

Implementation of an information management system for industrial enterprise resource planning

Implantación de un sistema de gestión de información para la planificación de recursos empresariales industriales

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ABSTRACT:

The issues of implementing enterprise resource planning system are relevant and require appropriate research. It particularly concerns the situation of forming new industrial activity profiles. The definition and implementation of this enterprise development strategy is one of complex and time-consuming tasks that have rarely been carried out at the proper level within domestic industrial enterprises. That is due to the fact that the management of an enterprise, as a rule, is focused on the solution of short-term enterprise functioning issues. Such a situation leads to frequent change of the tasks set for enterprises as well as to changing their economic activity priorities and to decreasing the competitiveness. In such a situation, it is very difficult to talk about the formation of new activities. However, the development of market relations determines the need to change current developed management stereotypes as well as the nature of management itself. First of all, this refers to the activities that determine the prospects for the development of enterprises. These and other

RESUMEN:

Las cuestiones relativas a la aplicación del sistema de planificación de recursos empresariales son pertinentes y requieren una investigación apropiada. Se refiere particularmente a la situación de la formación de nuevos perfiles de actividad industrial. La definición y aplicación de esta estrategia de desarrollo empresarial es una de las complejas y laboriosas tareas que rara vez se han llevado a cabo a un nivel adecuado dentro de las empresas industriales nacionales. Esto se debe al hecho de que la gestión de una empresa, por regla general, se centra en la solución de los problemas de funcionamiento de las empresas a corto plazo. Esta situación conduce a un cambio frecuente de las tareas que se establecen para las empresas, así como a cambiar sus prioridades de actividad económica y a reducir la competitividad. En tal situación, es muy difícil hablar de la formación de nuevas actividades. Sin embargo, el desarrollo de las relaciones de mercado determina la necesidad de cambiar los estereotipos actuales de gestión desarrollados, así como la naturaleza de la propia gestión. En primer lugar, se

circumstances determined the urgency of enterprise resource planning system implementation as a means of innovative production renewal. The purpose of the study is to analyze the prospects and develop the enterprise resource planning system implementation process model in order to optimize main business processes, provide the manager with information at all levels of the enterprise management and response adequately to changes occurring in the market. The article suggests a model of the resource planning system implementation process for a large multi-industry enterprise and it concludes that the functioning of the enterprise resource planning system leads to the improvement of the enterprise management structure.

Keywords: organization management, management strategy, management tools, management models, management information system, enterprise logistics system, large multi-industry enterprise

refiere a las actividades que determinan las perspectivas para el desarrollo de las empresas. Estas y otras circunstancias determinaron la urgencia de la implementación del sistema de planificación de recursos empresariales como medio de renovación de la producción innovadora. El propósito del estudio es analizar las perspectivas y desarrollar el modelo de proceso de implementación del sistema de planificación de recursos empresariales con el fin de optimizar los procesos principales del negocio, proporcionar al gestor información en todos los niveles de la gestión empresarial y respuesta adecuada a los cambios que se producen en el mercado. El artículo sugiere un modelo del proceso de implementación del sistema de planificación de recursos para una gran empresa multisectorial y concluye que el funcionamiento del sistema de planificación de recursos empresariales conduce a la mejora de la gestión empresarial estructura.

Palabras clave: gestión de la organización, estrategia de gestión, herramientas de gestión, modelos de gestión, sistema de información de gestión, sistema logístico empresarial, grandes empresas multisectoriales

1. Introduction

In scientific literature covering crisis and strategic management, some scientists define the general strategy of an enterprise in terms of activities and behavior in a particular market as economic. At the same time, they suggest to consider as economic the strategy that determines the rules and techniques for ensuring the economically effective achievement of strategic goals, on the one hand, and the strategy based on the interest of all participants in the process of developing and implementing strategic programs in the effective achievement of these goals, on the other hand (Kurochkina *et al.*, 2006). At the same time, Gradov A.P. regards the formation of incentives for the adoption of certain strategic decisions as the general feature for all components of a company's economic strategy (Gradov, 1995). It should be noted that the strategy of an enterprise is quite often considered only from the perspective of the development strategy. This, according to Prytkov I.V., leads to a rather narrow understanding of other strategies of the enterprise (Prytkov, 2011).

When creating and implementing new business profiles, it is necessary to determine the overall strategy for the development of the enterprise and the choice of the priority areas (Voronkova, 2014; Voronkova, 2011). Three main approaches are used in theory to determine the essence of strategy and strategic management: target, system and situational approaches.

According to the target approach to understanding the strategic management, the strategic activity of an enterprise is focused, first of all, on defining the system of needs of a specific enterprise, the quantitative and qualitative characteristics in the production potential of the system for which the targeted approach is applied. Thus, the target orientation of each competitive enterprise innovative development strategy is determined by targeted representations of a specific goal, which can be refined in the process of developing and implementing a strategy, gradually approaching the specific goal of the enterprise's innovative development. At the same time, each goal has its own strategy defined, which is a means of implementing the enterprise's innovation development plan (Vlasov *et al.*, 2016).

The mission of a large multi-industry enterprise (LMIE) is presented in the form of a so-called "goal tree". In order to choose a suitable strategy for the enterprise, it is necessary to align a specific strategy with the corresponding level of the enterprise's development for each target. It is the combination of these strategies that forms the system of strategies for innovative development of an LMIE. Thus, it is possible to build a hierarchy of strategies for the innovative development of the enterprise.

It should be noted that the emergence of a new strategy for the innovative development of a particular enterprise makes it completely dependent on common goals. Each new type of activity needs its own strategy, regardless of whether common goals are changed or those set are already achieved (Voronkova *et al.*, 2016).

Therefore, a system approach based on the purpose of the entire management system (of a specific enterprise) has been widely used along with the target approach. At the same time, the research process is based on taking into account the interconnections of the components both within the system and in the external environment (Voronkova, 2006a; Voronkova, 2006b). The usage of the system approach is associated with several aspects: first, it is necessary to clearly define the research objective, and second, it is important for strategic management to determine the structure of the strategic set and the correspondence to the system organizational structure as a whole.

There are also various scientific opinions as to which sets of strategy classifications it is necessary to submit one or another system of strategies. However, there is no doubt that in any case, the classification of enterprise strategies is multi-tiered. This is explained by the fact that a strategy is a rather complex category and it can be divided into specific and localized strategies due to various characteristics (Vihansky, 2008; Stroganov, 2012).

In addition to general strategies that represent alternatives to the behavior of enterprises in a competitive environment, some scientists identify general strategies of the enterprise's behavior depending on the stage of its life cycle. In such cases, not only the general growth strategy is considered, but also the whole range of strategies: stabilization, restructuring, reduction of activities, liquidation, and various combinations of all these strategies (Goldstein, 2009; Cheremushkin, 2012).

General strategies of an enterprise are receiving details in specific strategies, which allow enterprises to achieve their goals and solve certain tasks of innovative development under certain conditions of management.

If we analyze the opinions of individual scientists on specific strategies, we can see that they are generally classified by three main factors (Kleiner, 2008; Weinstein, 2002; Panesh, 2011; Platko, 2012; Firova, & Bikesina, 2016; Kurochkina, & Gavlovski, 2016).

First, in terms of the life cycle of goods and services, technologies and strategic business zones – development, implementation, sales growth, maturity, market saturation, reduction in sales, decommissioning, and exit from the market.

Secondly, in terms of the development stages of the enterprise itself – organization of new business, focusing on the single direction and developing it, transfer of capital to other spheres of business, liquidation of the enterprise.

Thirdly, considering the elements of micro- and macroenvironments, which are actually used in the process of enterprise functioning – strategies in various business areas and strategies for developing resource potential by types of resources.

Thus, in the strategic management of the LMIE development, such components of the enterprise system as personnel, financial resources, investments, material resources, production capacities, products, foreign economic activities and the like can act as classes that require the existence of certain strategies.

The most relevant and suitable in the current conditions of management should be the logistical approach to the formation of a strategy of innovative development of the LMIE. It is suggested to understand the process of building a mechanism through which all possible strategies for the individual elements of the logistic system of an enterprise should be closely linked to and ensure the earliest achievement of the overall goal of the enterprise under the logistic approach to the formation of the innovative development strategy of the LMIE. The most important condition for achieving the main goal of the enterprise's operation will be the compliance with the relevant principles of this approach, namely: variability, mobility, and flexibility.

Thus, for each individual enterprise, the strategic set should be variable, depending on the presence of a particular class and its characteristics. In addition, the strategy and classes should be agile and flexible in order to have a real possibility of changing them depending on the requirements of the time and the situation that takes place in this particular period of management.

The effective operation of the enterprise's logistics system is impossible without an information system. As the authors of the logistics works emphasize, this is primarily due to the fact that effective activity depends on the availability of an integrated system for managing financial and production resources, personnel, supply and marketing (Sergeev, 2001; Gattorna, 2008; Stock, 2005).

2. Methods

Currently, the information within the logistics system of an enterprise is necessary for coordinating the flow of materials, raw materials and finished products. In addition, information is needed to carry out cost reduction, production, supply and distribution activities in order to increase their efficiency.

An important issue here is choosing the right enterprise logistics management system and the process of its implementation. The scientific and practical state of the investigated problem requires a mechanism to introduce information systems to the management of the LMIE logistics system. In order to solve this problem, it is advisable to develop the model and the mechanism of an enterprise's informational logistics system implementation process.

Logistics is considered to be an essential factor in implementing activities aimed at increasing the economic efficiency of supply, production, marketing, distribution and other logistics operations occurring within a particular system. Significant progress in the rationalization of these areas of the system can be achieved through the maximum coordination of material and information flows when combined. This is one of the main tasks of logistics. To solve it, electronic data processing, standardization of material and technical relations, organization of work based on scientific functional analysis and structuring as well as new technologies leading to the automation of production are to be applied. That is, appropriate changes are necessary within the activities of existing economic systems, to which the industrial enterprise belongs.

According to the analysis (Kogalovsky, 2003; Lifshits, & Kluzina, 2012; Loginovsky *et al.*, 2012), the implementation of an information system should be arguably viewed not as a change in one element of the model, but as a process of change that affects all components of the system and the system as a whole. It should be noted that the implementation of changes without any systematic approach can lead to significant losses.

It is known that there are four main types of information systems: local, financial-management, medium and large integrated systems. Each of them has its own functional set and specific purpose, since when choosing a system, it is necessary to clearly formulate what needs it should fulfill.

For the LMIE logistics system as an object of this work, a single integrated system with a set of vertical control elements should be relevant. That is such a system that can manage the production, supply, distribution, financial and information flows of an industrial enterprise.

First of all, it is necessary to calculate the total cost of the project. The calculation of the project implementation cost is suggested to be carried out according to the following scheme:

$$V = V_{\text{prod}} + V_{\text{inst}} + V_{\text{supp}} \quad (1),$$

where V is the total cost of the project for implementing the information system;

V_{prod} is the cost of the information system itself, that is, the software product that the manufacturer offers;

V_{inst} is the management system installation cost;

V_{supp} is the cost of operational support for the management system.

The cost of implementing an information system depends on the number of workstations and the cost of each workstation license. As for the cost of software, the sellers include it into the cost of the system. The cost of installing the system includes the cost of training personnel and installing software as well as bringing the system to the running state. The cost of installing the system, as a rule, is 50% of the total cost of the information system implementation project. Operational support cost is understood as telephone support, the supply of new software and free of charge elimination of errors that occur during operation. Typically, the operation cost is 10-15% of the total cost of the system under the contract. Other unplanned costs may arise during the implementation, so the preliminary calculation should be very detailed.

3. Results

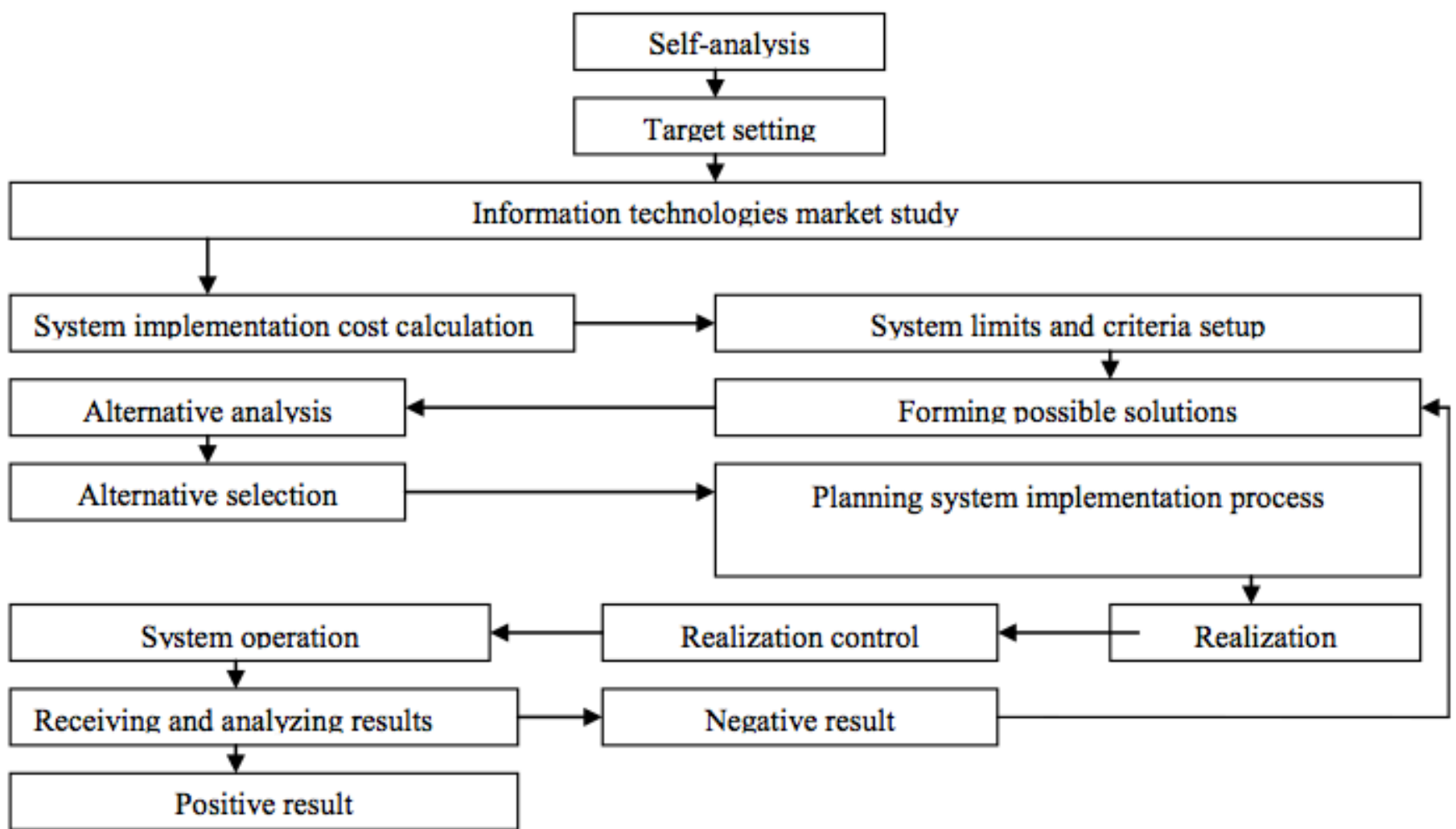
Based on the information system requirements analysis, a schematic model of the information system for managing the enterprise logistics system implementation process is proposed (Fig. 1).

Thus, since the management of the logistics system is an integrated and multilevel process, it requires information support. The establishment of an information management system allows reacting more quickly to market changes, rationalizing the management process, automating the implementation of a number of operations.

Along with that, the availability of an information system is not a universal method for solving problems and does not fully guarantee the effectiveness of its functioning. It only saves resources and allows making more informed management decisions.

Since the information system should cover the entire chain from the receipt of the customer order to the compilation of multivariate and multilevel production plans and supervision of their implementation, product quality management and production capacities load, material and financial flows management, the information system implementation is proposed to be done in the following blocks (subsystems): planning and production management; procurement; marketing; composition; finance.

Figure 1. Schematic model of the information management system of the LMIE implementation process



The production management subsystem solves the range of planning tasks – from finished products planning to issuing tasks to shops for the semi-finished products and final products production. In this case, the system automatically generates a detailed shift task in accordance with the equipment load plan and the variable schedule of the enterprise: orders execution; equipment usage; target costs of raw materials and the time needed for the execution of each order. After entering the actual data, the system automatically compiles the production plan implementation report.

The procurement management subsystem should be presented in the form of raw materials and materials supply, payments for supplies, raw materials demand calculation, accounting and analysis of accounts payable management. The system calculates the requirements for raw materials automatically in accordance with production standards in order to order the production plan considering the equipment loading plan. According to this need, a procurement plan for raw materials is prepared. After entering the actual data, the system generates a report on the plan, on the actual process and on the fulfillment scenarios for deliveries of raw materials and materials, grouping the data according to various available criteria – dates, suppliers, material names, etc. It is also possible to view reports on the plan, on the actual process and on the fulfillment scenarios for executing the payment plan for raw materials and materials, which can also be generated based on various parameters.

In the *warehouse management subsystem*, the workflow is represented by external and internal movements; rejection, revaluation and acceptance-transfer acts. The system provides for the reduction of workflow with the help of resource limit cards that allow issuing the necessary quantity of inventory to the production site or a separate link of the system in aggregate for the entire budget period. This approach significantly reduces the time spent working with documents. Consequently, such a system can significantly reduce the number of shortages and losses, since any deficiency is recorded and becomes personified. The system also provides for the possibility of inventory management by forming regulatory stocks.

The sales management subsystem allows automating the whole complex of works related to the sales of goods – from the receipt of orders to sales, while ensuring an effective work of the sales department of the enterprise and coordinating the activities of all units involved in the

sales process. Thanks to the availability of such a system, the quality of customer service is improved; accounts receivable decrease; warehouse stocks are minimized; the comprehensive analysis of sales performance indicators is carried out to support the adoption of strategic decisions related to changes in product mix and selling prices. The system should have a tool that allows real-time management of sales, reducing prices for low-liquid goods or raising the selling price for highly liquid goods. This increases the profitability of business. This system allows the sales department, on the one hand, to manage costs, and on the other hand – to plan and manage the company's sales.

The most important component of any enterprise's activity is the *financial block*. In the system, it consists of subsystems managing and balancing cash flows, analyzing production cost, receivables and payables as well as forming several possible budgets of the enterprise.

The system allows representing all business processes of the enterprise in the form of material values flows, which can be traced in both monetary and resource terms. In this case, both incoming and outgoing cash flows should be displayed, and the planned and actual balance of their movements is automatically drawn. The system allows identifying, analyzing and managing the process of optimizing cost reduction, starting with the purchase of the necessary resources and ending with the sales cost. The implementation of this function allows planning and estimating both the efficiency of existing production and new directions of activity of the enterprise, which is especially important for multi-industry enterprises.

4. Discussion

The most common of modern information management systems in the world are:

- Enterprise Resource Planning (ERP) class system, that provides management of all enterprise processes (Matende, & Ogao, 2013);
- Supply Chain Management (SCM) class systems, providing management of logistical chains (Fiorini, & Jabbour, 2017).

Systems of the ERP class are considered to be the most advanced software of the planned type of enterprise management information systems. They consist of a set of modules and are designed to provide management in many areas of the enterprise. The central element of the ERP system is the database common to all modules, which include: procurement; warehousing; inventory management; tracking supplies; transportation; distribution; sales management; contacts with customers; accounting; financial management; personnel management; control.

In Europe, the market of ERP-systems, created by new, relatively small IT companies, grows by 10-12% annually, which is rather high growth rate in comparison with the companies of the first (Microsoft, Oracle, Infor) and the second (Siebel, Baan, Sun Microsystems and others) tier (Kazakov, & Konovalov, 2016).

ERP II systems (the next generation) use the latest advances in information technology, multidimensional data analysis in the database (On-line Analytical Processing (OLAP)), Balanced Scorecard (BSC), e-market mechanism in particular, which radically improves some important parameters of the system. The implementation of ERP II systems is based on a process presentation rather than the modular one (Gable *et al.*, 2013).

The information and logistics system, which is a specialized solution for the automation of logistics, is often called the "Supply Chain Management System" (SCM). Specialists give the following definition of SCM: "A holistic, customer-oriented system of coordinated integrated actions between partners or participants in logistics throughout the value chain, starting with the client's desire, which is crucial for the purchase of raw materials and supplies, up to delivering goods to the consumer and the disposal of waste, which is accompanied by information and money flows" (Zigiari, 2000). The SCM system is a hardware and software complex designed to improve the methods of searching for procurement items, optimize the process of supporting the production of goods (including movement and storage) as well as

rationalizing customer relations.

The introduction of SCM, in a certain sense, allows moving from working with the goods to working with the client. It is about the materialization of not only the logistics, but also the marketing approach of "customer orientation". The close integration of various business applications is required to implement the closed management cycle. Thus, the adoption of the concept involves the constant exchange of operational information between the ERP system, the Customer Relationship Management System (CRM) and the SCM system.

In today's world, industrial enterprises are also involved in the so-called B2B relations (business-to-business), which means a new form of electronic information exchange between counterparties in the online mode, mainly through the Internet. The modern understanding of the wide usage of the latest techniques and technologies, innovations, electronic data interchange and the integration of information systems between industrial enterprises at the international level covers the concept of e-logistics, which uses a single Electronic Data Interchange system (EDI), object identification (labeling) of Global Positioning System (GPS), etc.

The implementation of information systems within any economic systems shows significant economic effect. In the industrial production system, it becomes a multiplier of economic development, an indicator of innovative products promotion to the market. Directly at industrial enterprises, it is advisable to develop special business plans – programs for information support of innovative projects, new developments, for promotion and sale of services and production of information products.

Thus, the introduction of the information system makes it possible to optimize the main business processes, provide the manager with information at all levels of the enterprise management and adequately respond to changes occurring in the market. In addition, the company receives a number of competitive advantages:

- Timely detection of trends on the basis of actual performance versus the plan deviations;
- Description and reporting on the key elements of the system: supply, production, warehousing, transportation, and sales;
- Correct and timely issuance of planned, production tasks;
- Periodic inventory and regular re-planning (recalculation) of the detailed production plan;
- Prompt notification of suppliers and customers about changes in structure, volumes of orders and delivery dates.

So, it is necessary to create an integrated information management system at the industrial enterprise, which is a set of subsystems, relatively independent components of the enterprise. This information management system is presented in the form of an integrated system, which includes a certain number of local computer networks.

A single integrated system of the enterprise should implement several groups of tasks:

- Methodological, which form the basis of automated management;
- Informational, with the help of which the system provides for the formalization of organization workflow and maintenance of a single regulatory framework;
- Personnel, providing recruitment, training, retraining of personnel for studying and operating this system;
- Technical, providing the selection, design, installation, adjustment and maintenance of computers, communications and data transmission;
- Software, providing the selection, development, acquisition and maintenance of software for the operation of information and technologic processes in a single integrated system;
- Technological, providing the selection, development and implementation of information processing technologies.

The availability of the information management system at the LMIE requires its phased implementation and system thinking. In order for the integrated information system of the enterprise to be able to provide the required management efficiency, all of its elements (local computer networks of individual departments) need to be integrated both vertically and horizontally.

Vertical integration will ensure the connection of planned, dispositive (dispatching) and executive systems. At the same time, planned systems are formed at the administrative level of management and the level of long-term decision taking on the enterprise activity profiles structure and development strategies. They are designed to create and optimize the links of the logistics chain. Planned systems are characterized by batch processing of tasks.

The activities of the *dispositive systems* are aimed at making medium and short-term decisions. These systems are aimed at ensuring the smooth running of organization units of the enterprise and are formed at the level of individual units' management. We are talking about the disposal of intra-plant transport, the stocks of finished products, the provision of materials, the launch of orders for production. Some tasks can be handled in batch mode, while others require interactive processing due to the need to use the most actual data for the management.

The activities of the *executive systems* are aimed at the fulfillment of routines. They should be used at the administrative and operational levels of management. For these systems, the speed of processing and recording of actual state without delay are important; thus, they should operate in an interactive mode.

Horizontal integration ensures the linkage of individual task complexes in dispositive and executive systems. The main role belongs to dispositive systems, which determine the requirements for the respective executive systems.

5. Conclusion

Thanks to the functioning of the information management system, the enterprise achieves the goal of organizing a certain level. In order to improve the management structure, it is necessary to conduct a preliminary in-depth study of existing information flows, to determine the existing contradictions between the content of management functions and its organizational forms, between the organizational structure and the quantitative composition of bodies and their management, to establish a unified system of managers' operations and the regulation of employees' functional duties.

Thus, the introduction of an integrated information system to the management of an industrial enterprise provides certain advantages: greater speed of information exchange between units; reduction of accounting errors' quantity; unproductive paper-work volume decrease; cooperation of separate information blocks. In the end, all those allow more effective implementation of logistics approaches to the management of the industrial enterprise and lead to cost optimization.

References

- Cheremushkin, S.V. (2012). Utochnenie sodержaniya ponyatiya "strategiya" s pozitsii upravleniya finansovoi rezultativnostyu kommercheskoi organizatsii [Clarification of the "Strategy" Concept from the Perspective of Financial Performance Management of a Commercial Entity]. *Finansovyi menedzhment*, 4, 48-63.
- Fiorini, P.C., & Jabbour, C.J.C. (2017). Information Systems and Sustainable Supply Chain Management towards a More Sustainable Society: Where We Are and Where We Are Going. *International Journal of Information Management*, 37(4), 241-249.
- Firova, I.P., & Bikesina, T.V. (2016). Sovremennye problemy vnedreniya integrirovannogo risk-menedzhmenta v tselyakh snizheniya finansovykh riskov khozyaistvuyushchikh subektov [Modern Problems of Integrated Risk Management Implementation in Order to Reduce the

- Financial Risks of Economic Entities]. *Nauka i biznes: puti razvitiya*, 11, 35-37.
- Gable, G.G., Sedera, D., & Chan, T. (2013). Enterprise Systems Success: A Measurement Model. In S.T. March, A. Massey, & J.I. DeGross (Eds.), *Proceedings of the Twenty-Fourth International Conference on Information Systems* (pp. 576-591). Seattle.
- Gattorna, J. (2008). *Upravlenie tsepyami postavok: Spravochnik izdatelstva Gower* [Supply Chain Management: Gower Publishing House]. Moscow: INFRAM. (p. 670).
- Goldstein, G.Y. (2009). *Strategicheskii menedzhment: Konspekt lektsii* [Strategic Management: Lecture Notes]. Taganrog: Publishing house TRTU. (p. 356).
- Gradov, A.P. (1995). *Ekonomicheskaya strategiya firmy* [The Economic Strategy of the Enterprise]. St. Petersburg: Spetsialnaya Literatura. (p. 410).
- Kazakov, K.V., & Konovalov, R.V. (2016). Osobennosti formirovaniya sistemy upravleniya rossiiskim promyshlennym predpriyatiem s primeneniem ERP-sistemy na osnove sovremennykh informatsionnykh tekhnologii [Management System of a Russian Industrial Enterprise Formation Features Using ERP-System Based on Modern Information Technologies]. *Informatizatsiya obrazovaniya i nauki*, 1(29), 89-96.
- Kleiner, G.B. (2008). *Strategiya predpriyatiya* [Strategy of the Enterprise]. Moscow: Delo. (p. 568).
- Kogalovsky, M.R. (2003). *Perspektivnye tekhnologii informatsionnykh sistem* [Emerging Technologies of Information Systems]. Moscow: Kompaniya IT. (p. 288).
- Kurochkina, A.A., & Gavlovsky, R.S. (2016). Vnedrenie protsessno-orientirovannogo upravleniya v organizatsiyakh malogo i srednego biznesa RF [Implementation of Process-Oriented Management in the Small and Medium-Sized Businesses of the Russian Federation]. *Globalnyi nauchnyi potentsial*, 9(66), 52-56.
- Kurochkina, A.A., Pankov, A.V., & Petrov, A.N. (2006). *Strategiya sotsialno-ekonomicheskogo razvitiya natsionalnoi ekonomiki v usloviyakh ekonomicheskogo rosta* [Strategy of Social and Economic Development of National Economy in Conditions of Economic Growth]. St. Petersburg: Publishing House SPbGuEf. (p. 159).
- Lifshits, A.S., & Klyuzina, S.V. (2012). Statisticheskaya informatsionnaya baza v sisteme upravleniya razvitiem promyshlennykh predpriyatii [Statistical Information Base in the System of Industrial Enterprises Development Management]. *Voprosy statistiki*, 1, 17-20.
- Loginov, O.V., Maksimov, A.A., & Korennaya, K.A. (2012). Razvitie informatsionnykh sistem krupnykh promyshlennykh predpriyatii [Development of Information Systems of Large Industrial Enterprises]. *Izvestiya vysshikh uchebnykh zavedenii. Uralskii region*, 2, 40-51.
- Matende, S., & Ogao, P. (2013). Enterprise Resource Planning (ERP) System Implementation: A Case for User Participation. *Procedia Technology*, 9, 518-526.
- Panesh, A.A. (2011). Sistematizatsiya kontseptsii strategicheskogo menedzhmenta [Systematization of Strategic Management Concepts]. In *Materialy simpoziuma "Strategicheskoe planirovanie i razvitie predpriyatii". Sektsiya 1* ["Strategic Planning and Enterprise Development" Symposium Materials. Section 1] (pp. 122-124). Moscow: CEMI RAS.
- Platko, A.Y. (2012). Strategii razvitiya dlya predpriyatii promyshlennosti i razrabotka modelnoi matritsy sootvetstviya kriteriyam ustoichivogo razvitiya [Development Strategies for Industrial Enterprises and the Development of a Model Matrix for Meeting the Criteria for Sustainable Development]. *Izvestiya Moskovskogo gosudarstvennogo tekhnicheskogo universiteta MAMI*, 3(2), 49-55.
- Prytkov, I.V. (2011). Kharakteristika sovremennykh podkhodov k vyrabotke strategii razvitiya predpriyatiya [Characteristics of Modern Approaches to the Enterprise Development Strategy]. *Organizator proizvodstva*, 3, 39-44.
- Sergeev, V.I. (2001). *Logistika v biznese* [Logistics in Business]. Moscow: INFRA-M. (p. 608).

Stock, J.R. (2005). *Strategicheskoe upravlenie logistikoi* [Strategic Management of Logistics]. Moscow: INFRA-M.

Stroganov, I.A. (2012). Prakticheskie aspekty strategicheskogo vybora v predprinimatelstve [Practical Aspects of Strategic Choice in Entrepreneurship]. *Rossiiskoe predprinimatelstvo*, 6(204), 35-42.

Vikhanskiy, O.S. (2008). *Strategicheskoe upravlenie: Uchebnik* [Strategic Management: Textbook] (3rd ed.). Moscow: Gardariki. (p. 296).

Vlasov, A.B., Pakhomova, Y.V., Kudryavtseva, N.N., & Duvanova, Y.N. (2016). Innovatsionnaya strategiya upravleniya razvitiem predpriyatiya [Innovative Strategy of Enterprise Development Management]. *Vestnik Voronezhskogo gosudarstvennogo universiteta inzhenernykh tekhnologii*, 4 (70), 370-375.

Voronkova, O.V. (2006a). *Metodologiya formirovaniya integrirovannoi regionalnoi programmy upravleniya kachestvom. Referat dissertatsii na soiskanie uchenoi stepeni doktora ekonomicheskikh nauk* [Methodology for the Formation of an Integrated Regional Quality Management Program (Doctoral Thesis Abstract)]. Tambov: Tambov State Technical University.

Voronkova, O.V. (2006b). *Formirovanie regionalnoi kontseptsii upravleniya kachestvom produktsii i uslug: ucheb. posobie dlya studentov ochnogo i zaokhnogo otdelenii spetsialnostei 080502, 080105* [Formation of the Regional Concept of Quality Management of Products and Services: Manual for Full-Time and Part-Time Students of 080502, 080105 Branches]. Tambov: Ministry of Education and Science of the Russian Federation, State Educational Institution of Higher Professional Education "Tambov State Technical University".

Voronkova, O.V. (2011). O finansovykh aspektakh nauchnogo potentsiala [On the Financial Aspects of Scientific Potential]. *Nauka i biznes: puti razvitiya*, 4, 109-112.

Voronkova, O.V. (2014). Klyuchevye napravleniya issledovaniy v Rossiiskoi Federatsii [Key Areas of Research in the Russian Federation]. *Nauka i biznes: puti razvitiya*, 5(35), 87-90.

Voronkova, O.V., Kurochkina, A.A., Firova, I.P., & Yaluner, E.V. (2016). Innovative Managerial Aspects of the Potential of Material-Technical Base and the Formation of Controlling Mechanism in the Management of the Enterprise Potential Development. *Journal of Internet Banking and Commerce*, 26(1), 14.

Weinstein, G. (2002). Ot novykh tekhnologii k "novoi ekonomike" [From New Technologies to the "New Economy"]. *Mirovaya ekonomika i mezhdunarodnye otnosheniya*, 10, 22-29.

Zigiaris, S. (2000). *Supply Chain Management*. Report produced for the EC funded project INNOREGIO: Dissemination of Innovation and Knowledge Management Techniques. Retrieved June 21, 2017, from http://www.adi.pt/docs/innoregio_supp_management.pdf

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