

An Efficient Supply Chain Management Model: The Analysis of Domestic and International Practices

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Abstract— The study discusses the challenge of providing an effective supply chain management model that would meet modern requirements. The purpose of the study is to analyze the theoretical and practical aspects of developing business processes of supply chain management, as well as to substantiate an efficient business logistics management model. The survey revealed that supply chain management is carried out in a highly competitive environment while business owners are in very difficult conditions: on the one hand, customer requirements are being expanded and diversified, and on the other hand, global logistics market entry requires better service and price cuts. It has been concluded that it is feasible to outsource IT logistics processes due to the global tendency to complicate supply chain management, the introduction of information technologies, increasing customer requirements, and major business processes within the supply chain. This is reflected through an increase in investment / demand in the IT industry, an increase in the number of providers, an increase in equipment, a shortage of specialists, etc. The trend observed in our country is consistent with the ones of developed economies. An algorithm for the implementation of the supply chain formation mechanism has been developed.

Keywords— *supply chain management, outsourcing, IT-logistics processes, logistics services.*

1. Introduction

At the present stage of economic development, supply chain management is a separate strategic concept, which involves the management of all business processes, and includes any activities related to transformation, management, distribution, etc. of materials and services.

The supply chain management model is a system of strategic management and coordination

of business functions within enterprises and between partner companies within the supply chain (movement of material, information, labor and financial resources).

The basic principle of the model construction is versatility, that is, the possibility of the model implementation at the enterprise of various scale and types of activities. The implementation is carried out by standardizing the construction of the process management model and the system for evaluating business operations and processes.

Increased competitiveness of the environment, increased customer requirements, and order personalization are the reason for the more active interaction of enterprises within the supply chain. This model is created for various purposes; namely, to increase overall profitability within the supply chain, reduce overall costs, implement competitive strategies, increase the market share and / or coverage, etc.

On the other hand, the multicomponent nature of flows raises difficulties associated with the optimization of supply chain models to meet the needs of individual enterprises. This problem can be solved through the specialization and distribution of tasks between individual enterprises within the supply chain. In this case, the risks are shared and operating costs are reduced; there is the possibility of general optimization according to various criteria, and increasing the interaction and integration of enterprises, which ultimately increases the overall competitiveness of the enterprises within the supply chain.

The need to ensure strategic mobility, save resources, improve the quality of products and services encourages entrepreneurs to search for the resources to increase efficiency in the framework of supply chain management. This requires the development of measures to optimally integrate the supplier of raw materials, infrastructure institutions, manufacturers of finished goods, wholesale and retail enterprises in

order to reduce unproductive and transaction costs, as well as more fully satisfy customer needs.

In the face of the growing influence of global economic factors, entrepreneurial activity, to a greater extent, requires considering the market for services, in particular logistics. The competitive recovery of the domestic economy is largely hampered by the presence of weak supply chains, the imperfection of the material and technical supply of resources, and the underdeveloped logistics infrastructure. The basic precondition for the successful participation of domestic enterprises on global markets is the development of entrepreneurial strategies based on logistics outsourcing mechanisms.

2. Literature review

The importance of designing and applying supply chain reference models is determined by the need to model and standardize business processes in supply chains in order to facilitate and improve the integration of logistics systems and processes of an enterprise with suppliers, consumers, and logistics intermediaries [1].

In general, most research on supply chain management has been carried out since 2005 and concentrated on the developed countries of Europe, Asia and the USA; The principal research methods are conceptual analysis and analytical modeling [2, 3]. The key trends in supply chain management include:

- digitalization of all supply chain management aspects, in particular the Internet of things, robotics, analytics and big data, which are aimed at improving productivity and customer satisfaction. Digital Logistics, Digital Supply Chain, Smart Supply Chain, Cold / Cool Supply Chain, Socially responsible Supply Chain, Green Supply Chain [4] have been developed within the framework of this concept;

- the basic management concept is sustainable supply chain management, in particular sustainable green supply chain management [5];

- the combination of efficiency and flexibility in the supply chain [6];

- strengthened customer focus; focus on key staff competencies [6];

- returns management and last mile delivery are of particular importance [7].

Supply chain management most clearly demonstrates that the model of interaction is being changed from Human to Human (H2H) to Machine to Human (M2H), Human to Machine (H2M) or Machine to Machine (M2M) [8].

The basic factors affecting the efficiency of supply chain management are information transparency and the ability to regulate and redistribute resources within the supply chain; the key constraints are excessive control over investment costs and excessive bureaucratization of supply chain management processes [9].

Modern supply chain management models are described below [10 -12]:

- The CPFR-model (Collaborative Planning, Forecasting and Replenishment) is considered as one of the strategies for developing trade relations, or as a concept of managing relationships and material, financial, and information flows in distribution channels. The goal of the management is to increase the overall profitability within the supply chain. The model is generally implemented by trade enterprises as it focuses on VMI (Vendor Managed Inventory) and provides QR (Quick Response) and ECR (Efficient Consume Response). The model consists of 5 business processes: Plan, Source, Make, Deliver, Return.

- The SCOR-model is a business process-oriented model that is mainly focused on the continuity of all supply chain flows based on the following management concepts: Business Process Reengineering, Benchmarking and Best Practice.

- The GSCF-model involves Customer Relationship Management, Customer Service Management, Demand Management, Manufacturing Flow Management, Supplier Relationship Management, Product Development and Commercialization, Returns Management. The model is characterized by the interconnection of processes, which allows the search and identification of opportunities to increase economic efficiency, improve proposals for the provision of services and the development of a product range.

- The ISO 9000 model is a process model of the enterprise quality management system that focuses on quality assurance rather than on profitability and / or another optimization criterion.

- The Retail-H model is used in certain industries; it is not a versatile model that can be used by manufacturing enterprises (only trade companies).

- The Y-CIM model focuses on the use of technical systems (there is synchronous planning of information technologies and related processes); it covers all business processes in the supply chain management system.

The disadvantages of these models are as follows [13]:

- the demand is fixed and constant; there is no shortage of goods;

- transport costs per unit are fixed for all supply chain elements;

- the costs to store a unit of finished goods per unit of time remain constant throughout the whole period of modeling.

There is no agreed opinion in the scientific literature about the most efficient supply chain [14]. Comparing the modern Lean and Info-Sharing approaches to supply chain management, the researchers note that Lean Supply Chain Planning leads to significant inventory savings, but, on the other hand, it requires more transport efforts compared to the Info-Sharing model.

Thus, it can be noted that supply chain optimization requires complex solutions and significant changes. An integrated approach to supply chain management

makes it possible to more fully satisfy the needs of consumers and achieve the company goal [2, 15].

The introduction of the supply chain management concept involves a comprehensive strategic approach to management at the stage of production and sales; in other words, the overall profitability of enterprises throughout the supply chain increases.

The economic crisis justified the need to find new ways to save resources and increase the competitiveness of supply chains.

Therefore, it is feasible to conduct research on modern strategies and strategic decisions taken by domestic enterprises in supply chains.

2.1. Setting Objectives

Changes in consumer preferences, the emergence of new types of products, the improvement of technological methods, and new global market trends require adjustments to the activities of enterprises that are involved in the supply chain.

Each supply chain is characterized by its own unique set of market requirements and operational tasks; therefore, it is necessary to highlight general supply chain development trends in our country. It is in our country that it is possible to track the key supply chain management trends inherent in the domestic economy and in the global world. In particular, the concept of supply chain management requires a change in the schemes and principles of the interaction between enterprises.

The fundamental basis of the competitive advantages of business entities are technologies that can quickly reflect customer needs, provide improved product quality and reduce production costs. Due to the low elasticity of supply of some production factors, the required volumes of economic resources can be created only during a certain period of time; generally, some of them are unique. It is strategic partnerships that allow taking advantage of contractual relations in the context of logistic outsourcing and overcome the pressure of competitive factors.

The purpose of the study is to determine the theoretical and practical problems of developing business processes of supply chain management, as well as to identify appropriate models for managing business logistics.

The research objectives are as follows:

- to generalize the positive features and disadvantages of logistics outsourcing through the example of the Russian Federation;
- to study of the role of logistics outsourcing in improving enterprise competitiveness;
- to study the development trends of the domestic market of logistics services, as well as to consider the factors of the attractiveness of the Russian Federation for foreign outsourcing companies.

3. Methods and materials

3.1. Research context

Strategically, outsourcing allows the company to focus on the core business. According to [16], in Europe there has been a significant increase in the volume of logistics activities transferred to outsourcing firms, in particular this is observed in transportation (61%), fleet management (13%), customer support (5%), inventory management (8%), order accounting (6%), warehousing (35%), customization (11%), reverse logistics (15%), information systems (25%).

The tactical advantages of outsourcing are as follows: the company adheres to the number of full-time positions; outsourcing allows a flexible schedule; there is no need for the office space expansion and associated costs; there is a guarantee of professional responsibility of the outsourcing company; various volumes of tasks can be performed through outsourcing.

3.2. Research hypothesis

It has been concluded that it is feasible to outsource IT logistics processes due to the global tendency to complicate supply chain management, the introduction of information technologies, increasing customer requirements, and major business processes within the supply chain. This is reflected through an increase in investment / demand in the IT industry, an increase in the number of providers, an increase in equipment, a shortage of specialists, etc. The trend observed in our country is consistent with the ones of developed economies.

3.3. Research methods

In order to identify general trends in supply chain management, a survey of respondents was conducted; it was also complemented with the statistical data.

A multi-stage sampling was applied in the survey; there were two stages. At the first stage, the general population living in our country was taken as a basis. The number of respondents was selected from each region in proportion to the total number of the residents in this region. The selection was made randomly based on advertising materials of logistics companies, as well as the data of job seekers in logistics (e-mail, phone numbers, etc., found on job search sites). There were 2489 randomly selected respondents, of which 98 people (3.9%) agreed to participate in the survey.

At the second stage (if the respondent answered positively to the question), it was proposed to switch to the online questionnaire. At this stage, 94 people (97%) agreed to answer the following questions (Fig. 1-4):

- What trends have you noted in supply management in our country?
- What is the key factor affecting the sustainable development of supply chains?
- Which trends are similar / different to global

trends?

The survey was based on an online panel; thus, the respondents were a group of registered Internet users who realized that they agreed to participate in research for free. We believe that this approach is appropriate and provides reliable results.

Data quality control procedures involved the following activities:

- the data obtained in the survey were compared with profile data and data obtained in other projects;
- there were restrictions on participation during a certain period of time;
- multiple registrations were checked with the help of the built-in functions;
- uniqueness was controlled.

The sampling error did not exceed 5%.

The questionnaire was designed based on our own developments. The feature of the study is the separation of respondents by age and the principle of "employee / business owner" (Table 1, Table 2).

Table 1. Survey results (for business owners)

Question/survey results	25-35	35-45	45-60	Over 60
- What trends have you noted in supply management in our country?				
Tendency to complicate supply chain management	7	11	19	2
Increasing customer requirements	4	11	20	1
The need to use various information technologies	2	8	7	2
- What is the key factor affecting the sustainable development of supply chains?				
Information technologies	1	2	6	5
Intense competition	1	11	12	4
The entry to the global logistics market	15	18	14	5
- Which trends are similar / different to global trends?				
Tendency to complicate supply chain management	7	11	19	2
The need to use various information technologies	4	11	20	1
other	2	8	7	2

Table 2. Survey results (for employees)

Question/survey results	25-35	35-45	45-60	Over 60
- What trends have you noted in supply management in our country?				
Tendency to complicate supply chain management	3	5	12	9

Increasing customer requirements	2	7	22	8
The need to use various information technologies	1	4	11	10
- What is the key factor affecting the sustainable development of supply chains?				
Information technologies	2	17	12	1
Supply chain personalization	2	17	12	3
Difficulties to meet all requirements for logistics services	1	14	11	2
- Which trends are similar / different to global trends?				
Tendency to complicate supply chain management	3	5	12	9
The need to use various information technologies	2	7	22	8
other	1	4	11	10

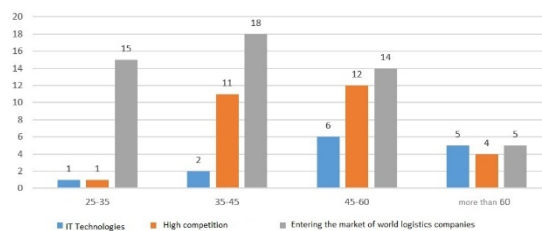


Figure 1. Responses of business owners to the question "What trends have you noted in supply management in our country?"

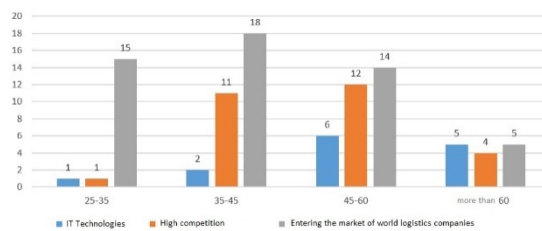


Figure 2. Responses of employees to the question "What trends have you noted in supply management in our country?"

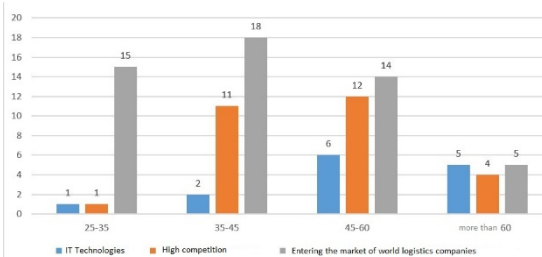


Figure 3. Responses of business owners to the question "What is the key factor influencing the sustainable development of supply chains?"

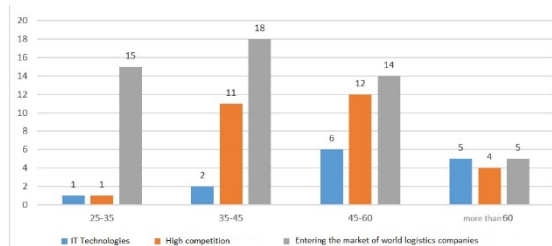


Figure 4. Responses of employees to the question “What is the key factor influencing the sustainable development of supply chains”

4. Results

In general, the respondents noted that logistics technologies are becoming increasingly complex. Today it is important to quickly respond to the changes in marketing factors and market conditions. The reasonableness of managerial decisions directly depends on the awareness of market conditions.

It is noted that supply chain management is carried out in a highly competitive environment and business owners find themselves in very difficult conditions: on the one hand, customer requirements are being expanded and diversified, and on the other hand, global logistics market entry requires better service and price cuts. Small and medium-sized enterprises also find it difficult to cover a large area and ensure order personalization. Therefore, the “race for the leadership” may result in the bankruptcy of domestic companies. According to the respondents, the entry into the global logistics market saturated with logistics companies having significant material and financial resources poses a threat to their businesses, which operate with low profitability.

The respondents (business owners) believe that the widespread use of IT outsourcing services can be a solution to the problem. The current trends in IT outsourcing services are characterized by:

- growth in the volume of support services (IT support infrastructure);
- increase in the number of providers with the involvement of foreign or partially foreign capital;
- exacerbation of the skilled labor shortage;
- increase in the consumption of outsourcing services;
- development of quality management systems;
- processes of market consolidation (M&A), the intensification of processes for improving product parameters within individual firms.

The respondents also noted that continuous innovation in the logistics of enterprises requires personnel to initiate hidden reserves, imagination and intuition, as well as to constantly improve their skills; this contributes to the generation and mutual penetration of new knowledge. The development of information systems and technologies that allow automating transport, storage, and other processes, as well as carrying out end-to-end management of logistics processes in the supply chain, creates even

greater changes. Nowadays electronic technologies, for example EDI, RFID, e-mobility, e-business, e-logistics, are being actively used.

According to the respondents (business owners) supply chain management is affected by the complexity of supply chain management and, therefore, the need to use various information technologies. In this case, the compliance of logistics processes with global supply chain development trends is noted [16]: the complexity of supply chain management technologies and the need to use various information technologies.

Statistical data on the market of IT services in our country indicate similar trends. Thus, according to [17], there is an increase in infrastructure investment (in particular in telecommunication equipment), an increase in freight traffic (both internal and external), an increase in the number of people employed in the supply management sector.

5. Discussion

The range of outsourced services in supply chain management can be different depending upon current tasks. For example, outsourcing may be limited to warehousing and/or transportation. Outsourcing can be traditional (an external service provider performs contracting services that are usually performed within the organization), or innovative (the company is provided with modern logistics management tools that improve its logistics efficiency).

The practice of foreign countries [18] shows that enterprises outsourcing services have clear criteria and priorities when choosing logistics service providers. Thus, the highest priority is the guarantee of the quality of services provided, prices, payment terms, full range of services. The market experience is also relevant. This is especially important in the case of international transportation as it requires an extraordinary approach, ingenuity, and personal contacts.

Refusal of linear (one-way) relationships with suppliers and customers in favor of an intertwined network, which calls for multidirectional and multi-level relationships, allows narrowly specialized enterprises to find their place in various integration formations. Supply chain management as a driver and the center of key logistics competencies in such formations is aimed at searching for economic compromises and harmonizing economic interests through end-to-end management of logistics flows, which leads to the emergence of new types of logistics providers [19].

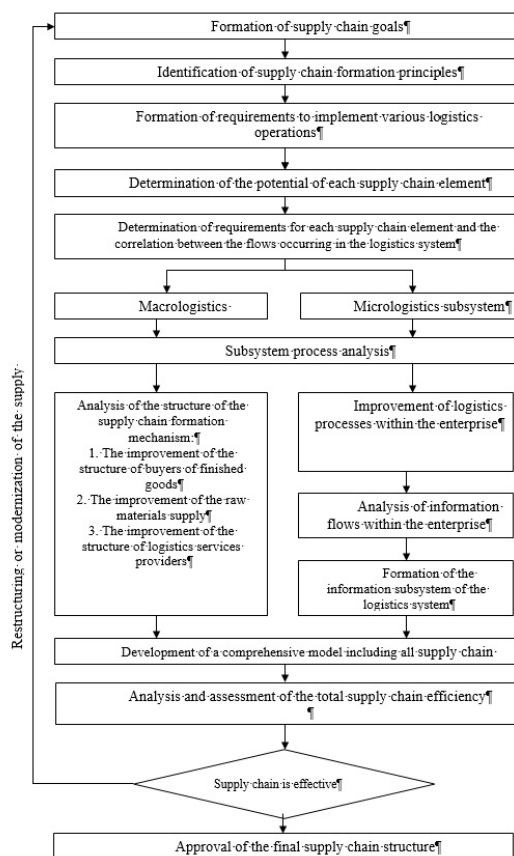


Figure 5. Supply chain formation algorithm

The factors hampering the development of the logistics outsourcing market in our country should be noted. These include the lack of a favorable investment climate, poorly developed stock market and logistics infrastructure, financial and economic instability, imperfect contractual relations, high corruption and bureaucratic barriers to the development of entrepreneurship. Today domestic enterprises operate in a dynamic global environment and are forced to quickly make and implement relevant strategic managerial decisions.

Logistics outsourcing and the implementation of modern management mechanisms can promote innovative development and ensure the competitive position of domestic business entities [20]. This requires regulatory and incentive mechanisms that would increase the number of specialized firms that provide enterprises with ad hoc and / or long-term logistics outsourcing services [21]. The following key functions of these entrepreneurial structures should be highlighted: assistance to enterprises in business planning, choosing logistics management models, advising in the process of purchasing resources and carrying out technological operations, solving managerial and production problems, developing and implementing effective programs for restructuring supply chains, analyzing economic activities and the formation of strategic plans for entering foreign markets [22].

In connection with the above, an algorithm of the supply chain formation is proposed (Figure 5).

The priority task is the formation of goals of each individual supply chain. It is also necessary to determine the principles of supply chain formation. Their approval will help to establish the requirements for the implementation of various logistics operations. After that, the potential of each supply chain element is determined. Next, the requirements for each element and the correlation of all available flows in the logistics system are identified.

The next step is to divide the algorithm into macro- and micrologistics subsystems. Process analysis is performed in each subsystem. Macrologistics subsystem involves optimization of the relations with customers and suppliers of raw materials, that is, it aims to improve the structure of logistics service providers as a whole. Micrologistics subsystem optimizes logistics processes within the enterprise and improves the general information system.

After that, there is a need to develop a complex model for each subsystem; the model should include all supply chain elements [22]. Next, the efficiency of the supply chain is evaluated and a decision on its implementation is made. Unless the result is satisfactory, restructuring or modification of the supply chain is required. Based on the analysis, the efficiency of the supply chain formation algorithm is evaluated. The algorithm can be applied, provided that it is effective. Otherwise, there is a need for further improvement. This algorithm allows managing and unifying the supply process. It can contribute to the solution of complex supply chain management issues.

6. Conclusions

The decision to outsource certain activities of the enterprise should be made when both the supplier and the manufacturer are involved in the supply chain, which allows them to ensure the highest quality of finished goods, develop long-term plans and joint programs to reduce costs, implement information technologies, get access to the technology of their partners, cooperate with key customers, and jointly address management issues.

In addition, in a number of cases, it is feasible to use external resources; however, they also should be managed to overcome the negative aspects of outsourcing and maximize benefits. Thus, outsourcing enables the company to focus on core business, optimize the production process, and use advanced technologies.

All types of logistics activities can be outsourced; however, the feasibility of the transfer should be evaluated in terms of strategic goals, financial and non-financial benefits, etc.

Outsourcing today has become a common business practice as it is impossible to fully meet all requirements and changes with the preserved quality of the processes involved.

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