

DIGITAL PLATFORM FOR MANAGING ENTERPRISES' BUSINESS PROCESSES IN AN INNOVATIVE ECONOMY

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ABSTRACT

The aggravation of the international political situation throws new challenges to industrial enterprises operating in the export-import sector; in light of this, the need to develop effective work methods in the current situation is most acute. The article discusses various approaches to the organization and management of business processes for industrial enterprises whose main activity largely depends on export-import operations. In the context of digitalization, the approach itself is to organizing export-import activities is primarily aimed at reducing the costs of ineffective organizational measures and avoiding critical errors in creating the management system base. As a basis for creating the scheme for managing export-import activities, the article proposes to consider the approach of using a digital platform based on a single window. The proposed method of work focuses not only on creating a mechanism for a particular enterprise but also on the design and organization of the system's core, participation in which will be beneficial to all interested parties.

Keywords: *Business Process Simplification; Digital Platform; Electronic Document Management; Export-Import Operations; Single Window Technique.*

1. INTRODUCTION

The realities of the time, dictating new rules for the formation and management of business processes to the economic environment, predetermined the special conditions for the functioning of industrial enterprises in the digital economy [4; 6; 17; 18].

Prokopyshyn [19] and Pyroh et al. [20] mention that in the intensification of the processes of international transfer of goods and services, the issue of organizing and managing business processes export-import operations becomes exceptionally acute.

Many scientists [9; 10; 24] point out that the need to focus on the study of the processes of functioning and management of export-import

operations of industrial enterprises is determined by the critical problems of the management process in the context of the digitalization of the economy:

- the complexity of export-import operations in the implementation of project deliveries of industrial products, which are characterized by non-standard weight and size characteristics, unique design and high cost;
- the absence of industrial enterprises – small and medium-sized entities business own organizational and economic resources and competencies for implementation of these operations;
- fragmentation and lack of integration of digital public services in the field of regulation and administration of export-import activities, as a result of which at the moment there is still a need for paper

documents and duplication of procedures for their processing in various bodies.

These problems generate time losses to ensure the required procedures, which leads to an increase in additional costs for industrial enterprises.

It is difficult to overestimate the importance of optimizing the processes of export-import activities themselves to strengthen the competitive advantages of an industrial enterprise in the context of the digitalization of the economy. At present, the expansion of its activities in international markets is the key condition for maintaining a high level of profitability of an industrial enterprise. Against this background, additional obstacles may be the aggravation of international relations, which increase the degree of riskiness of dependence on export-import activities, and in fact, encourage enterprises to maximize the list of their international partners to reduce possible losses from potential sanctions in the event of a deterioration in the political situation.

The theory of modern management of business processes of an industrial enterprise suggests the need to optimize them to achieve the maximum economic effect. The very essence of export-import operations predetermines both high risks and additional costs for supporting each transaction; however, diversification of sales markets and access to the international level promises a high level of potential profit, coupled with free access to advanced technologies. The digitalization of the economy carries both additional risks for the enterprise and provides new opportunities, which is why it is essential to choose the right approach to the process of transition to new economic realities.

2. METHODOLOGY

2.1 Managing The Export-Import Activities Of Industrial Enterprises Through Implementing The Concept Of The Platform Economy

Considering approaches to the implementation of business process management in the digital transformation of the economy, special attention should be paid to the study of combining the concept of "platform as a service" and the approach of

integrating public-private partnerships [11; 16; 22]. From an import/export management standpoint, this synergy will leverage the strengths of both concepts while addressing their inherent challenges.

The essence of the concept of "platform as a service" is based on the mechanism for forming the composition of participants and developing the organizational structure of a digital platform that creates and manages export-import operations through a phased algorithmization and integration of the processes of foreign trade activities of industrial enterprises with the services of government bodies and commercial infrastructure organizations-contractors.

Industrial enterprises, platform participants outsource their main and supporting export-import business processes to a provider company that provides various services from various infrastructure organizations registered and certified on the platform [3]. There may be customs brokers, logistics operators, financial and credit institutions that will provide outsourcing and simplification of related procedures for export-import operations of industrial enterprises among the participating counterparties.

On the other hand, the concept of public-private partnership makes it possible to implement investment projects in the field of export-import infrastructure, thanks to which the state gets the opportunity to compensate for the lack of budgetary funds and gain access to advanced competencies and technologies. Business structures receive preferences in terms of the implementation of fixed-income investments under state guarantees in long-term projects.

In the context of the increasing digitalization of economic systems, the essence of the proposed approach to managing the processes of import-export activities of industrial enterprises is to create an industry-specific digital platform that serves as the basis for organizing and coordinating the interaction of industrial enterprises with public administration institutions and commercial infrastructure counterparty organizations. A schematic diagram of such a digital platform is shown in Fig.1.

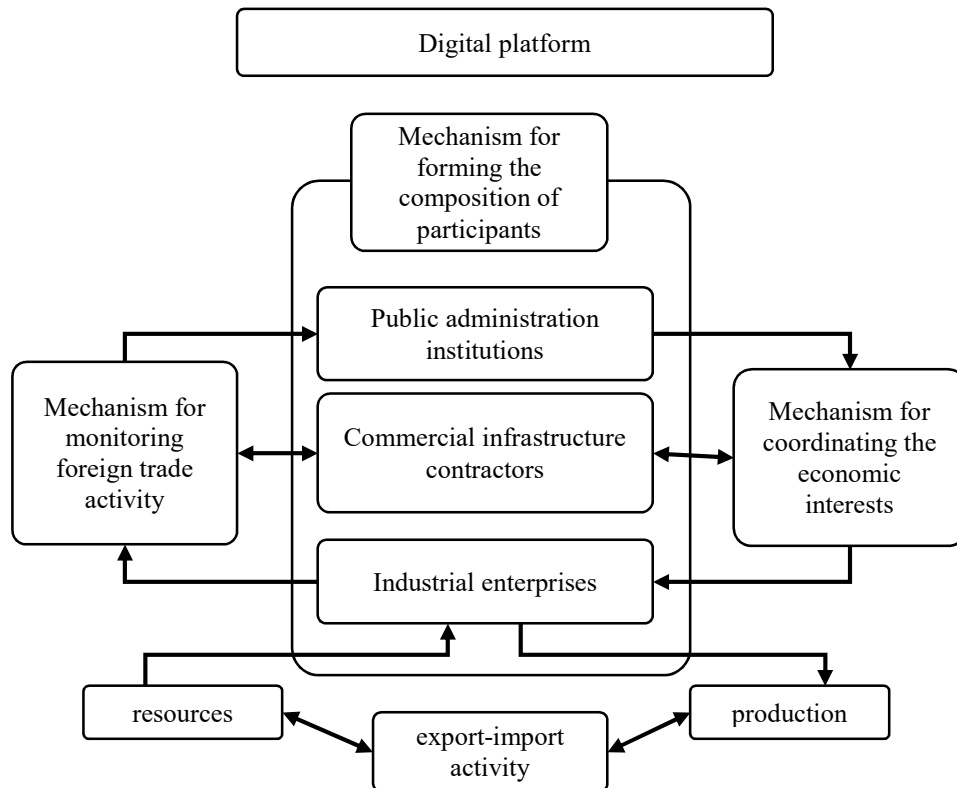


Figure 1: Scheme Of A Digital Platform For Managing The Export-Import Activities Of Industrial Enterprises

At its core, the critical element of the system is an industrial enterprise, which is a subsystem that transforms production resources (both imported and obtained on the domestic market) at the entrance to industrial products sold both on the domestic market and exported.

$$P = p(R, R, G, C, W) \quad (1)$$

where R is the resources required by an industrial enterprise, P is the finished product manufactured by an industrial enterprise, G is the control action from the side of public administration institutions, C is the control action from the infrastructure of commercial counterparties, W are the parameters of the digital platform and its environment.

The management system is based on a two-level hierarchical system, which includes state management institutions and commercial infrastructure organizations. Several dependencies describe the functioning model of this system.

$$Y = f_1(X, W); Y_2 = f_2(X_2, W); Y_3 = f_3(Y_2, X_2, W) \quad (2)$$

where X are indicators of the state of an industrial enterprise, X_2 are indicators of the state of commercial counterparties, W are indicators of the state of the digital platform and the external environment.

The digital platform for managing export-import activities is defined as a system of algorithms for the interaction of industrial enterprises with state management institutions and commercial infrastructure counterparty organizations, the purpose of which is to reduce transaction costs in the implementation of export-import trading activities. The implementation of the functionality of the digital platform for the implementation of the functions of organizing and managing export-import activities is planned to be carried out through the formalization and algorithmization of procedures, the definition of rules and conditions for the implementation of critical processes in the following main types of interactions:

- interaction of industrial enterprises with government agencies, in the business-to-government segment (Business-to-Government, B2G);
- interaction of industrial enterprises with commercial counterparties in the business-to-business segment (Business-to-Business, B2B);

• interdepartmental and interstate interaction in the government-to-government (G2G) segment [1; 21].

Analyzing the works of scientists [2; 5], the mechanism for the functioning of the digital platform is supposed to be formed based on an approach to the institutional management of the processes of export-import activities of industrial enterprises, using the experience of creating and

developing multifunctional platforms in the corporate and public sectors of administration.

The primary stage in creating the platform will be forming the organizational structure and determining the composition of the participants in the digital platform. The main stages of forming and developing a digital platform for managing export-import activities are presented in Fig. 2.

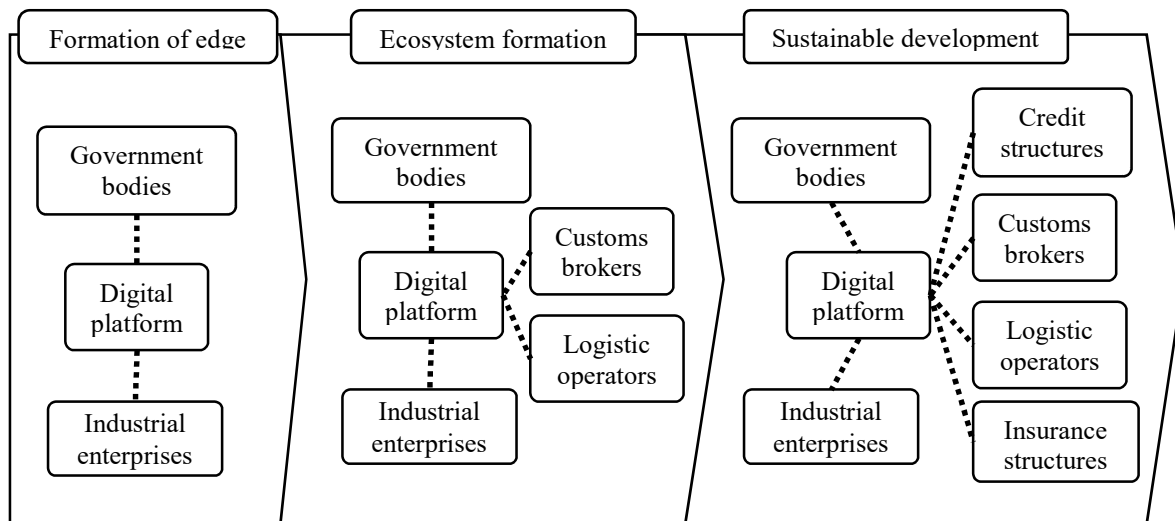


Figure 2: Scheme Of The Formation And Development Of A Digital Platform For Managing The Export-Import Activities Of Industrial Enterprises

The stages of development of a digital platform for supporting and managing the export-import activities of industrial enterprises can be divided into three main stages:

The stage “*Formation of edge*” – this process includes the creation of a basic regulation for the functioning of a digital platform to ensure the interaction of industrial enterprises with various government structures, ensuring the creation of the B2G segment.

The stage “*Ecosystem formation*” – involves the implementation of several measures to expand the functionality of the digital platform through integration and certification on the platform of the leading infrastructure counterparty organizations that provide commercial services for the implementation of export-import activities, such as customs brokers and logistics operators, while ensuring the creation segment B2B.

The stage “*Sustainable development*” implies further expansion of cooperation between platform participants in the B2B segment through horizontal integration with infrastructure organizations in the

economy's financial sector – credit institutions, insurance, factoring, and leasing companies. In addition, at this stage, it is advisable to organize the formation of a supranational G2G segment by organizing interaction with government agencies of foreign states.

It should be noted that the prerequisites for the economic efficiency of the digital platform project and its participants are laid at the initial stage of the core formation. The key goal is to reduce the transaction costs of industrial enterprises and public administration institutions by improving and simplifying the procedures for controlling export-import operations, along with increasing the efficiency of interaction between various state structures of control and management.

2.2 Implementation Of The Mechanism For Managing The Export-Import Activities Of Enterprises Through A Digital Platform Through The Concept Of "Single Window"

Achieving the primary goal of the functioning of the digital platform – improving the quality of management of export-import business processes of

industrial enterprises, is supposed to be carried out by implementing the concepts of a single window and public-private partnership.

Analyzing the activities of such structures in the era of digitalization of economic systems, we can conclude that the acceleration and simplification of business processes through the introduction of information technologies is a crucial aspect of scientific and technological progress and the success of economic adaptation to current conditions.

The introduction of the single-window concept demonstrates the acceleration and simplification of the processes of information interaction between industrial enterprises engaged in export-import activities and public administration institutions.

Increasing the efficiency of data exchange between information systems of supervisory and regulatory bodies of state administration improves the availability of information, increases the efficiency of organizational and legal tools for implementing state policy in the field of foreign economic activity, and also, albeit slightly, but reduces the level of bureaucratization of state structures. At the stage of forming the core of the

digital platform, the critical task is to ensure effective paperless interaction between all participants in this system; in addition, it is necessary to lay the foundations for ensuring secure interdepartmental interaction between state bodies at the national and supranational levels.

The concept of a single-window as a mechanism for information interaction, as a rule, involves the creation of an information system based on the principles of a one-time provision of initial information; in addition, an essential point in the functioning of this system is the simplification of the processes of interaction of all subjects of the logistics chain in the implementation of export-import activities [8; 12; 14].

Creating a digital platform on such conditions is possible with the consolidation of the processes of supporting export-import activities in a set of integrated subsystems with a single "input-output" interface that allows interested parties to submit and receive documents in electronic form through a single information channel. A diagram of this key concept underlying the proposed digital collaboration platform is presented in Fig. 3.

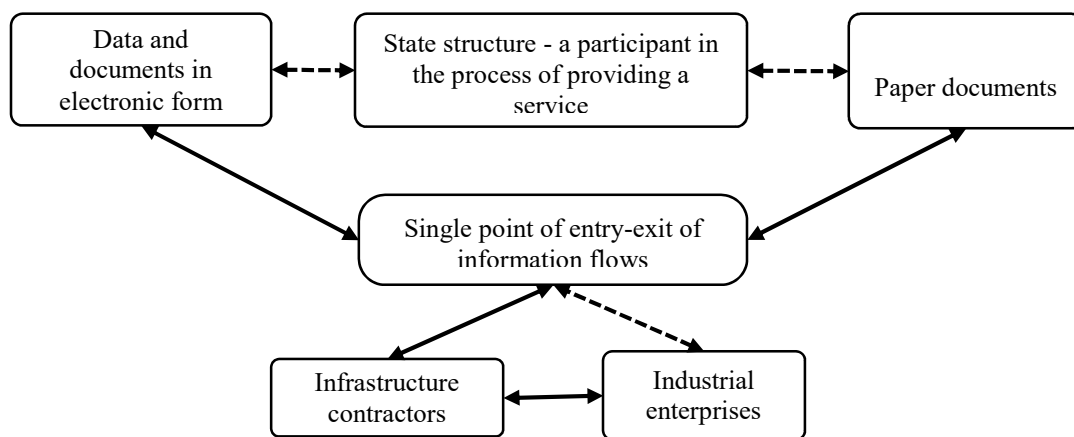


Figure 3: Scheme Of Interaction Between The Participants Of The Digital Platform For Support Of Export-Import Transactions According To The "Single Window" Scheme

The very essence of the "single window" concept, in the light of its application to the support of export-import business processes of industrial enterprises, involves simplifying the processes of access to both public services in electronic form and the process of interaction with infrastructure counterparties [7; 13; 15; 23].

The principle underlying this scheme is the one-time electronic submission by participants of structured, standard documents for processing import, export and transit operations through a single

throughput channel; and the method of simplification of the process of information interaction, the purpose of which is to unify the process of exchanging electronic documents between the parties without a detailed specification of the structural-functional and transport-technological architecture of the automated information systems used for this.

The scheme for implementing this concept is possible according to one of three options, each of

which has its characteristics both in structure and in the scheme of operation:

A specialized state structure is a single body representing state interests in the field of import-export operations, which acts as a centralized hub that consolidates information requests sent in paper and electronic form, and in addition, acts as a key link in the process of disseminating related information among all participants in the digital platforms. An accompanying role arising from the format of the behaviour model assigned to this structure is the source of dissemination of crucial information, such as normative and legislative acts and orders, among all subjects interested or involved in this process; in addition, control measures are assigned to this structure, within the framework of prevention the emergence of unnecessary obstacles in the logistics chain of export-import operations.

Unified information system – this option is based on a single automated system for collecting and disseminating information. In contrast, the system itself, which underlies this concept, can act as both a public and a private structure. At the same time, this system, regardless of the form of ownership, should be able to ensure the implementation of the principles of consolidation and integration of the processes of electronic collection, use, distribution and storage of data related to the issues of export-import business processes of all participants in the digital platform. Undoubtedly, in the context of the functions performed and in comparison with analogues, the range of functionality of such a system is pervasive. To solve the problem of simplifying the implementation of the specified functionality is possible to implement this system under one of the following options:

- *full integration*, all data is processed within the created system, with the involvement of third-party outsourcing companies.
- *a system with a decentralized centre* – an organizational structure in which data is not the exclusive property of one form; therefore, for their processing, they are sent to the relevant facilities specializing in the analysis and processing of incoming information. In this scheme, the key feature is that this final structure responsible for processing the initial data is not the same structure responsible for issuing the final result of processing this information.

The last option for implementing this system is a combined structure responsible for processing incoming information, combining the capabilities of both structures; in essence, this option is possible for implementation as an extreme alternative if none of

the two options allows you to achieve the required indicators.

Unified information and operating system is a system based on the principle of the dominance of information system automation processes to enable the subjects of export-import activities to provide and receive the necessary accompanying documentation in electronic form. With this approach, there is no duplication of document flow in paper form. In addition, this system assumes the role of a centre for supporting and servicing payment transactions related to the payment of duties, licenses, and other financial flows accompanying the business processes of export-import activities. When implementing this scheme, a positive side effect can be considered a decrease in the dependence of industrial enterprises on the need to interact with outsourcing companies providing document management services with government agencies.

2.3 Economic Features And Prerequisites For Implementing A Digital Platform For Supporting Export-Import Business Processes, Using The "Single-Window" Technology.

An analysis of the existing practices of applying the "single window" concept shows that the use of this technology in the modern world takes place in various areas and under entirely different economic conditions. The "single-window" technology itself can be quite easily adapted to multiple systems with complex internal relationships. However, a wide range of potential applications of this concept has a number of factors serving as a limitation of attempts to use this technology. One of the key factors that predetermine the success of the implementation of this technology is the presence in the system of a kind of "bottleneck" on information flows between different participants in the system; another factor is the presence of numerous mutually duplicated points of entry, and exit of information flows and, finally, the presence of a core of concentration of controlling or permissive structures, whose activities are as mired in bureaucratic delays as possible.

In the light of the use of such technology in the formation of a digital platform for managing export-import business processes of industrial enterprises, the list of factors that have a positive impact on development can be divided into groups according to the nature of the interests of the participants

Industrial enterprises:

- minimization of the number of paper documents provided to state structures;
- minimization of costs for the services of intermediaries in the field of export-import

activities in connection with the simplification of regulatory procedures;

- reducing costs by speeding up customs clearance processes.

State institutions of management and control:

- reduce the time and cost of receiving and processing documents and information when passing mandatory procedures;
- optimize the control functions of executive authorities ensure transparency of government procedures,
- eliminate the corruption component of the procedures,
- increase the degree of control and responsibility of administrative authorities.

Financing the infrastructure of a digital platform implemented based on the "single-window" concept can be carried out by combining several options:

- 1) at the expense of the subscription fee paid by the participants of the digital platform;
- 2) by paying for transactions made in the information system, both by participants in the digital platform and by third-party counterparties;
- 3) by paying for services performed during the registration of new participants in the digital platform;
- 4) from special funds of the state budget or part of the proceeds from the collection of customs payments.

The digital platform will be based on the vital function of the information operator. In turn, industrial enterprises with business processes in export-import activities will be able to transfer the necessary information in electronic form and provide related electronic documents certified by an electronic digital signature to government agencies. Once information is sent to the digital platform system, the necessary information will be automatically uploaded to the relevant supervisory authorities' relevant databases.

A complex scheme of interaction of industrial enterprises with government bodies and commercial infrastructure organizations-contractors in implementing foreign trade processes implies significant transaction costs. After the onset of a certain critical level of transaction costs, it becomes economically rational to create a centralized platform solution to implement foreign trade processes.

Additional costs also arise for various counterparties due to the inconsistency of their tariff policies with the interests of other participants in the

system of export-import operations. As a result, some participants are trying to reduce the associated transaction costs by switching to receiving services at cheaper rates from less professional contractors. Others are trying to compensate for the extra costs by adding the additional cost of transaction costs to the cost of production.

All this leads to a deterioration in the economic climate and mutual understanding between the participants in the export-import operations system. Therefore, the benefits of joining and participating in the activities of a digital platform for managing export-import business processes become even more apparent.

The diagram in Fig. 4 shows the interaction between participants in the system of export-import operations before and after implementing the developed mechanism of the digital platform.

As follows from the diagram, for industrial enterprises, the economic effect of using a digital platform is formed by outsourcing part of the processes of export-import activities to the platform provider, which ensures their algorithmization and presentation in the form of digital service packages.

For a digital platform service provider company, the source of economic benefit for the company is the economies of scale from the sale of services to various industrial enterprises.

Taken together, the digital platform makes it possible to reduce total transaction costs as a result of the well-coordinated interaction of all participants in export-import activities through digital simplification and reorganization of business processes.

The economic effect of the practicality of introducing digital platform technology based on a "single window" for an industrial enterprise can be represented as a formula:

$$TC_{trad} + P \ll TC_{digit} \quad (3)$$

where TC_{trad} is the transaction costs of the enterprise for business processes of export-import activities under the traditional scheme of work, TC_{digit} is the transaction costs, P is the tariff for the use of digital platform services by the enterprise, the amount of the fee is determined according to the tariff scale depending on the chosen package of services, as well as from the payment scheme – subscription fee or transaction fee.

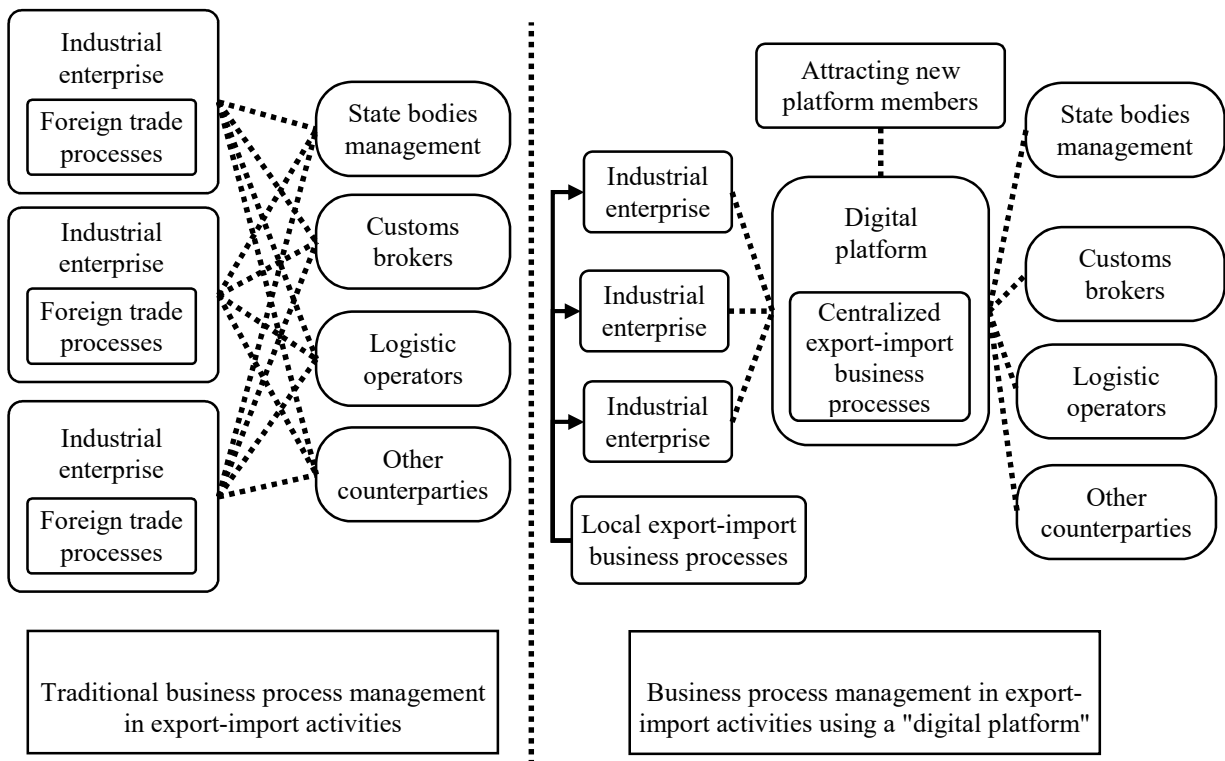


Figure 4: Scheme Of Transition From A Traditional Approach To Work Through A Digital Platform For Managing Export-Import Operations

It should also be noted that for an industrial enterprise, the critical condition for the economic efficiency of the implementation of business processes is the positive value of the cash flow of operating activities, calculated by the formula:

$$P_o = SR - CoS - OPEX \quad (4)$$

where P_o is the amount of profit from operating activities, SR is sales revenue, including the export of products to foreign markets, CoS is the cost of sales (including the cost of imported materials), $OPEX$ is operating expenses, including the costs of export-import operations.

Based on this, the boundary condition for the economic efficiency of a digital platform, under which its operation will be justified, can be expressed by the formula:

$$\frac{TC_{trad}}{OPEX} < \delta \quad (5)$$

3. EXPERIMENT AND ANALYSIS OF RESULTS

Creating a full-fledged digital platform that allows optimizing transaction costs for all involved participants is impossible without the direct involvement of state institutions, with concomitant changes in legislative acts regulating export-import activities. Therefore, as a basis for the experiment, a mathematical model will be used, and partly the experience of creating a digital broker to provide support services for export-import operations.

The basis of the experiment will be the consideration of creating and operating a digital platform using the "single window" technology to meet the needs of industrial enterprises in the field of supporting export-import activities.

The functionality of the proposed platform solution is to provide export-import activities; the list of functions is divided into segments of interaction with partners (government/business) and areas (export/import):

Interaction with government institutions (B2G):

- determination of the classification code of the goods;
- determination of the country of origin of goods;
- preliminary information;

- documentary support of arrival to the customs territory of the country;
 - customs declaration services;
 - obtaining permits on compliance with prohibitions and restrictions;
 - obtaining permits from authorized bodies.
- Interaction with commercial organizations-contractors (B2B):

- organization of freight forwarding;
- cargo insurance;
- implementation of banking operations;
- conducting targeted marketing research;
- implementation of consulting services; provision of agency services of a customs representative;
- provision of linguistic services;
- provision of services for comprehensive outsourcing of export-import activities.

The initial stage of introducing a digital platform for supporting export-import operations will consist of forming a database of partner clients and ensuring effective paperless interaction between industrial enterprises and government authorities.

In the future, with the growth of the client base and the formation of a positive image of a reliable partner, the task of the digital platform will be to strengthen interaction with government institutions and ensure the conclusion of contractual relations "state-business". At this stage, it is necessary to

ensure the tasks of integrating information and computer systems with counterparties involved in export-import activities and providing secure information interaction between state bodies at the national supranational levels.

When operating a digital platform, its client should be divided into two types: industrial enterprises that already have established business processes in export-import activities and enterprises that only plan to enter foreign markets, both to import materials and technologies and for the purpose of exporting finished products.

In the first case, to start working with the platform, it is necessary to evaluate the enterprise's business processes in the field of foreign trade activities, which will make it possible to conclude the potentially essential volume of services that the enterprise can receive. In the second, it is necessary to assess the export potential and determine the required basic services to which the enterprise will need to be connected. It will also be required to provide the enterprise with expertise and consulting support to establish business processes, primarily at the expense of the digital platform's resources and outsourcing several services.

The schedules for the organization of work with a digital platform for these two types of enterprises are presented in Fig. 5 and Fig. 6, respectively (the timing of the implementation of each stage is indicated in weeks).

Enterprises, potential participants in export-import activities

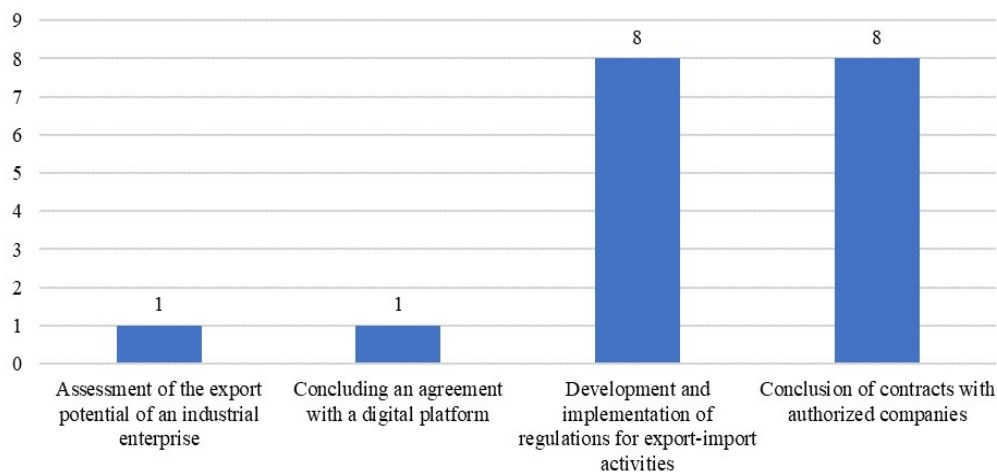


Figure 5: Industrial enterprises with established business processes in the field of export-import activities

Industrial enterprises with established business processes in the field of export-import activities

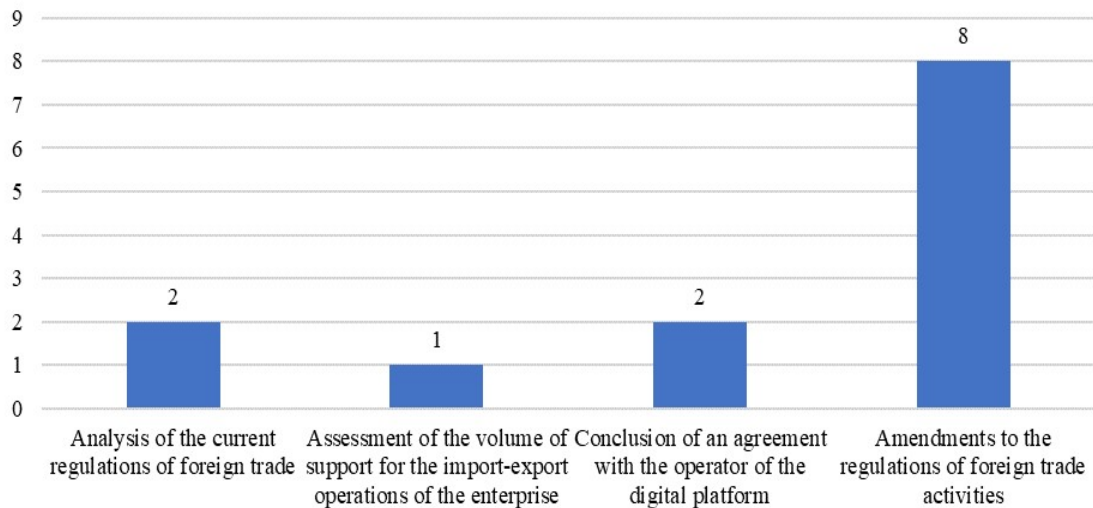


Figure 6: Enterprises, Potential Participants In Export-Import Activities

In both cases, the work of enterprises with a digital platform will be based on two options for interaction: transferring part of the processes to outsourcing the digital platform or introducing part of the platform procedures into the enterprise's business processes.

After passing preliminary negotiations, to start working with a digital platform, an industrial enterprise needs to conclude a contract, two levels of integration are assumed:

- the first level gives the enterprise access to the B2G segment, which ensures the submission of data in the electronic form to government agencies;
- the second level provides access to the B2B segment, which includes authorized counterparty companies that offer a full range of services for export-import activities.

The division of functionality into two levels was done to be able to implement closer integration with government institutions in the future, which will allow the digital platform to provide a basic list of services in this area to a broader range of partners.

In addition, for public administration, which is determined by the rules of law, it is essential to decide on the specifics of the implementation of platform public administration and establish control over public administration, which is carried out

through digital platforms. Considering the concepts of e-digital government, we note that digital government is the next stage in the development of e-government. Digital government builds on previous work to create e-government and improves the quality of public services through the opportunities provided by digital technologies. The digital government ensures the horizontal integration of all authorities, and strong cooperation between government and business, to balance all stakeholders' interests. The development and delivery of public digital government services should be based on a customer-centric model.

4. LIMITATIONS

Business process management of enterprises in an innovative economy is an essential topical. Our study proposed one of the possible options, which does not exclude other effective options and developments. Also, the introduction of a digital platform is a rather voluminous issue; therefore, the study reflected the most important aspects:

- A conceptual model
- The introduction of a single-window mechanism
- Issues of designing and organizing the core of the system

Further ways of research may be the approbation of this model in the field of public-private partnership.

5. CONCLUSIONS

The question of the existence of industrial enterprises in current economic conditions, associated with the globalization of all processes and the rapid penetration of digital technologies into all aspects of activity, make us take a fresh look at the already familiar schemes for organizing export-import operations.

The introduction of new promising technologies, which makes it possible to simplify the processes of supporting export-import activities and reduce associated costs, is critically important for any business entity. The critical feature of special attention to industrial enterprises is due to modern realities when a large enterprise can no longer expect to maintain advantages focusing only on the domestic market.

The proposed technology of a digital platform based on a "single window" was developed, taking into account the need to reduce additional costs for its implementation and the impact on the organization and management of business processes of the enterprise itself.

An essential advantage of this technology is that many of its key aspects have already been successfully tested in other areas of activity. Electronic document management, the technology of a one-time provision of information without its subsequent duplication, and the transfer of accompanying business processes to outsourcing have been successfully used for a long time.

The novelty of the approach lies in the competent integration of all these parts into a single working scheme, with its subsequent extrapolation to an increasing number of participants.

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