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Kashitsina A.S., Dubnitskiy V.I.

PROBLEMS OF MODELING SUPPLY CHAIN INDUSTRY

SHEI «Ukrainian State Chemical Technology University», Dnepr

The scientific article is devoted to the problems of ensuring the sustainability of supply chains. In this study, the goal was set to address the causes of instability in the environment of the supply chain in the market. It is characterized by specificity to ensure security of supply and, above all determined by the concept of stability and reliability. The author has analyzed the trends to ensure such reliability. comparative analysis of methodological approaches to the modeling of the supply chain was conducted. It has also been designated and defined algorithm for the correct formulation of the supply chain. Based on this and identified issues of modeling of supply chains. In the future, the theme of this article can be used as a basis for the correct formulation of the supply chain in order to avoid problems and errors in the simulation of supply chain logistics. Since, in this paper we consider the problem of modeling the supply chain in the industry, and therefore the mathematical model will be based on industrial processes. This article describes not a perfect simulation algorithms and shall not run correctly, so the author suggests an optimal mathematical model, which describes the supply chain as a process of stockpiling, using the results for queuing systems with limited resources.

Keywords: Supply chain, modeling problems, the simulation algorithm, circuit reliability analysis of the problem, mathematical model, logistics.

Analysis of previous studies

The famous concept of SCM (Supply Chain Management) assumes generally the functions of planning, organization and control of the supply chain, the links of which are suppliers of raw materials producers, intermediaries and consumers goods.

D. and J. Lambert. Stock describe this concept as follows [1]: supply chain management is the integration of key business processes, starting with the end user and covering all suppliers of goods, services and information, adding value to consumers and other interested faces.

Supply Chain Management – a modern management concept, which is the development of an integrated approach to logistics. The objectives of supply chain management are: minimize total logistics costs to achieve maximum profit and minimum cost of individual units.

Setting goals

Objective – with anal and rating supply chain modeling problems in the enterprise.

Basicconceptsofsupplychainandtheir properties

Supply chain may take the form of a network, which is tops economic elements and connections between them correspond to material flow [2].

The definition of «supply chain» American specialists in logistics is: «it is three or more economic entities (organizations or individuals) that are directly involved in internal and external flows of goods, services, finance and/or information from the source to the consumer» [3].

The essence of supply chain can be illustrated by a simple example. Fig. 1 shows one food supply chain: Supplier supplies manufacturer one kind of material resources through an intermediary, the company Manufacturer (FC) delivers one type of goods to the consumer through an intermediary. Central to this is an enterprise-chain producer (focal company), the purpose of which is to increase profits and reduce logistics costs. Focal company can be not only a manufacturer of goods, but also a mediator. In this case, the circuit is simplified: the mediator is a tipper point to the movement of financial resources [3].

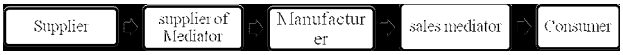

Fig. 1. Schemea single-commodity supply chain

Like other economies, supply chain structure and has a number of characteristics: reliability, manageability, flexibility and adaptability. The efficiency of the supply chain depends on its reliability.

Reliability, stabilitysupply chain, as an economic category

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Potentially unstable supply chain in modern conditions, in many cases characterized by the following trends:

– Increase the intensity and complexity of the material and information flows;

– Complications of organizational and economic relations in the supply chain;

– Reduction of inventory in the supply chain.

It is necessary to consider that the methodology to ensure sustainability of supply chains is the classical notion of stability, the main feature of which is that it relates to a particular system and the behavior of its trajectory neighborhood of equilibrium. As supply chains are socio-economic systems that are similar in structure to ecosystems than to physical or mechanical, essential in this case is the existence of conditions in their balance. These conditions determine the position of the boundary of the stability of supply chains that are changing along with the development and supply chain ability to stay in this area is characterized as their «vitality.»

The region of stability of supply chain thus characterized by a range of possible variations of predictive values of their members, who must be prepared to ensure that these values change. To find the reality of these ranges in some cases using the theory of reliability of technical systems, in accordance with which, the state of a single element is characterized as «normal operation» or «refusal». In particular, the theory of supply it is the reliability of supply, which is often correlated with the probability of execution of its contractual obligations suppliers.

Classical economic category of «reliability of supply» are essentially system-factor in the preservation of their supply chain stability with the existence of economic fluctuations. Reliability interpreted as broadly as the ability of the system to ensure supply of achieving the main goal, which is defined as the timely delivery of planned production volumes in the set and nomenclature. With that as a measure of safety speaks probability of required volumes, nomenclature and terms of supply [4].

Supplyreliabilityassessment

The classic method creating objective conditions for increasing the reliability of vendors, it serves as a preventive assessment at one time or another. Not the last role informal evaluation of vendors, the choice is often based on a personal assessment of his qualities, including that generated correspondence with the advice of others.

Among the methods of formal assessment of suppliers of often take into account the following:

– Check the reliability of potential suppliers through a trial order

– The use of services provided by specialized agencies

– Remote analysis of potential distributors and others.

It should be noted that successful trial order does not ensure reliability in the long term because there are additions that should be considered and used in the evaluation:

a – Technical and product vendors the ability to perform full-scale orders for delivery in the same format conditions as the test;

b – Motivation suppliers regarding conditions following format demonstrated in the performance test order.

The complexity and the inability of mathematical verification of reliability of supply reasonably led in order to solve this problem using a broad economic-static approach.

Ensuring security of supply in sales is partly achieved by appropriate techniques that are used in the supply. It should be mentioned that the logic of finding solutions in this area is defined tasks conquest of distribution of material resources achieve global sales target – ensuring a competitive level of service (logistics services) customers.

Indicators of customer service are:

1. Access to the inventory (the likelihood of shortages, the number of satisfied applications for delivery as a percentage, frequency coverage of stocks to order for delivery);

2. Functionality (speed of order execution custom orders);

3. Reliability of supply (execution of the planned availability of stock);

4. Territorial comfort (customer satisfaction The location of the sale of goods) [5,6].

Features assessing the likelihood of certain types of failures in the functioning of the supply chain, so by its nature is limited, so it is clear that special attention should be given to measures to ensure the stability of the logistics systems of this kind [5].

Modelingsupplychain

Economists, both domestic and European, often point to the fact that the commodity exchange in the broadest sense is a chain interactions. One of the items associated with the understanding that in the developed market mechanism on a regular basis on a massive scale involving two types of chain reactions of high-speed self-organizations mesoeconomicsbonds [7].

The first act erratically under the influence of supply; the second is a replacement purposeful management of economic relations [8].

The concept of operation of the supply chain, based on a structural harmonization functional logistics cycles [5]. Schematically, this concept is shown in Fig. 2, looks like a «logistics pipeline» [9].

Details logistics processes in the supply chain can be represented as a matrix approach to the visualization of logistical structures (Fig. 3) [10].

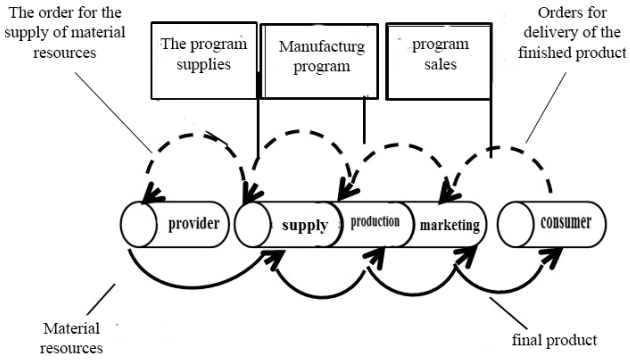

Fig. 2. Modeling supply chain based on functional cycles logistics

It should be noted that one of the imperatives of modeling criteria is to ensure the economic and financial balance in such structures. The need for it is due to the need to supply verification plans. This is budgeting supplies often cannot use model of economic size of the order, since it is based on a decision cannot be made in various financial reasons.

Modeling algorithms chainandsupplyprojectdesignproblems

Modeling algorithm boils down to the following steps:

− Concept development project supply chains;

− Supply chain modeling based on standards IDEF − Technology;

− Forming the network model supply chains;

− Development Gantt.

This approach is not ideal, the relationship between the enterprise and logistics processes in modeling is determined [11].

The next approach is based on modeling of circuits based ERP-systems and appeals to simulate the machine [9]. Using such a system a priori designed to solve control problems of one company, instead of the supply chain.

The main mistake is:

− Lack of proper reasoning and additional economic calculations about the interpretation of Control sustainable supply chain;

− Convert a systematic approach to end in itself.

The downside of this approach modeling, first, that it is not new, it is very similar to the principle of general systems theory; Second, the gap with a partner, often entails consequences (significant transaction losses), so most companies sign long-term contracts; Third, the use of ERP-systems as a tool to ensure sustainability of supply chains complicate the following points:

− Resistance divisions, chain participants to provide confidential information reduces the efficiency of the system;

− Crashes caused by supply often conduct simulation modeling to estimate the disturbance that increases passive ERP-systems;

− Adapting supply chains may need restructuring.

One of the pressing problems of supply chain modeling is the identification of economic nature, the limits of supply chain management. There are all bases to believe that should be allocated to the upper and lower limits of the integrity of the supply chain. The first, identified with certainty its many businesses that can really enter into it without prompting in this chain beyond its trans promotional stability. The second of them, a lower limit, characterized by a number of in-house processes that are critical to the entire supply chain.

Additionally, you must consider the following factors that make the complexity of modeling:

− Members chain is not always consider themselves participants;

− Supply Chain Management gives traditional functional boundaries interactions contractors.

The conclusion of this work is the fact that for optimal, controlled and correct operation of the supply chain enterprises should first of all be − aim to maximize profits or minimize costs. In our case example of optimum performance supply chain has become a model conservation reserves, built a mathematical model considering all influencing factors in all others is the optimum size of the order party supplies, at what will be minimized costs and correctly would run the chain, the system will not bear losses and can be used as a working model of the enterprise.

Conclusions

The conclusion of this work is the fact that for optimal, controlled and correct operation of the supply chain enterprises should first of all be - aim to maximize profits or minimize costs. In our case

Productiontypology		Structural and production supply chains scheme						
		The elements of the supply chain						
		Supplier		Enterprise – ob'yektdiagnosis	Logisticsmediator		Consumers (end)	
		Dest.	OJEC.		Dest.	Pro.	VIP	other
		i	j	...	...	N	...	R
Ex.	i							
Exit.	j		r_{ij}					

Fig. 3. Picture relationships in the supply chain

example of optimum performance supply chain has become a model conservation reserves, built a mathematical model considering all influencing factors in all others is the optimum size of the order party supplies, at what will be minimized costs and correctly would run the chain, the system will not bear losses and can be used as a working model of the enterprise.

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ПРОБЛЕМЫ МОДЕЛИРОВАНИЯ ЦЕПЕЙ ПОСТАВОК ПРЕДПРИЯТИЯ

Кашицына А.С., Дубницкий В.И.

Научная статья посвящена проблемам обеспечения устойчивости цепей поставок. В данном исследовании была поставлена цель, устранить причины нестабильности в среде цепей поставок на рынке. Она характеризуется спецификой, такой чтобы обеспечить безопасность поставок и, прежде всего, определяется понятием стабильности и надежности. Автор проанализировал тенденции для обеспечения такой надежности, был проведен сравнительный анализ методологических подходов к моделированию цепочки поставок. Также был определен алгоритм для правильной постановки цепочки поставок. Исходя из этого и были выявлены проблемы моделирования цепочки поставок. В будущем, тема этой статьи может быть использована в качестве основы для правильной постановки цепочки поставок для того, чтобы избежать проблем и ошибок в моделировании цепочки поставок материально-технического обеспечения. Так, в этой статье мы рассмотрим задачу моделирования цепочки поставок в отрасли, и, следовательно, математическая модель будет базироваться на производственных процессах. В данной статье описывается не совершенный алгоритм моделирования и не должны работать правильно, поэтому автор предлагает оптимальную математическую модель, которая описывает цепочку поставок как процесс накопления запасов, используя результаты для систем массового обслуживания с ограниченными ресурсами.

Ключевые слова: цепочки поставок, проблемы моделирования, алгоритм моделирования, анализ надежности схема задачи, математическая модель, логистика

ПРОБЛЕМИ МОДЕЛЮВАННЯ ЛАНЦЮГІВ ПОСТАВОК ПІДПРИЄМСТВА

Кашицина А.С., Дубницький В.І.

Наукова стаття присвячена проблемам забезпечення стійкості ланцюгів поставок. В даному дослідженні була поставлена мета, усунути причини нестабільності в середовищі ланцюгів поставок на ринку. Вона характеризується специфікою, такий щоб забезпечити безпеку поставок і, перш за все, визначається поняттям стабільності та надійності. Автор проаналізував тенденції для забезпечення такої надійності, був проведений порівняльний аналіз методологічних підходів до моделювання ланцюжка поставок. Також було визначено алгоритм для правильної постановки ланцюжка поставок. Виходячи з цього і були виявлені проблеми моделювання ланцюжка поставок. В майбутньому, тема цієї статті може бути використана як основа для правильної постановки ланцюжка поставок для того, щоб уникнути проблем і помилок в моделюванні ланцюжка поставок матеріально-технічного забезпечення. Так, в цій статті ми розглянемо задачу моделювання ланцюжка поставок в галузі, і, отже, математична модель буде базуватися на виробничих процесах. У даній статті описується не досконалий алгоритм моделювання і не повинні працювати правильно, тому автор пропонує оптимальну математичну модель, яка описує ланцюжок поставок як процес накопичення запасів, використовуючи результати для систем масового обслуговування з обмеженими ресурсами.

Ключові слова: ланцюжки поставок, проблеми моделювання, алгоритм моделювання, аналіз надійності схема завдання, математична модель, логістика.