

СТРАТЕГІЧНІ МОДЕЛІ УПРАВЛІННЯ МЕРЕЖЕЮ ПОСТАВОК

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Описано найбільш використовувані моделі управління ланцюгами поставок. Проаналізовано роль партнерства в мережі поставок, розроблено модель розвитку ланцюга поставок як економічної системи за сукупністю параметрів та вихідним результатом. Визначено межі загального впливу бізнес-процесів як параметрів управління ланцюгами поставок на основі оцінювання ефективності використання моделей.

Ключові слова: мережеві організації, мережа поставок, партнерство, моделі розвитку мережі, JIT, MRP.

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STRATEGIC SUPPLY CHAIN MANAGEMENT MODELS

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The most used management models of supply chain were described in the article. The role of partnerships in the supply chain were clarified, models of the supply chain as an economic system characterized purpose of development, a set of parameters and initial results were analyzed. Areas of the overall impact of business processes as supply chain management parameters on the performance evaluation of the use of models were identified.

Key words: network organization, supply chain partnership, models of network development, JIT, MRP.

Statement of the problem. The work of the enterprise should not only successfully manage the logistics network and evaluate the effectiveness of management. It is the complexity of process that determines the relevance of the article. The efficiency of logistics networks measured by various methods that help monitor and evaluate the whole process of delivery.

Analysis of recent research and publications. The problem in determining the efficiency of logistics networks are imperfect toolkit his assessment that may be applied in the present conditions in practice. Problems of assessment supply networks covering E. Krykavsky [1], L. Smolar [2], C. Bozarth [3], A. Szymonik [4] A. Harrison [5] and others. However, the effectiveness of management models supply networks are under-represented.

Goals of the article. The aim of the article is to assess the most used models of supply chain.

The main material of research. All modern economic organization operating in dynamic environment that is constantly changing. Demand for consumer goods, technology, competition, markets and suppliers are constantly changing. As a result, companies can adjust their resources differently in response to the changes.

The most important models include optimization, simulation and heuristic model.

Use of appropriate modeling techniques can help to compare the effectiveness of current and planned network due to their features, cost and services provided. Actually selected modeling method should help to choose a network that will achieve the main goals set already in the process of designing or restructuring the network. After determining the initial decision to analyze “what happens if” in order to test the sensitivity of the relevant projects are the key changes.

Optimization model are effective for network design. Optimization models based on exact mathematical procedures that help find the best or optimal solution. Mathematical analysis can be performed to confirm that the decision is the best solution of the problem. The optimal solution can be obtained, for example, using a simple model of economic order quantity (EOQ).

Optimization model, even if they involve certain restrictive conditions indicate the best option problems of solution selected from a number of possible solutions. Modern optimization model constructed using mathematical programming (linear, numerical, dynamic, mixed, etc.), recalculation order. Their use allows many different software packages for personal computers, microcomputers and others.

Strategic issues that are considered in applying optimization techniques include:

- Rationalization of network (support customer service, trust responsibility for customer specific distribution centers, the number and location of distribution centers, transactions carried out in distribution centers - at their own expense or through external service providers, the number of units of stocks that need to be stockpiled in some distribution centers, order supplies distribution between the centers of distribution, the number and location of production facilities, the number and method of production of individual institutions, analysis of network providers, the need to establish centers that will consolidate the delivery of materials for the choice of means of transportation.

- Sensitivity to changes in the cost and level of service, value distribution and customer service; cost allocation based on the number of distribution centers; demand analysis.

- Questions like “what happens if” in interrelation with: Decision making and economic policy of the company (capacity expansion, introduction of new products, the analysis of policy planning supplies, expansion or liquidation distribution centers), environmental issues (global economic problems, changes in market, strikes, natural disasters, power outages) [1].

The main advantages of optimization models:

- Guarantee the best possible solution for a given set of assumptions and data;
- The opportunity to properly handle data network structure;
- Correct analysis and evaluation of the decisions improves efficiency further analysis;
- Implementation of reliable comparisons between threads for making the best decisions.

One of methods of optimization that is high demand is linear programming (LP). This method is most useful for creating a network of facilities, with the size of demand and supply create the boundary conditions model. The method has limited application because the problem is solved with the help should be formulated determined way and must undergo a linear approximation. For the linear programming cannot be taken into account fixed and variable operating costs of logistics facilities.

The use of mixed integer-linear programming can solve the problems associated with the fixed and variable costs, limited potential layout of production and sources of supply.

Another method of network design involves the development and use of simulation models. Simulation is defined as “the process of designing the actual network models and experiments on it in order to understand the principles of the system or evaluate various strategies, taking into account the constraints imposed criterion or several criteria.” Simulation modeling is developed using and then held under observation changes influence value, the performance of network restrictions and other factors.

Sensitivity analysis concerns the analysis of location, design, allowing the manager to decide to study the effect of choice of location for expenses and maintenance. Modeling requires collection and analysis of a wide range of data to determine the interaction of components such as transportation, storage, inventory, processing materials and labor costs. Modeling does not guarantee the optimal solution, but can only evaluate decision alternatives entered into the model.

Probably the most widely used innovative solutions in inventory management approach represented “just in time” (JIT). Currently, the business community often talk about the production process of “just in

time” inventory “just in time” delivery system or “just in time”. Current understanding of the expression “just in time” implies that inventories should be available when the company needs them.

The goal of systems based on the concept of “just in time” is cycle management of orders and off waste. Ideally, the product should enter the enterprise at a time when the company needs it, without deviation from the agreed date. A lot of “just in time” is focused on short, regular cycles orders. This explains the current popularity of “rapid response” as a decision support system of stocks.

The concept of “just in time” is an USA version of the system developed by Japan's Toyota Motor Company, called Kanban. Name “kanban” refers to the information cards attached to the vehicle by which, supplied to a small number of necessary components to various business establishments in Japan. Each card indicates the exact number of items required for replenishment and exact time of delivery [2].

The advantages of JIT are:

- Elimination of production and materials;
- Improving communication, both internal and external;
- Reducing the cost of procurement;
- Reducing the time of delivery;
- Reducing the time of formation of the product;
- Increasing productivity;
- High-quality products;
- High speed of response to customer requirements.

The main idea of the concept of JIT is to maintain minimum stocks. This leads to the need to improve communication both internal and external, in order to maintain continuity of production with a decrease in inventories. To improve internal communication, the company is implementing information systems to allow processing of transactions in real time. In order to improve the communication has been implemented in the new concept of electronic data interchange (EDI).

Experience shows that effective implementation of JIT concept can affect the substantial reduction in inventories and materials work in progress and finished products. The concept of “just in time” is based largely on the quality of products and components composing [3].

The concept of JIT based on four basic principles: lack of inventory; short cycles of work; small consignments; a high quality. The concept of “just in time” - a modern solution used to manage distribution, production and reserves. This operating concept consist the provision of materials in specific quantities and exact time of when they are needed. JIT system helps improve quality, minimize costs, and thus change the entire system operation.

JIT concept allows managers to reduce unit costs and improve customer service. The main difference between the concept of JIT and more traditional approaches is that in the JIT aimed to stabilize and reduce cycle time and minimize or eliminate the stocks. As a result, the company saves by reducing the costs under inventories and seeks to improve the efficiency and flexibility of its system. Proper use of “just in time” allows you to synchronize strong and dynamic partnership network by excluding stocks from its components.

Another method of inventory management is materials requirements planning (MRP). MRP refers to the supply of materials and components for production, demand for which depends on the demand for a final product.

MRP system consists of a series of logically interrelated processes, rules and registers whose objective is the distribution of the main task of the network into smaller components in the time space-related needs in inventories and planning covering those needs. MRP takes into account the needs of the network and ensure their coverage due to changes in production planning, supply, stocks and the structure of production. It also allows you to calculate the net demand for individual stocks, determine their distribution in time and outline the necessary volumes that can cover the need.

Objectives system MRP: provision of sufficient materials, parts and products planned for production and delivery to the customer; maintaining the lowest possible level of inventory; production planning, supply procurement. To achieve these goals, the MRP system takes into account the current and planned number of parts and inventory products, and the duration of the planning period.

Calculation of material requirements. Planning starts with determining the number of finished products that clients need, and the time that they should get them. Then calculated the need for component parts products based on the production plan of the final product. The key elements of the MRP are:

- Master production schedule (MPS). Master production schedule is planned based on actual customer orders and forecasts demand. This is the basis of all systems MRP. It distinguishes that end products the company manufactures and when they need customers. The main production schedule includes detailed production schedule of stocks and the time for which they should be made [4].

- Bill of material file, (BMF). The structure of the material determines the exact amount of raw materials and components needed for the production or assembly of the final product. The list of materials shows when the materials to be provided and what their interrelationships for the final product.

- Inventory status file (ISF). The inventory is to make the company deduct the materials at its disposal, and determine the need for additional reserves. Register stocks also includes important information regarding the need for stocks of selected items and the time of delivery. Register stocks plays a crucial role in the implementation schedule planning and helps minimize inventory.

- Program Material Requirements Planning (MRP). Based on the demand for the final product mentioned in mainly manufacturing schedule and information necessary materials, program MRP puts the demand for the final product into its component materials. The program then calculates the total demand for these materials are based on information from the register of inventory and prepare orders for materials needed for production. These orders correspond to the size of demand for the material and its distribution in time [5].

- The results of the report. After completion of the program will MRP calculations obtained important results and reports for decision support managers responsible for logistics, production and installation. The report presents information related to the number of materials that must order company, and the terms in which it must do; possible need for acceleration terms of delivery of products; state planning system supply materials. These reports are required for systems management planning materials.

Distribution resource planning, (DRP) is a widely used and effective method for determining appropriate inventory levels in distribution systems. With this method, companies can improve customer service, reduce the overall level of stocks of finished products, reduce transportation costs and simplify transactions carried out during the distribution. Given these benefits manufacturers show great interest in the feasibility of DRP.

Method DRP, usually used in conjunction with MRP, which helps manage and minimize inventory in the supply that require a large number of positions. Parts that need to be combined and used in the assembly of the finished product is usually delivered at different times. Therefore MRP system is connected to the main production schedule, which provides guidance range of elements in the proper order. This figure is then used as the basis for predicting the actual demand for components for determining the time when there is demand. Once agreed schedule production time delivery of some items is to schedule indicating when the order will go to specific details. The size of the order should be determined by comparing existing stocks with a total size required to schedule their number.

MRP method minimizes the inventories to the extent in which the main production schedule accurately reflects what is needed to meet market demand. If the production schedule does not meet demand, the company suffers from an excess of some components and other deficits.

The main argument in favor of the DRP is more accurate demand forecasting, and further use this information to develop production schedules. Thus, the company can minimize inventories in the supply, using the method MRP schedules and processed products. Inventories for finished products can be minimized using the method DRP. Most models DRP is more complex than an autonomous model of MRP, which also allows you to develop transportation schedules.

The main idea of the concept of Demand Chain Management is the assumption that data on demand may be higher than the demand. Nature of supply includes items such as geographic location, seasonality, the optimal size and size of the complex delivery orders. The concept of supply chain management emphasizes that the main stimulus that causes the flow to move material should be consumer demand. In other words, instead of having to push products in the supply chain, based on the valuation of demand

valued supplier, you must go to the supply chain management based on pull Information from the final customer [6].

Today outsourcing has become one of the most active sources of income. From its earliest time, many companies turned to outsourcing. Technology development and availability of joint electronic data greatly expanded the range of services offered by outsourcing companies. The effectiveness of the company is determined when we know which activities should be carried out within the company and to be transmitted. These types of decisions are the key to ensuring the long-term performance and profitability.

Logistics functions focused on movement and storage that must be made in the supply chain companies are increasingly becoming the subject of outsourcing.

Outsourcing associated with intentional movement of certain business processes to an external company, mainly such as information services, warehousing, distribution, real estate management, employee benefits, customer service centers, production, station Web pages, sales via the Internet, credit cards, design and other. In case of transfer processes, risks and business assets are generally also transferred to the outsourcing company.

The reasons for using outsourcing services can be divided into five groups: finance, technology, resource management, network management.

Many large companies are obliged to declare in its financial statements and on the stock exchanges of assets in leasing and methods used when accessing the market. Companies often have limited access to financial resources and therefore turn to outsourcing companies. Sometimes, outsourcing provider can get soft loans because its activities are subject to lower risks [7].

Competitiveness can be achieved through the extensive integration of new technologies in the company (if they are useful). However, considering the possibility of investing in the development of technologies, companies sometimes use outsourcing company than to implement them yourself. Then the company can focus on their duties, which would allow not to waste time mastering no duties.

Resource management of company, focused in different places that should be the same, regardless of whether the production resources are concentrated near or distant. Assuming that most of these locations require additional maintenance, personnel and funds transfer profitable their maintenance outsourcing. In addition, the outsourcing company acts as an independent manager for resources and the value of fixed assets.

Network management is that companies should focus their efforts and managerial skills in areas where they are really strong – otherwise, they must find a partner in outsourcing to help them.

Assuming that outsourcing activities based on cooperation between the companies to ensure service delivery or product range, potential gaps in the cooperation will be visible to external companies. The reason mainly is the differences in strategy, goals, culture, and at a basic level - add different styles of management and mutual trust and respect. Managers need to see from the beginning of the level of detail of the tender documentation, accurate descriptions of openness and customer management and the reasons for outsourcing. Any concealment, at this stage could have consequences that hamper contract.

Given the relationship in the supply chain, it is important to conduct a thorough analysis of the level of cooperation and relations between the partners in a particular network, in order to monitor the development and preparation of the plan of placing a specific chain network. This may help to use different models, such as the model of Poirier supply chain management maturity. It consists of four levels [8]:

- Sourcing and Logistics – characterized by functional excellence and execution of tasks such as reducing suppliers, inventory levels and costs;
- Internal excellence – adjustment of financial accounts and management processes;
- Network construction – joint implementation partner of various processes across the enterprise and their planning;
- Industry leader – the widespread use of technology, relationship of supply and demand and global approach.

For the four levels of Poirier's model contains nine factors that help participants identify specific level. They include project management, their preferences, types of projects, used tools, financial goals and contracts with suppliers. Poirier's model provides a good illustration of how the company can improve its

position inside, and then enter the market through its own network or supply chain, which may be leading in their field.

Next model similar to the Poirier's model was processed PRTM consulting firms and Performance Measurement Group (PMG), together with the Supply Chain Council. They developed a model in four stages:

Its steps include [9]:

- Functional approach – measures the level of structural units according to their function, which allows clearly carry out its tasks in the supply chain;
- Internal integration – resource management at the functional level and at the level of the entire company;
- External integration – members of the network to develop common goals and plans and coordinate the sharing of data;
- Cooperation between many enterprises – characterized by planning, making decisions and responding to customer needs in real time, achieved synchronization processes, mainly through IT solutions and e-business.

Conclusions and recommendations for further research. The development of strategic supply chain management models depends on the development and evolution of information and nanotechnology, as well as innovation. All appear newer methods are sophisticated and more useful than the previous to the current conditions of the market. This helps to more quickly and accurately to meet customer needs.

1. Крикавський Є. В. Концепція кластера у формуванні потенціалу конкурентоздатності деревообробних підприємств: монографія / Є. В. Крикавський, О. А. Похильченко. – Львів : Видавництво Львівської політехніки, 2012. – 352 с. 2. Смоляр Л. Г., Котенко О. А. Мережеві структури як сучасна форма організації економічної діяльності [Електронний ресурс] // Електронне наукове фахове видання «Ефективна економіка». – Режим доступу: <http://www.economy.nauka.com.ua/?op=1&z=1660>. 3. Bozarth C.B., Handfield R.B., Wprowadzenie do zarządzania operacjami i łańcuchem dostaw. Helion, Gliwice 2007. 4. Szymonik A., Logistyka i zarządzanie łańcuchem dostaw, Difin, Warszawa, część 1, 2010. 5. Харрисон А. Управление логистикой: разработка стратегий логистических операций / Алан Харрисон ; пер. с англ. под ред. О. Е. Михейцева. – Днепропетровск : Баланс Бизнес Букс, 2007. – 368 с. 6. Талан М. В. Моделювання логістичних стратегій торговельних підприємств / М. В. Талан // Вісн. Ін-ту підприємництва та перспективних технологій при Нац. ун-ті “Львівська політехніка”. – 2008. – № 633. – С. 696–701. 7. Douglas M. Lambert. Supply Chain Management: Processes, Partnerships, Performance. Third edition. – Sarasota: Supply Chain Management Institute, 2008. – 431 s.