

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Introduction
The formation of a platform economy is one of the key results of the introduction of digital technologies that are transforming the traditional market model. Companies based on digital technologies, including digital platforms, demonstrate significantly greater productivity. Thanks to this, such organisations can grow exponentially, successfully adapt to external conditions, capturing new markets [Exponential Thinking.., 2021].

According to one of the definitions, a digital platform is “a system of algorithmic mutually beneficial relationships between a significant number of independent participants in an economic sector (or field of activity) carried out in a single information environment, leading

to a reduction in transaction costs through the use of a package of digital technologies for working with data and changing the separation system labor" [Strategy of digital transformation.., 2021].

Companies can take three approaches in relation to the use of digital platforms. The first is that an organisation deliberately refuses to use them, which may be due to the characteristics of the industry / market in which it operates. Such a strategy may be due to a small number of customers.

The second approach is characterised by the fact that the organisation uses an existing platform, ready-made solutions for its own tasks. These include, for example, the use of the platform as one of the distribution channels for products, the search for partners to solve various business problems. The advantages of this approach are that the organisation bears less risk and invests less to enter the platform compared to the third approach, when the company acts as the owner or provider of the platform, that is, it creates a platform for solving business problems based on data/information received from intelligent products, equipment capable of data exchanging.

The approach taken by a company is determined by the goals it pursues. The first section of this study identified the key benefits driving the adoption of digital platforms by industrial enterprises. The methodology of the study is given below, followed by the results obtained.

1. Key benefits of using platforms for industrial enterprises

The attractiveness of platforms for user companies is determined by the set of tasks that it allows to solve. Firstly, acting as a technological basis for performing various functions, for example, in the field of organising production, marketing activities, resource management activities, etc. Secondly, acting as an intermediary in

Table 1
Benefits from the participation of industrial companies in ecosystems created by digital platforms

Benefits from being part of the business ecosystem	Definition	Authors
New business opportunities	The digital business ecosystem provides its members with new business opportunities	[Hein et al., 2020; Cozzolino et al., 2021]
Co-creation of value	Co-creation of value, which can be accompanied by improved process efficiency through the use of best practices	[Hein et al., 2020; Silva et al., 2021; Sun, Zhang, 2021]
Increasing innovation potential	The innovative potential of the company is enhanced by the impact of other types of innovation	[Helfat, Raubitscheck, 2018; Jovanovich et al., 2021; Barile et al., 2022]
Gaining a competitive advantage	An efficient business ecosystem gives a competitive advantage to all participants and creates barriers to entry for competitors	[Sun, Zhang, 2021]
Gain access to additional resources and knowledge	Solving the problem of limited resources within one company	[Garcia et al., 2022; Suurenen et al., 2022; Ko, Amankwah-Amoah, 2022]
Cost and risk management	Business ecosystem reduces costs and risks when participants cooperate to develop the innovations and solutions the business needs	[Greve, Song, 2017; Garcia et al., 2022; Suurenen et al., 2022]
Provides modularity to meet customer needs	Modularity gives more options to meet customer needs	[Jose, Tollenaere, 2005; Sun, Zhang, 2021]

the market, reducing transaction costs, simplifying the interaction between various market participants [Schreieck et al., 2016]. In this regard, digital platforms become the basis for the formation of ecosystems, the benefits of participating in which are reflected in Table 1.

At the same time, there are a number of criteria that determine the readiness of enterprises to participate in the digital platform or implement it in their activities. These include, in addition to the functionality of the platform and a set of critical mass, a number of important components:

- work on the platform of major players in the target market for an enterprise;
- geographical coverage exceeding the territory of one region/country;
- the number of participants who initiated the work of the platform and the status of these participants;
- reliability and security of the platform.

A study conducted at the Financial University in 2022, which was devoted to the study of the effects, stimulating the technological development of industry, including through digitalisation, showed that, despite the widespread discussion of the benefits that companies receive as a result of the use of digital platforms, openness issues are an important limitation of their use and integration opportunities [Scenario modeling.., 2022].

The reasons for this limitation are related to the fact that in many large industrial enterprises the process of automation was gradual, as a result of which programs are often used that may be incompatible with each other, the data collected on the equipment is heterogeneous, which leads to difficulties in their consolidation and processing. As a result, the implementation of platforms in enterprises is slow, gradually affecting the processes of different levels, the speed of implementation of platforms can also be different even within enterprises of the same holding. In this regard, the compatibility of the platform with the software of various providers is one of the conditions for accelerating the adoption of digital platforms.

Another factor important for using the platform is to ensure the safety of data and their confidentiality. Despite the fact that in a platform economy, competitors can also be considered as partners in creating value, representatives

Table 2
Characteristics of enterprises to determine the propensity to adopt platforms

Mature companies	Developing companies
The organisation has specialised divisions/departments dealing with asset management (e.g. procurement)	Unstructured and limited resources requiring cross-functional roles to manage multiple processes and activities
Standardised business processes and activities	Non-standardised business processes
Strong position in the market	An unstable position in the market, as a result of which the organisation seeks to diversify
Established network of suppliers and customers. There is a network of partners with whom the company is ready to conclude an agreement in case of a need for resources	Supplier and customer networks are under development
The selection of a supplier takes place in accordance with predetermined criteria and procedures	Supplier selection is largely based on project specific criteria (e.g. expertise, product specification).
The organisation has strategic partners with whom cooperation has been established	May have strategic partners, but mostly contracts for a specific project.
The company has effective communication channels (for example, IT systems) with suppliers/clients/partners	Limited resources to invest in efficient communication channels.
The organisation ensures information security of data using internal resources	Limited resources for solving business security problems and a large need for external service providers.

Источник: [Arica, Oliveira, 2019].

of Russian companies in the study noted a lack of trust and unwillingness to exchange data for the joint development of products and innovations.

At the same time, some authors note that the companies' own characteristics also play an important role for the participation of industrial companies in the ecosystems created by platforms. For example, the authors [Arica, Oliveira, 2019], based on the analysis of 34 companies from five European countries, identified two groups of enterprises characterised by different propensity to adopt platforms used for asset exchange within the sharing economy. The first group - mature enterprises - is characterised by a lower inclination to use platforms for their activities. The second group - developing enterprises - on the contrary, shows a greater willingness to implement and use platforms. A more detailed description of the groups is presented in Table 2.

At the same time, the authors of the study note that the digital platform is also designed to reduce the risks associated with the interaction of various companies. The risks that digital platforms should mitigate include:

- the risk of choosing an unscrupulous buyer/supplier, which is associated with the limited time and resources that the organisation can allocate for their search;
- lack of accurate information about the capabilities and experience of the supplier/contractor;
- limited choice/options of known suppliers for a specific need;
- lack of transparency on the part of the supplier and the risk of failure in business relationships with the client, especially in the case of unbalanced power relations, when a mature company has a significant share of the supplier's market;
- Uncertain results due to lack of previous experience with a particular partner.

At the same time, platforms have a significant potential for the development of the organisation. In 2020, Deloitte partnered with MAPI to conduct a study that included an online survey of 850 industrial executives in North America, Europe, Asia, and interviews with 30 industrial executives that revealed why organisations are still moving towards digital platforms in their activities [Smart manufacturing ecosystems.., 2020].

The results of the study showed that the two main reasons that explain the interest of industrial enterprises to enter into platform-based cooperation and form an ecosystem are the ability to increase the speed of development and launch of new products and services, as well as the ability to increase the amount of revenue received from the sale

Table 3
Characteristics of the sample of industrial companies

Characteristics of companies in the sample	Number of companies	Share of companies (%)
Ferrous and non-ferrous metallurgy	37	24
Food industry	27	17
Mechanical engineering and metalworking	25	16
Chemical and petrochemical industry	40	25
Forestry, woodworking and pulp and paper industry	11	7
Building materials industry	16	10
Company lifespan		
from 1 year to 10 years	53	34
11 years and over	104	66
Average headcount		
no more than 500 people.	50	32
501 people and more	107	68

Source: compiled by the author.

of products, services, including the provision of additional services. The third reason, important for industrial companies, is the reduction of operating costs, achieved by improving the efficiency of business processes.

The benefits obtained by foreign companies are also important for Russian companies. This study identifies four key goals for which Russian industrial companies can use digital platforms. The objectives of the study were to determine whether the use of digital platforms really makes it possible to achieve growth in the performance of enterprises, and to identify the features of their use.

2. Research methodology

The research methodology included a survey using questions divided into four blocks:

1) the use of digital platforms to stimulate the export of products of Russian industrial companies;
2) the use of digital platforms to increase labor productivity;
3) the use of digital platforms to increase the level of cooperation between Russian enterprises;
4) the use of digital platforms to integrate Russian manufacturers into global supply chains.

The period of the study: March - July 2022. The database of companies was formed according to the Ruslana database. A total of 157 companies took part in the survey. Table 3 shows the characteristics of the sample of enterprises that took part in the survey.

The experts were asked to answer questions using a Likert scale from 1 to 7, where 1 - platforms are not used, 7 - the company has a team of employees who develop / support the digital platform used to achieve the stated goals, while the digital platform is integrated into business processes, comprehensively covers the entire company.

The study determined the impact of the use of digital platforms on the resulting indicators:

- performance results (Yi1): sales proceeds;
- performance results (Yi2): breadth of the product range;
- performance results (Yi3): change in the number of outlets;
- performance results (Yi4): foreign trade turnover;
- performance results (Yi5): labor productivity;
- platform coverage dynamics (Yi6): change in the number of business partners;
- subjective perception of performance (Yi7): position relative to competitors;
- Dynamics of the quality of relations with partners (Yi8): change in the number of contracts.

Table 4
Factors of “Stimulating the export of Russian industrial products” block

Composite variable	Elements	Composite reliability	Factor load
Stimulating the export of Russian industrial products	The company uses foreign platforms to match foreign buyers	0.821	0.923
	The company uses the platform to search for firms that provide legal support when entering foreign markets		0.717
	The company uses the platform to search for firms that provide agency services when entering foreign markets		0.682
	The company uses platforms to search for information related to the specifics of the external market and its features		0.870
	The company uses digital platforms to gain access to distribution channels and select foreign marketplaces		0.813
	The company uses specialised platforms to search for information about the required export documentation		0.757
	The company uses specialised platforms to participate in export support programs		0.701

Source: compiled by the author.

Table 5
Factors of "Labor productivity improvement" block

Composite variable	Elements	Composite reliability	Factor load
Increased labour productivity	The company uses the platform to ensure the process of technical inspection and repair	0.738	0.713
	The use of the platform has reduced production losses (downtime)		0.627
	The use of the platform allowed to reduce production losses (material overrun)		0.734
	The use of the platform allowed to reduce production losses (defective products)		0.835

Source: compiled by the author.

Table 6
Factor loads of "Integration of Russian manufacturers into global supply chains" block

Composite variable	Elements	Composite reliability	Factor load
Integration of Russian manufacturers into global supply chains	The company, using the platform, increased the number of suppliers in the foreign market (as a result of integration into global production chains)	0.717	0.828
	The company, using platforms, increased the number of buyers in the foreign market		0.836
	The company, using the platform, increased the offer in terms of additional services		0.817

Source: compiled by the author.

Table 7
Factor loads of "Increasing the level of cooperation between Russian enterprises" block

Composite variable	Elements	Composite reliability	Factor load
Increasing the level of cooperation between Russian enterprises	Over the past 2-3 years, cooperation between enterprises using digital platforms has increased the share of new products in the total output	0.729	0.679
	Cooperation with the use of the platform has reduced the time to market for new/ innovative products		0.821
	The company uses platforms to communicate with partners		0.717
	Increasing the transparency of business processes using the company's platform has increased its attractiveness for partners		0.734
	The company uses platforms to implement/ensure sales of personalised products		0.872
	Cooperation with the use of platforms made it possible to simplify the process of finding trustworthy partners		0.813

Source: compiled by the author.

For each resulting indicator, regression models were formed, the general view of which is presented as follows:

$$y = \beta_0 + \beta_1 \times x_1 + \ldots + \beta_n \times x_n, \quad (1)$$

where y is the resulting indicator, β_1 is the non-standardised coefficient, x_1 and x_n are independent variable indicators.

3. Statement of hypotheses

To achieve the objectives of the study, five hypotheses were put forward.

Hypothesis 1. There is a positive relationship between the use of digital platforms and the achievement of foreign economic activity results.

The internationalisation of a company is one of the conditions for the development of a company. At the same time, access to resources in other countries and a high level of competition contribute to optimising the implementation of the company's business processes, increasing the efficiency of its activities and the quality of products. The result may be an increase in the diversification of the company, an increase in the occupied market share, and the development of the existing market.

Entering foreign markets involves a number of difficulties, for example, the need to build supply chains from scratch, search for customers, the unknown brand of the company, search for partners / contractors, the need to take into account legal restrictions and regulatory features in a particular country. In this regard, industrial companies can use platforms that reduce uncertainty and offer services for analysing barriers to entry into a target foreign market, aggregate information about legal features (the need for licenses, permits, etc.), and also provide information on customs regulation , sanctions restrictions. An example of one of these platforms is the platform of the Export Center of Russia, where companies can consult on the implementation of export activities, provide training for employees and advanced training necessary for the implementation of export activities, obtain information on financial and credit support, etc.

To test the hypothesis, the factors shown in Table 4 were used.

Hypothesis 2: There are positive relationships between the use of digital platforms and increased productivity of the organisation's staff.

Productivity is one of the key elements that determine the competitiveness of an organisation. Digital platforms, increasing the transparency of the company's business processes, optimising the execution and control of production processes, auxiliary functions, contribute to increased productivity. In this regard, digital platforms can bring many advantages for Russian companies. According to some reports, today the productivity of Russian enterprises is two to three times lower than that of foreign companies, which is one of the reasons for their lagging behind in the competition.

There is a certain productivity limit, below which the enterprise is not able to engage in export activities [Simachev et al., 2022]. In this regard, we can say that the

Table 8
Use of digital platforms by Russian industrial companies (% of companies using digital platforms for a given criterion)

Criterion	Level 1	Level 2	Level 3
The platform is used to interact with other businesses	12		
The platform is used to ensure interaction within one group of enterprises			78
The platform is used to increase productivity			83
The platform is used to search for suppliers in foreign markets		46	
The platform is used to find clients in foreign markets		56	
The platform is used to receive consulting services when entering foreign markets	38		
The platform is used to access distribution channels in the foreign market		54	

Source: compiled by the author.

low level of productivity limits the company's ability to expand its export activities.

To determine the degree of achievement of goals as a result of the use of platforms that improve productivity in the enterprise, the factors from Table 5 were used.

Hypothesis 3. Digital platforms facilitate the integration of Russian manufacturers into global supply chains.

Digital platforms can be an effective tool for companies to enter the international market. According to [Cozzolino et al., 2021], one of the main reasons for producers to participate in digital platforms is access to advanced technologies and solutions that make it easier to distribute their products. This is facilitated by the simplification of the search for customers and partners in the global market, and the reduction of transaction costs. In this regard, it has been suggested that digital platforms can increase the integration of Russian manufacturers into global supply chains. The factors that characterise this block are presented in Table. 6.

Today, the platformisation of the economy and the formation of platform-based ecosystems are intensifying both competition and cooperation between companies [Cozzolino et al., 2021]. For example, open innovation platforms are seen as a new generation of co-creation spaces that allow participants in the innovation ecosystem to interact with each other [Rho et al., 2020], which helps to increase their joint innovation potential. The result is an acceleration of the process that develops new products, bringing them to the market and increasing the number of developments.

In this regard, the following hypotheses were put forward:

Hypothesis 4. The use of digital platforms has a positive effect on increasing the share of new products.

Hypothesis 5: There is a positive relationship between the use of digital platforms and the increase in partnerships with other organisations.

To test the hypotheses for each of the blocks, control questions were developed, presented in Table 7.

4. Research results

The results of the study showed that companies that use digital platforms to enter and work in foreign markets, in most cases, showed the achievement of the goals of foreign economic activity. At the same time, it should be noted that the use of foreign sites is more preferable when operating in a foreign market than the use of our own site for product distribution.

The advantage of foreign platforms is that export platforms that allow Russia to trade in foreign markets also provide access to B2B and B2C marketplaces of the country of presence, trade support (work with claims, marketing administration, trilateral negotiations, support in processing transactions), help to ensure optimal logistics, hold year-round product exhibitions to attract more customers. Thus, Hypothesis 1 was confirmed.

The next hypothesis related to the connection of digital platforms and productivity increase is also confirmed. At the same time, exporting enterprises almost always use digital technologies that optimise production activities, which indirectly confirms that a higher level of competition stimulates productivity and the desire of the organisation to adopt digital technologies.

Hypothesis 3, which allows to assess the impact of digital platforms on increasing integration into global supply chains, was also generally confirmed. It should be noted that the impact on economic performance indicators for 2021 was assessed - the imposition of sanctions distorted the overall picture of the effectiveness of the use of platforms. According to the Russian Export Center, only due to the purchasing power in the countries of the European Union, the number of sales of products decreased by 35%. However, today there is a change in routes, the development of digital platforms and platforms that allow entering the Asian market, for example, some enterprises have attempted to deliver goods from the EU to Russia through Uzbekistan or Iran[1].

According to the results of the analysis, it was revealed that, despite the fact that for foreign industrial companies, as noted above, one of the main reasons for using digital platforms is the development of new products, including jointly with partner companies, for Russian companies hypotheses 4 and 5 were not confirmed. This leads to the conclusion that companies are more inclined to develop innovations on their own, relying on their own resources.

Based on the analysis, it was assessed for what purposes Russian companies use digital platforms to a greater extent. The results of the analysis, which reflect the percentage of use of each platform type, are presented in Table 8, where the numbers are the percentage of companies from the sample that use digital platforms according to the given criterion.

In general, according to the results of the study, we can say that the use of digital platforms among Russian industrial companies cannot be unambiguously attributed to any one level. Although many enterprises use digital platforms to enable interaction within the same group of companies, as well as to increase labor productivity, there is still a small percentage of those companies that turn to platforms for interaction with other enterprises (this does not include supplier-to-consumer" interaction), as well as to receive consulting services when entering

[1] Official website of the Export Center. https://www.exportcenter.ru/.

foreign markets. At the same time, half of the surveyed organisations use platforms to cooperate with suppliers and customers in foreign markets.

Conclusions

Digital platforms today are one of the drivers that enhance the competitiveness of industrial companies. The potential of platforms allows enterprises not only to increase productivity, but also to simplify the process of entering foreign markets. The analysis showed that the goals pursued by foreign and Russian enterprises using platforms, despite the similarity, still differ in priority. Thus, the analysis of the literature showed that foreign companies are more often focused on building ecosystems for the joint creation of innovations and products. At the same time, as shown by the results of an empirical study, Russian industrial companies are more focused on increasing productivity and ensuring interaction within one group of enterprises. Platforms are also actively used to attract customers and partners.

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