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DEVELOPMENT OF DIAGNOSTICS OF ENTERPRISE IN PUBLIC E-PROCUREMENT SYSTEM IN TERMS OF LOGISTICS

Розкрито зміст поняття «інформаційно-фінансові потоки» і представлено концептуальні засади діагностики підприємства у системі електронних публічних закупівель на засадах логістики. Проаналізовано процес здійснення електронних публічних закупівель в аспекті інформаційно-фінансової, інформаційної, фінансової логістики, документологістики, логістики товарів, послуг, робіт. Запропоновано систему показників функціонування системи електронних публічних закупівель на основі логістичного підходу на макро- та мікрорівнях.

Ключові слова: *електронні публічні закупівлі, логістика, інформаційно-фінансові потоки, система «інформація – ресурс – час».*

1. Introduction

Realization of functions and tasks of state institutions of all levels is impossible without the procurement of goods, works and services to meet the most important social needs based on the rational use of public funds and the development of a competitive economy. Currently, the priority areas for public administration in Ukraine and in Europe are: the use and development of existing systems for the provision of electronic services, the creation of an integrated e-government, the improvement of IT-competence at the state level, the activation of the private sector and the like. Therefore, the main factors in the effective functioning of public e-procurement are the development of information and communication technologies and the use of logically-oriented management of streaming systems of government customers and enterprises participating in tendering procedures. In addition, for successful (effective, efficient) work of e-procurement in Ukraine, it is necessary and appropriate to develop approaches to determining the level of readiness of the state and business in the aspect of public e-procurement taking into account logistical processes. This determines the relevance of the work.

2. The object of research and its technological audit

The object of research is processes of formation, use and direction of development of enterprise diagnostics in the system of public e-procurement taking into account logistical processes.

The subject of research is development of enterprise diagnostics in the system of public e-procurement based on logistics.

In substantiating the initial assumptions (conceptual bases) for building the diagnostics of enterprises in the system of public e-procurement on the basis of logistics, the results of studies on the theory and opinion of the managers of enterprises in Ukraine (in particular, PE «AMK», PLC «Yadro», PE »GalTeploService» and others) and the Polish company «Zakład Handlowo-Usługowy BHP».

3. The aim and objectives of research

The aim of research is substantiation of theoretical provisions and development of practical recommendations for improving the diagnostics of enterprises in the system of public e-procurement based on logistics.

To achieve this aim, the following tasks are defined:

1. To reveal the essence of the concept of «information and financial flows» as components of optimization processes in the procurement procedure.

2. To present the conceptual basis of enterprise diagnostics in the process of electronic public procurement in the aspect of logistics.

3. To develop practical recommendations for building a system of indicators for the functioning of public e-procurement at the macro and micro levels, taking into account logistical processes.

4. Research of existing solutions of the problem

Studies in the field of the formation and development of the system of public e-procurement, the substantiation of scientific-theoretical and applied bases of economic diagnostics and logistics of enterprises are engaged in many scientists and practitioners [1–12]. So, in particular, in work [1] the existing conceptual bases of modeling and management of the enterprise's logistical risk are analyzed and refined. The authors of [6] substantiate the system of factors affecting the participation of New Zealand's medium and small enterprises in public electronic procurement. Research [7] is devoted to the analysis of features of the introduction of e-procurement systems and the procurement process at the macro level. Methods for forecasting socio-economic effects from the introduction of e-procurement in public institutions are being investigated by foreign authors in [8]. In work [13], recommendations for diagnosing and optimizing e-procurement

are proposed from the point of view of information theory. The author [14] considers the approach to determining the bid price and the winner in the electronic tender procedure. The study [15] proposed a conceptual model for assessing the level of readiness of construction companies to implement e-procurement in developing countries.

Thus, as the theory and practice on the problem shows, it should be noted that today the issues of micro-level (enterprise level) diagnostics in the system of public e-procurement and associated logistical processes remain insufficiently studied. At the same time, the existence of significant differences in theory and practice, as well as regulatory and legal inconsistency in this area, necessitates the development (or improvement) of the theoretical, methodological basis for diagnosing an enterprise in the system of public e-procurement based on logistics.

5. Methods of research

To solve the tasks, the following general scientific and special methods are used, in particular: theoretical generalization, systematization and system analysis, method of expert assessments, graphical method, statistical methods and economic-mathematical modeling.

6. Research results

Most enterprises of Ukraine at the present stage of economic development use logistically-oriented management of their activities. The basis of such management is ensuring the optimal level of the enterprise's competitiveness. The main structural components of the enterprise's competitiveness are:

– efficiency and effectiveness of the operation (Fig. 1);

– competitiveness of products (goods, works, services);

– concentration of the market at which the enterprise operates [1–5].

However, in conditions of market variability and models that are insufficiently studied by scientists to build optimal logistic-oriented strategies, the formation and functioning of the logistics system of an enterprise often occurs spontaneously and inefficiently. In addition, the logistics management is basically reduced to the management of goods flows, not focusing on the logistics management of information, finance and e-documents.

In the scheme of e-procurement we will distinguish nine stages:

1) planning of purchases;

2) formation of procurement announcement;

3) directly electronic tender;

4) completion of the electronic auction;

5) determination of the winner;

6) coordination and signing of an agreement between the winner of the tender and the customer;

7) e-payments;

8) fulfillment of the order (delivery of goods, provision of services, performance of work) by the winner of the tender procedure;

9) support of contracts and control over their implementation.

At each stage of public e-procurement, there are such logistical processes: with information, information-financial, financial flows, with flows of electronic and paper documents, with flows of goods, services and works.

The essence of the concept of «information and financial flows» lies at the heart of the logistics concept and the development of information technologies for the functioning of public e-procurement systems. Information and financial flows are the movement of electronic money or payments, which are realized in a non-cash form in electronic form from the customer (state enterprises, institutions and organizations) to the winner of the tender procedure (entrepreneurial business structures).

From the point of view of the efficiency and effectiveness of the operation of logistics chains, information and financial flows represent a composite of optimization procurement processes (Table 1) [6–12].

This logistical approach to consideration of the process of e-tender procedures (Table 1) is the basis for the analysis of macro and micro levels of the functioning of the electronic system of public procurement.

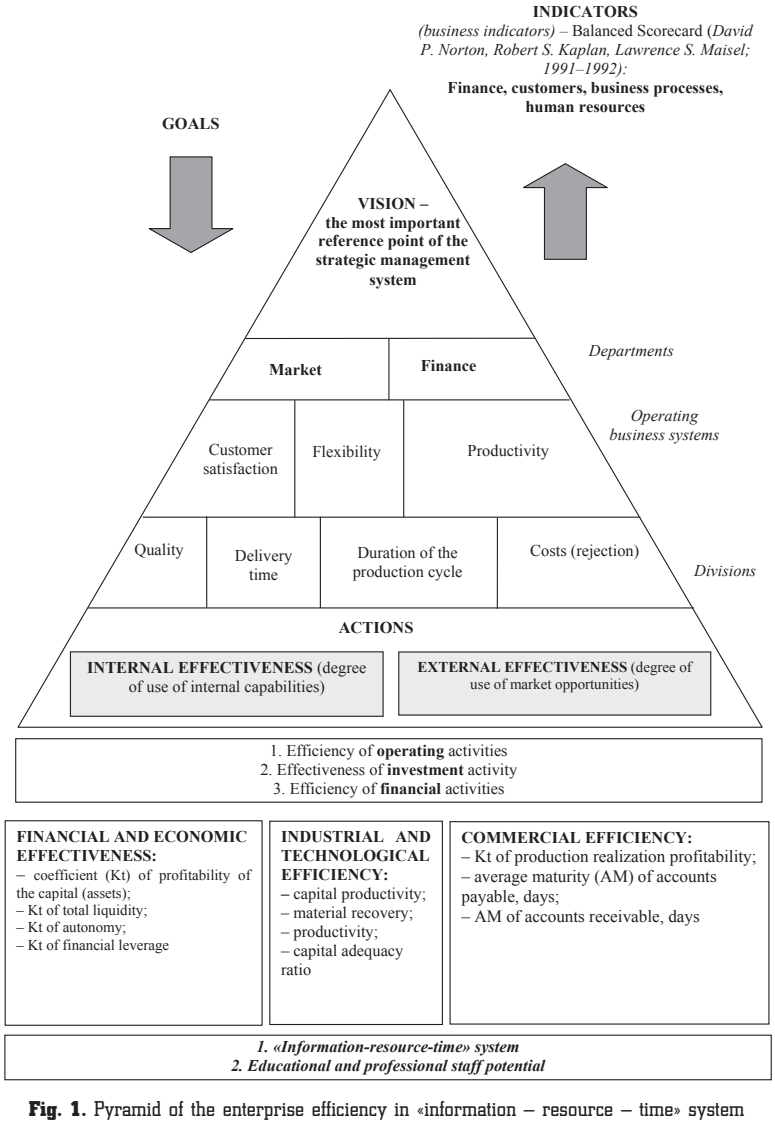

Fig. 1. Pyramid of the enterprise efficiency in «information – resource – time» system

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Table 1

The process of public e-procurement in the aspect of logistics

No.	Stage of public e-procurement	Logistic processes within the stages of public e-procurement	Logistics directions in accordance with logistics processes	Brief description of the stage of public e-procurement
1	Procurement planning	1. Logistical process with information flows. 2. Logistical process with flows of electronic documents	1. Information logistics. 2. Document management	Completion and movement of e-documents, in particular the annual procurement plan
2	Forming an announcement about the purchase	1. Logistical process with flows of electronic documents. 2. Logistical process with information flows	1. Document management. 2. Information logistics	Formation of an announcement in an electronic system about holding open trades
3	E-tendering	1. Logistical process with flows of electronic documents. 2. Logistical process with information flows	1. Document management. 2. Information logistics	Forming an announcement of a competitive dialogue
4	End of e-auction	1. Logistical process with information flows	1. Information logistics	Exchange of information on the subject of procurement between the customer and the bidders
5	Determining the winner	1. Logistical process with information flows	1. Information logistics	Processing of all submitted proposals
6	Agreeing and signing a contract	1. Logistical process with information flows. Logistical process with flows of electronic documents	1. Information logistics. 2. Document management	Formation of the ranking of the participants' positions by the indicator – price
7	E-payments	1. Logistical process with information flows. 2. Logistical process with financial flows. 3. Logistical process with information and financial flows	1. Information logistics. 2. Information and financial logistics. 3. Financial logistics	Publication of the ranking of participants' positions by indicator – price
8	Deliveries of goods, services, works	1. Logistical process with information flows. 2. Logistical process with document flows. 3. Logistic process with flows of goods, services, works	1. Information logistics. 2. Document management. 3. Goods logistics. 4. Logistics of services. 5. Logistics of works	Analysis of the proposal with the lowest price for compliance with the qualifying criteria of the participant and technical (qualitative) characteristics of the subject of procurement
9	Maintenance of contracts and monitoring of their implementation	1. Logistical process with information flows. 2. Logistical process with document flows	1. Information logistics. 2. Document management	Movement of information about the winner to the responsible unit of the customer for the organization of work with the conclusion of the procurement contract

Note: compiled by the authors, taking into account [16–20].

At the same time, it is advisable to offer such indicators as:

1) readiness of subjects of e-tender procedures to conduct and participate in procurement;

2) efficiency and effectiveness of the state and enterprises in the context of interaction and conduct of business transactions electronically (Fig. 1) [13–15, 21–25].

As can be seen from Table 1 and Fig. 2, the diagnostics of the enterprise in the system of public e-procurement on the basis of logistics is the process of identifying the state of readiness for participation in e-tender procedures, analyzing the effectiveness and evaluating the effectiveness of this participation in relevant indicators, taking into account:

1) logistical processes within the stages of public e-procurement;

2) legal liability for violation of the legislation of Ukraine on public procurement [16], e-commerce [17], e-documents and e-document circulation [18] and e-digital signature [19].

It is established that for enterprises, the level of effectiveness of participation in public e-tendering procedures (R, %) is recommended to be calculated by the formula (1):

$$R = \frac{Q_w}{Q_l} \times 100\ \%, \qquad (1)$$

where Q_w – the number of actual winnings in «information-resource-time» system (successful completed tender procedures), units; Q_l – the total number of lots (the number of tendering procedures in which the enterprise participated), units (Table 2).

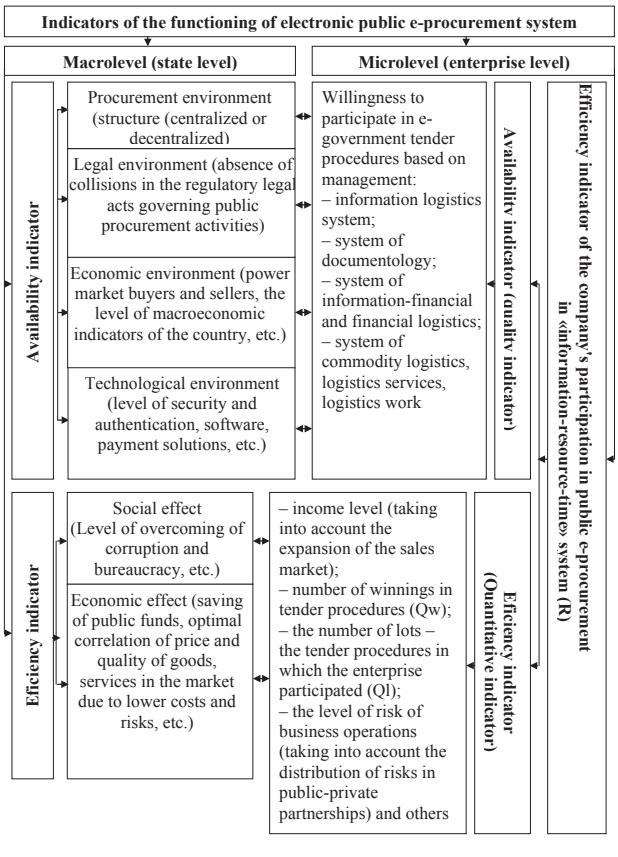

Fig. 2. Indicators of the functioning of public e-procurement system at the macro- and macrolevels

Table 2

Parameters of successful tendering procedures in the «ProZorro» system from the position of participating companies during 2015–2016

Name of the winning company (TOP-10 participants)	Type of economic activity of the enterprise	Q_l, units	Q_w, units	Amount of lots, thousand UAH	The amount of the won tender proposal, thousand UAH	R, %
2015 Number of participants (of them with the status of the tender – qualification of the winner), units: 8092 (1200)						
1. «Interpipe Ukraine» Ltd.	Production of pipes for the oil and gas industry, transportation of oil and gas, engineering and energy industries	6	6	319626.346	297653.640	100.00
2. LLC «Scientific production enterprise» Temp 3000»	Manufacture of yarn, fabrics, work and special clothing, personal protective armor	14	13	263776.800	243936.592	92.86
3. JSC «UkrGazVydobuvannya»	A vertically integrated company with a closed production cycle – from prospecting and exploration of oil and gas fields, their development, as well as production, transportation, processing of hydrocarbon raw materials and sale of petroleum products	5	2	392132.160	146001.400	40.00
4. LLC «WOG retail»	Import and implementation of the full	21	12	173045.588	123268.981	57.14
5. SE «Ukrtransnaftoproduct»	Transportation, supply and sale of petroleum products	8	5	239752.500	116283.240	62.50
6. LLC «Meta Oil»	Fuel production	1	1	100587.300	95369.887	100.00
7. LLC «Trade commodity»	Production of unleaded petrol and fuel	6	2	491582.160	93602.824	33.33
8. LLC «ICO»	Manufacture of textiles	105	19	582444.850	86141.590	18.10
9. LLC»OLTEKS	Manufacture of light industry goods (provision of uniforms of power ministries and departments, special clothing of leading domestic machine-building enterprises, infrastructure, telecommunications	74	17	512025.306	77305.449	22.97
10. PE «SF «AVITEKS»	Manufacture of light industry goods	26	8	218271.950	63188.400	30.77
2016 Number of participants (of them with the status of the tender – qualification of the winner), units: 59966 (6362)						
1. LLC «Vikno-market»	Wholesale trade in building materials	27	9	873.165	380504883.682	33.33
2. NJSC «NAFTOGAZ of Ukraine»	Exploration and development of oil and gas fields, transportation and storage, supply of natural and liquefied gas to consumers	164	164	12984413.883	12981.230	100.00
3. Consortium «Research-Production Association «Ukrgidroenergobud»	Construction and reconstruction of hydroelectric power stations and other hydraulic structures	5	2	4890970.939	4329590.748	40.00
4. PJSC «Sumy NPO»	Release of equipment for the oil, gas, chemical and nuclear industries	27	10	5003417.765	4144881.167	37.04
5. Private-production commercial production «Sputnik»	Construction of residential and non-residential buildings	10	10	1493.374	2941680.989	100.00
6. LLC «Trade commodity»	Production of unleaded petrol and fuel	136	39	6943308.616	1832529.662	28.68
7. «Interpipe Ukraine» Ltd.	Production of pipes for the oil and gas industry, transportation of oil and gas, engineering and energy industries	28	23	1549470.104	1334002.026	82.14
8. PJSC «Turboatom»	From design and research to the manufacture, assembly, testing of turbines and other power equipment, shipment	13	11	1643.339	1110412.835	84.62
9. LLC «Niko Diamant»	Sale of cars, their warranty and post-warranty maintenance, sales of original spare parts, accessories and auto cosmetics	5	2	963827.818	959765.317	40.00
10. PJSC «Kyivenergo»	Electricity supply and heat supply	551	551	765328.144	896041.435	100.00

Note: the data are presented as of December 18, 2016; compiled by the authors on the basis of [21–25].

At the same time, it was found that as of December 2015, the economy for Ukraine as a result of the introduction of the system of electronic public procurements «ProZorro» amounted to 453.97 million UAH, as of December 2016 – 19.39 billion USD. The aforementioned summary savings for the state reflect the difference in the planned purchase price and the best price offer in the electronic auction [13–15, 22–25].

7. SWOT analysis of research results

Strengths. The strength of research is a new approach to building a system of indicators for the functioning of public e-procurement at macro and macro levels, taking into account the logistics processes within the stages of public e-procurement. At the same time, new ideas and solutions for calculating the level of effectiveness of the company's participation in public e-procurement in the «information – resource – time» system are proposed.

Weaknesses. The weak side is that any changes in legislation, regulatory policy and the state of technical and technological provision, political instability and corruption risks significantly affect the level of information quality in the «information – resource – time» system.

The proposed approach to calculating the indicator of the level of participation effectiveness in electronic

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public tendering procedures is recommended to be used by enterprises as a self-diagnostics in this direction, and also with the aim of improving the system of maintaining tender documents and the procedure for selecting the winners of procurement by state customers.

Opportunities. The opportunities of further research in this direction is the formation of multicriterial system for diagnosing public electronic purchases, taking into account its diagnostic purposes, such as:

1) diagnostics of management efficiency by financial flows of the enterprises in systems of the state electronic purchases;

2) diagnostics of the system of interaction between the state and business in the aspect of public e-procurement [13];

3) diagnostics of the enterprise in the system of public e-procurement on the basis of logistics;

4) diagnostics of tender support of enterprises in the system of public e-procurement;

5) diagnostics of the criteria for selecting enterprises in the system of public e-procurement.

Threats. Threats are in the sphere of assessment of environmental factors of the enterprise of direct action, especially corruption risks. It is worthwhile to note here that the factors of the direct impact on the activities of the enterprise are based on unity and close interrelation between themselves, that is, the change of some factors may lead to a change in other factors, and, accordingly, the results of enterprise diagnostics in the system of public e-procurement based on logistics.

8. Conclusions

As the analysis of literature sources [1–25] and the current practice of functioning of enterprises in the system of electronic public procurement on the basis of logistics show, the following conclusions can be drawn, which are as follows:

1. It is established that information and financial flows underlie the logistic concept and development of information technologies for the functioning of electronic public procurement systems. Under the information and financial flows (as components of optimization procurement processes) it is suggested to understand the movement of e-money or payments that are realized in a non-cash form in electronic form from the customer (state enterprises, institutions and organizations) to the winner of the tender procedure (entrepreneurial business structures).

2. Diagnostics of the enterprise in the system of public e-procurement based on logistics is the process of identifying the state of readiness to participate in e-tender procedures, analyzing the effectiveness and evaluation of the effectiveness of this participation in the relevant indicators (parameters), taking into account:

2.1. logistics processes with information-financial, information, financial flows, with flow of electronic and paper documents, with flows of goods, services, works within the stages of electronic public procurement;

2.2. legal liability for violation of the legislation in Ukraine on public procurement, e-commerce, e-documents and e-document management and e-digital signature.

3. The key indicators (parameters) of the level of participation effectiveness in public e-tendering procedures are: the number of actual winnings in the «information-resource-time» system (successful completed tender procedures), the total number of lots (the number of tendering procedures in which the enterprise participated). Based on the performed calculations, it is established that the indicator of the effectiveness level of participation in public e-tendering procedures for domestic enterprises is directly dependent on the efficiency and readiness of the enterprise to participate in electronic state tender procedures.

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РАЗВИТИЕ ДИАГНОСТИКИ ПРЕДПРИЯТИЯ В СИСТЕМЕ ЭЛЕКТРОННЫХ ПУБЛИЧНЫХ ЗАКУПОК НА ОСНОВЕ ЛОГИСТИКИ

Раскрыто содержание понятия «информационно-финансовые потоки» и представлены концептуальные основы диагностики предприятия в системе электронных публичных закупок на основе логистики. Проанализирован процесс осуществления электронных публичных закупок в аспекте информационно-финансовой, информационной, финансовой логистики, документологистики, логистики товаров, услуг, работ. Предложена система показателей функционирования системы электронных публичных закупок на основе логистического подхода на макро- и микроуровнях.

Ключевые слова: электронные публичные закупки, логистика, информационно-финансовые потоки, система «информация – ресурс – время».

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DEVELOPMENT OF APPROACH TO ANTICIPATORY RISK MANAGEMENT OF THE ENTERPRISE UNDER UNCERTAINTY CONDITIONS

Запропоновано комплексний підхід до антисипативного управління ризиками підприємства за умов невизначеності. Підхід ґрунтується на ранній діагностиці слабких сигналів потенційних можливостей і загроз середовища функціонування підприємства, що дозволяє прогнозувати їх майбутній розвиток і приймати відповідні превентивні заходи щодо мінімізації впливу ризиків та використання можливостей для перспективного розвитку підприємства.

Ключові слова: *антисипативне управління ризиками, ідентифікація слабких сигналів, превентивні заходи, оптимізація допустимих ризиків.*

1. Introduction

Risk management in a period of rapid changes is one of the most important tasks for business entities. In modern conditions, domestic enterprises face complex contradictions and serious challenges to the European and global markets: the level of uncertainty, risks, threats and losses increase, and are intensified by socio-economic and political instability in the country. At the same time, eliminating foreign trade barriers opens new opportunities for economic entities to economic growth, formation and strengthening of their competitive positions, implementation of effective and successful reforms in the national economic system. How successfully and successfully economic entities take advantage of opportunities, minimizing possible risks and losses, depends on the validity and weightedness of strategic benchmarks in business activities and approaches to managing relevant risks in diversified global and European markets.

2. The object of research and its technological audit

The object of research is risk management of the enterprise under uncertainty conditions.