

Optimization of Logistics Business Processes Within the Framework of Export Activities Based on the Introduction of Cognitive Information Technologies

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Abstract. The strategic priority for the development of the Russian economy in modern conditions is the diversified development of non-primary non-energy exports, i.e. high value-added products that can provide a multiplier effect. Export is defined as the most important component of foreign economic activity, and the creation of an export-oriented environment seems to be one of the key elements of public policy. Moreover, the most promising direction for the development of such an environment lies in the field of information technology. Modeling of logistic business processes for the implementation of the final export product involves, firstly, the creation of an open information space accessible to each participant in foreign economic activity, and secondly, the streamlining and digitalization of business processes at each stage of the execution of a foreign trade contract during export activities. The introduction and further development of cognitive information technologies will allow adhering to the strategy of innovative diversification of export activities. The result will be the development of integration economic relations, the expansion of the geography of supplies, the reduction in the cost of production of the export product and the optimization of transport and logistics costs. This article discusses the theoretical and methodological foundations of the formation of an export-oriented environment in the context of the development of the digital economy, analyzes the relationship of logistic business processes in the field of export, considers the main stages of preparing and conducting export transactions and the possibility of using modern cognitive information technologies on each of them.

1. Introduction

According to the International Trade Center statistics, Russia's share in world exports for 2018 amounted to 2.3% (\$ 449.3 billion) [1]. According to this indicator, the Russian Federation today occupies the 14th place in the world, while back in 2013 it ranked the top ten countries in terms of export volume. The deterioration of the country's position is associated with a number of objective reasons, primarily related to the reduction in fuel prices, which traditionally forms the basis of this country's export supplies, as well as the difficult political situation associated with the specifics of Russia's foreign economic activity. Nevertheless, the Russian Federation remains one of the leading countries in the structure of world exports and seeks to strengthen its own positions. In this regard, the diversified development of non-primary non-energy exports of Russia, i.e. reorientation of the country's export of goods with high added value, capable of providing a multiplier effect. In order to

develop export within the framework of the identified direction at the interstate level, the country participates in regional integration associations, intergovernmental commissions and committees, forums and international organizations (BRICS, APEC, etc.). At the national level, an internal state system of support and regulation of export activities is being implemented [2]. However, in order to attract new domestic participants to the Russian export market, it is necessary to solve such problems as overcoming political barriers, searching for new sales markets, as well as developing measures to stimulate potential exporters to enter the world arena.

2. Relevance of scientific research

The need to create and develop an export-oriented environment is determined by a number of factors [2 - 5]: 1) the country's economic growth rate depends on the growth rate of demand for manufactured products and services, 2) the increased division of labor and specialization leads to an increase in the country's competitiveness in industries its specialization, and consequently to the creation of a better product, 3) cooperation with foreign companies helps to attract foreign investment, open new markets, exchange R&D, experience in domain management, marketing, and other spheres. The creation and further development of an export-oriented environment in the Russian Federation will lead to an increase in the rate of economic growth, creation of new jobs, increased labor productivity, emergence of new technologies, influx of the capital into the country, as well as an improvement in the state of the country's balance of payments.

3. Statement of the problem

The creation of an export-oriented environment in the Russian Federation at the present stage of development is fraught with a number of difficulties [2, 3, 6]: lack of full integrated support for manufacturers at all stages of product creation; impact of the chosen foreign policy on the country's image on the world market, limiting the range of export products and potential sales markets; excessive administrative burden, leading to a significant increase in the cost of production; lack of competence in the field of foreign economic activity of employees of exporting companies. To overcome the identified problems, it is proposed to solve a number of problems, namely: 1) study of the theoretical and methodological foundations of the formation of an export-oriented environment; 2) analysis of the relationship of business processes underlying the implementation of export activities; 3) consideration of the possibilities of digitalization of business processes at each of the stages of the execution of a foreign trade contract during export activities.

4. Theoretical part

Based on the sources [2, 7], a scheme has been developed for the implementation of export activities, which can be used by potential exporters in deciding to enter the foreign market and plan foreign trade activities (Pic. 1). In the framework of the proposed algorithm, the business processes of foreign trade export activity are divided into 6 large blocks or stages. The first stage is a familiarization, which should include: 1) acquaintance of the manufacturer (potential exporter) with the specifics of foreign economic activity; 2) the search for government export support programs; 3) the creation in the organization of the post of specialist in foreign economic activity and staff development in the field of work under the foreign trade contract. The result of this stage should be the willingness of a potential exporter to enter the foreign market. The second stage of the algorithm is related to conducting marketing research to determine the most attractive foreign market. For a novice exporter, a desk study will be more preferable, which will allow you to get some basic information about potential importers with a minimum of costs through the use of open sources (company reports, statistical collections, etc.). The result will be the acquisition of primary knowledge about the foreign market: market capacity, development prospects, price analysis, consumer preferences, etc. A deeper analysis will require the use of field research tools: participation of the organization in exhibitions, fairs, conducting surveys, surveys, observations, etc. After the exporting company has determined the foreign market of interest to it, it should assess the risks of foreign economic activity taking into

account the specifics of the importing country [7 - 9]: monetary, financial, marketing, manufacturing, political, legal. These risks should be minimized (distribution of risks between partners, hedging, limiting the volume of export supplies, etc.). If potential profit does not cover possible risks, the manufacturer should conduct additional marketing research with the aim of in-depth study of the market to minimize risks or choose another foreign market for the sale of its products. After the manufacturer has chosen the market, studied the possible risks and identified ways to minimize them, he needs to prepare the products for the requirements of the importing country. As part of this sub-step, the exporter gets acquainted with the basic requirements for permits, if necessary, goes through the process of protecting intellectual property, and also assesses how much the manufactured products (or the services provided) are ready for export. If the product / service is adapted to the specifics of the selected foreign market, the exporter proceeds to the next stage - conducting business communication with the aim of concluding a foreign trade contract. A country striving to conclude a foreign trade contract must take into account the peculiarities of cultural traditions, linguistic specifics, national mentality and style of negotiation. Effective business negotiations require agreement between the parties [10] and the conclusion of a foreign trade contract. Due to the fact that the contract law of each country contains significant differences in the financial, tax, insurance and customs legislation, the parties have the right to independently determine the legislation of which country their relations will be regulated. Due to the difficulties of adapting the company to the specifics of the legislation of another country, as well as the presence of language barriers, the most convenient solution for the parties to a foreign trade contract is the use of international law, in particular Incoterms 2010. Determining the delivery basis in accordance with Incoterms provides a unified interpretation of the terms of the foreign trade contract in part of determining the moment of transfer of ownership of products and the risk of damage, loss or accidental loss of goods from seller to buyer [11]. Pre-production preparation consists of an assessment of the production capacity of the enterprise, the adequacy of raw materials, materials and financial resources, as well as intellectual potential. The result of the stage should be the release of export products in the volumes and quality stipulated by the foreign trade contract. Preparation of manufactured products for export is related to the preparation and execution of documents for customs procedures, as well as payment of export customs duties. Logistics costs (delivery of goods to the final consumer) depend on the chosen type of transport and transportation (taking into account the geographical and climatic characteristics of the partner country under the foreign trade contract, expected delivery times, technological features of the cargo transported), a specific route (the optimal route should ensure delivery cargo as soon as possible, in full safety, at the best price), the selected conditions for cargo insurance, the use of the services of forwarding companies, etc. The stage of completion of obligations under a foreign trade contract includes receiving payment for exported products, VAT refunds, and, if necessary, after-sales service. Payment under a foreign trade contract is traditionally carried out in one of the following ways: Remittance, Collection of payment, Letter of credit, bill or check. The use of bank transfers in international practice is fraught with a number of risks: for the exporter there is a risk of non-payment of the delivered delivery, and for the importer there is a risk that the paid delivery will not be sent (or will be sent in quantity and quality that does not comply with the terms of the foreign trade contract). Therefore, this form of payment often involves partial or full prepayment. Unlike a bank transfer, collection guarantees a higher degree of reliability of fulfilling the terms of the export contract, which is associated with the transfer of a payment order by the importer to his bank only after receiving shipping documentation for products shipped under the contract. However, higher reliability is associated with additional financial and time costs.

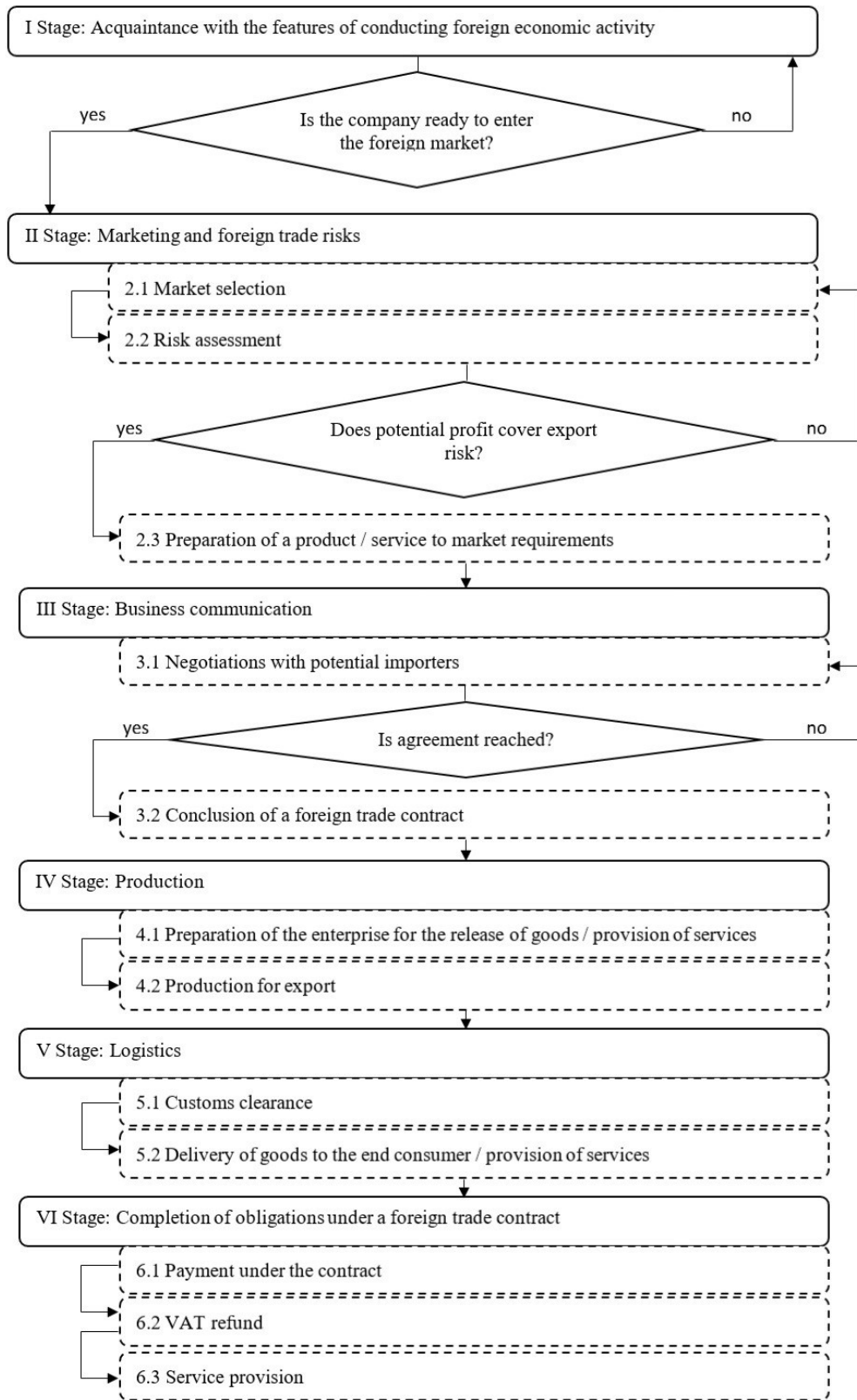


Figure 1. Algorithm of planning and implementation of export activities.

The most reliable form of settlement in international practice is considered to be a documentary letter of credit [12]. Its difference from collection is related to the need to open an account in the name of the exporter before the product is shipped, however, the funds are transferred directly only after receiving documents confirming the shipment of the products. This form of payment guarantees both the delivery of products and the receipt of payment, however, it is associated with the need to pay for bank services for servicing a letter of credit. Also, the letter of credit implies a longer term for fulfillment of obligations under the foreign trade contract in comparison with other payment methods. Less common today are a bill of exchange (a monetary obligation giving the holder the right to demand the amount indicated therein) and a check (an unconditional order to pay upon presentation the amount indicated in the document from the bank's funds available to the drawer). Regardless of the chosen form of payment, upon receipt of payment under a foreign trade contract, the exporter is entitled to a VAT refund from the budget. If the products sold in accordance with the export contract do not require after-sales service, the VAT refund will become the final stage of the export activity (within the framework of one contract). If necessary, after-sales service (provision of additional services) of products sold under the foreign trade contract can be carried out through a representative office opened in the importing country or by arranging the departure of a specialist from the exporting company abroad.

5. Practical part

Modern information technologies offer a wealth of tools to improve business processes. One of the most significant cost items under the foreign trade contract are logistics costs. According to the information guides, the share of transport costs in the cost of sales is 37% (for services - 17%), which necessitates the search for methods of optimizing such costs [13]. As part of the study, it is proposed to introduce into the practice of using exporting enterprises web services developed by the authors: "Routing the movement of automobile transport based on the solution of the traveling salesman problem" (okroute.ru) and "Virtual automated transport dispatcher" (tenderpost.ru) [14]. The first of these services assists in the formation of the optimal route to given destination points (from 2 to 30 points), which can be located in any country (through the use of the Google Maps geographic information system). The construction of the best route option (the shortest and / or fastest) is based on the solution of the traveling salesman problem (TSP) using two methods: exhaustive search (for the number of destinations from 2 to 14) and a genetic algorithm for the number of route points in excess of 14. Among the advantages services can be distinguished: 1) saving time on the route by automating the construction of the original matrix to solve TSP based on the entered points of direction; 2) the absence of the need to install additional software (through the use of "cloud" technologies) and training in working with it; 3) the introduction, if necessary, of a "ban" on undesirable traffic directions (it may be related to repair work on the route, traffic jams, poor quality of the road surface, unreasonably high tariffs for transportation within the country of destination); 4) the ability to build a ring route and a route that does not take into account the return to the starting point. To evaluate the effectiveness of using the web service, the routes of the Russian company Milk of the Urals were optimized according to the length of the route. The routes obtained after the TSP solution were more effective than the ones accepted at the enterprise by 17% on average. The introduction of automation tools in the business processes shown in Figure 1 is also possible within the framework of integrated virtual logistics structures, which aim to optimize the logistics business processes at each of the indicated stages of preparation and conduct of an export transaction by using algorithms of cognitive expert decision-making and automation systems. The development of this system is carried out as part of the second of the previously mentioned web services, which today already allows to optimize and automate the implementation of export transactions at the stages: "business communication", "logistics" and "completion of obligations under a foreign trade contract" [14]. At this stage, the target audience of the developed web services is the enterprises of the Russian Federation. Further development of the programs involves the expansion of the target audience to other countries; for this, it is planned to adapt the resource to the international (English) language and introduce additional

capabilities to take into account the internal tariffs of countries (both participants in the foreign trade contract and the territory of which delivery is possible).

6. Conclusion

The use of the proposed “cloud” services is designed to reduce the logistic costs of the exporter in the structure of production costs within the framework of the foreign trade contract [15,16], and is also aimed at reducing time costs and transaction costs in the preparation and implementation of export activities [17]. The implementation of the developed web services will automate most of the complex of foreign trade operations related to the introduction of new products to international markets, as well as open access for small and medium-sized enterprises to modern cognitive technologies for processing data and making decisions when planning an export transaction, including familiarization with features of conducting foreign economic activity, risk assessment, planning and implementation of business communication, conclusion of a foreign trade contract, at customs design and solution of logistical problems associated with the international delivery of goods. Thanks to the use of technologies of “remote” access to services, their accessibility increases for a wide range of small exporting companies [18], and the share of logistics costs for foreign trade operations is reduced by 17% as part of one of the main components of software and support for export activities [19-21].

References

- [1] Workman D 2019 World’s Top Exports Report Card for Products and Countries World’s Top Exports <http://www.worldstopexports.com/worlds-top-exports-products-countries>
- [2] 2017 RECBOOK: Handbook on Export Support Lead editor-compiler Vasily Ivanchenko (M.: Alpina Publisher) 234 p
- [3] Inotai A 2013 Sustainable Growth Based on Export-Oriented Economic Strategy The Bulgarian Case in an International Comparison *Economic Policy Institute* <https://library.fes.de/pdf-files/bueros/sofia/10070.pdf>
- [4] Song H 2012 New Challenges to the Export Oriented Growth Model’ in Zhang Y, F Kimura and S Oum (eds.) Moving Toward a New Development Model for East Asia- The Role of Domestic Policy and Regional Cooperation. ERIA Research Project Report 2011-10 (Jakarta: ERIA) pp 27-54 http://www.eria.org/RPR_FY2011_No.10_Chapter_2.pdf
- [5] Palley T I 2003 Export-Led Growth: Evidence of Developing Country Crowding-out Economic Integration Regionalism, and Globalization, Arestis, Baddeley, & McCombie (eds.) Cheltenham: Edward Elgar http://www.thomaspalley.com/docs/articles/economic_development/crowding_out.pdf
- [6] Palley T I 2011 The contradictions of export-led growth, PublicPolicy Brief 119 ISBN 978-1-936192-17-5 Levy Economics Institute of Bard College Annandale-on-Hudson (NY) <https://www.econstor.eu/bitstream/10419/54288/1/675943582.pdf>
- [7] 2017 Study Guide for Beginner Exporters REC export school Russian export center ANO DPO School of Export of JSC" Russian Export Center www.exportedu.ru
- [8] 2004 Exports Risks & Management *Export Bulletin* 6 Saudi Industrial Development Fund <https://www.sidf.gov.sa/en/MediaCenter/ResearchandStudies/ExportInformation/ExportBulletinKnowledgeBase/2004-EB-06-Export%20Risks%20and%20Management.pdf>
- [9] Moser C, Nestmann T, Wedow M 2006 Political risk and export promotion: evidence from Germany *Discussion Paper Series 1: Economic Studies* 36 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2785263
- [10] Moore L H 2013 Business Communication *Achieving Results* bookboon.com
- [11] Ramberg J 2011 ICC Guide to Incoterms 2010 Understanding and practical use *International Chamber of Commerce* <https://pdfs.semanticscholar.org/f03b/22ff092f0fc9da0537869569d93907f73c16.pdf>
- [12] Giovannucci D 2007 Basic Trade Finance Tools: Payment Methods in International Trade A Guide to Developing Agricultural Markets and Agro-enterprises

- https://papers.ssrn.com/sol3/papers.cfm?abstract_id=996765
- [13] The economics of how digital technologies impact trade 2018 https://www.wto.org/english/res_e/publications_e/wtr18_3_e.pdf
- [14] Volodina E V, Kudryashova P A, Studentova E A 2020 Optimization of Logistics Business Processes Based on the Implementation of Cognitive Information Technology In: Solovev D (eds) Smart Technologies and Innovations in Design for Control of Technological Processes and Objects: Economy and Production FarEastCon 2018 *Smart Innovation, Systems and Technologies* vol 138 Springer, Cham https://link.springer.com/chapter/10.1007%2F978-3-030-15577-3_44
- [15] Deng Y, Liu Y, Zhou D 2015 An Improved Genetic Algorithm with Initial Population Strategy for Symmetric TSP *Mathematical Problems in Engineering* <https://www.hindawi.com/journals/mpe/2015/212794/>
- [16] El-Samakaf, A F, Ashour W 2015 Optimization of Traveling Salesman Problem Using Affinity Propagation Clustering and Genetic Algorithm *JAI SCR* **3(4)** 239-245
- [17] Gattona J L, Walters D W 2016 Managing the Supply Chain A Strategic Perspective Macmillan Business
- [18] Hu W, Wu K, Shum P P All-Optical Implementation of the Ant Colony Optimization Algorithm *Scientific Reports* **6** 1-6
- [19] Ferrandez S M, Harbison T, Weber T 2016 Optimization of a Truck-drone in Tandem Delivery Network Using K-means and Genetic Algorithm *Journal Of Industrial Engineering And Management-Jiem* **9(2)** 374-388
- [20] Saiyed A R The Traveling Salesman problem <http://cs.indstate.edu/~zeeshan/aman.pdf>
- [21] Davletshina M R, Stolpovskii M V, Solovev D B 2019 Decomposition of Methane Hydrate with Heat Exposure *IOP Conference Series: Earth and Environmental Science* **272** paper № 032239. [Online]. Available: <https://doi.org/10.1088/1755-1315/272/3/032239>