ИНФОРМАТИКА, ВЫЧИСЛИТЕЛЬНАЯ ТЕХНИКА И УПРАВЛЕНИЕ / COMPUTER SCIENCE, COMPUTER ENGINEERING AND MANAGEMENT

Structuring of Logistics Management Organizational-Technological System

S. Al Salaimeh[*]**, A. Miqdadi**
Aqaba University of Technology (Aqaba, Jordan)
[*]*safwan670@yahoo.com*

Introduction. The task of the synthesis of the rational structure of logistics management, organizational and technical systems, belongs to the class of poorly formalized. The solution of such task is dependent on specific statement structuring, subject area, and applied formalized, heuristic or intellectual procedures.
Materials and Methods. The task of structuring is to develop a mathematical model, methods selection and rational analysis algorithms and synthesis of the structure of the logistics and organizational technological system based on the principles of decomposition and aggregation, identification, optimization and coordination of the rational decision to achieve the overall effect of systems, the excess amount of effects, receipts from each component to the logistics systems separately.
Results. This paper presents the structuring of logistics management organizational-technological system. The tasks of constructing an integrated structure of the organizations functional technological management system belongs to class of nonlinear stochastic programming.
Conclusions. The solution allow to achieve the overall effect of systems, the excess amount of effects, receipts from each component to the logistics systems separately.

Keywords: organizational structure, organizational-technological system, logistics, logistics management, non-linear stochastic programming

Структурирование организационно-технологической системы управления логистикой

С. Аль-Салаймех[*]**, А. Мигдади**
Технологический университет Акабы (г. Акаба, Иордания)
[*]*safwan670@yahoo.com*

Введение. Задача синтеза рациональной структуры управления логистикой, организационными и техническими системами принадлежит к классу недостаточно формализованных. Решение такой задачи зависит от специфического структурирования

положений, предметной области и применяемых формализованных, эвристических или интеллектуальных процедур.

Материалы и методы. Задачей структурирования является разработка математической модели, выбора методов и алгоритмов рационального анализа и синтеза структуры логистической и организационной технологической системы на основе принципов декомпозиции и агрегации, идентификации, оптимизации и координации рационального решения для достижения общего эффекта систем, избыточного количества эффектов, поступления от каждого компонента к логистическим системам отдельно.

Результаты исследования. В данной статье представлено структурирование организационно-технологической системы управления логистикой. Задачи построения интегрированной структуры функциональной технологической системы управления организациями относятся к классу нелинейного стохастического программирования.

Обсуждение и заключения. Решение описанной задачи позволяет достичь общего эффекта систем, избыточного количества эффектов, поступлений от каждого компонента к системам логистики отдельно.

Ключевые слова: организационная структура, организационно-технологическая система, логистика, управление логистикой, нелинейное стохастическое программирование

Introduction

The logistics management system is created to coordinate production, economic activities, financial, and economic support, and information services of a set of interrelated unites of integration of organizational technological systems. The first production transport logistic systems appeared during the Second World War to solve the tasks of strategic interaction of the defenses industry, material and technical supply, and transport with the purpose of timely provision of the USA army with weapons, combustive lubricating material and food [1–3].

A logistic system of organizational technological type include material technical supply, storage of raw materials and computers, manufacture of finished products, sending goods to the interim storage warehouse, final sale, and consumption the finished products. Information and computer support of these systems act as two hypostases as information or computer support for decision makingby a specific type of logistics system and as an independent logistics information management system (IMS). In the second case IMS constructed on the basic of special software, turns the information from a servant factor into an independent productive force. Able to significantly increase labor productivity and minimize production costs, so significantly increases the efficiency of the functioning of the logistics management organizational technological systems (LMOTS) [4–6].

Materials and Methods

The quality of organizational and technological management largely depends on the structure of the organizational and technical system of the conditions its operation. Structures mean many elements (production units, subsystems organizational technological systems and information management systems, and tasks), being form a certain integrity. The structure in narrow sense reflects a relatively stable one and invert regularities which relate to the internal structure and organization of the system. In a broad sense, these concepts are supplemented by features of functioning, reflecting the specific of the relationship between parts, the patterns of distribution of material and information flows and so on [9–10].

The task of structuring is to develop a mathematical model, methods selection and rational analysis algorithms and synthesis of the structure of the logistics and organizational technological system based on the principles of decomposition and aggregation, identification, optimization and coordination of the rational decision to achieve the overall effect of systems, the excess amount of effects, receipts from each component to the logistics systems separately.

Logistic management organizational technological systems are properly applied in a number of industries and non-productive sphere. These systems already formed industrial, constructional, commercial, information, and computer logistic. The solution of poorlyformed tasks of computer logistics often rests with specialized experts system or not a computer network administrator, server without data, electronic communication nodes.

Computerized logistic system is a kind of administrator coordinator organization of rational work of a set of interconnected information management systems.

In the world market of computer technology and the logistics system of the industrial trading, transports are quite fully represented. So that, the universal enterprise management was designed by the Rational Rose, it is equipped with models of logistics and the following functions:

– management of material flows;
– planning the needs of enterprise in the materials;
– market analysis of supplies;
– warehouse management;
– partners of the operation;
– account control;
– inventory.

The concepts of openness of information provide the possibility decentralized self-control at level of user department and units [11–14].

As a result of construction of the organizational and technological systems, rational logistical solution can also be obtained for the logistic systems, finance systems, system of analysis of activities, and personnel management systems.

Results

A wide range of function of organizational and technological management determines the variety of tasks to be accomplished. All the tasks of planning and controlling and management production and sight and divisions and in particular can be divided into direct and back. In direct tasks for a given set of factors, you need to determine the value of objective function. In back tasks, a set of factors corresponding to the optimal value of the objective function or optimal in some sense conditions.

Bellow, we consider a number of aspects related to the features of the solution of the revers optimization tasks of production planning and management. The tasks of constructing an integrated structure of the organizations functional technological management system belongs to class of nonlinear stochastic programming [15–19]:

$$S^* = argexter_{s \in S_D} E\left\{\sum_{j=1}^{K} \lambda_j \left[Q_j(S) - Q_j^*\right]/Q_j^*\right\}\zeta, \ (1)$$

where S_D – area of admissible solutions. (Structures), satisfied equation of the material balance of the sequence of information transformation, stage of development of quasi optimal plans and management decision; $Q_{1\xi}, Q_{2\xi}, Q_{3\xi}$ – indicators, respectively, the quality of the performance of the functions assigns to the system, completeness and reliability and timely receipt of information for management purpose; the total cost of creating and operating a particular type of structure; λ_j – weight criterion, and $\sum_j \lambda_j = 1; E\{*\}$ the operator of the mathematical exception.

Formalization of the task (1) requires additional information about the parameters and characteristics of the synthesized structure.

The parameters are necessary for the specification of constrains the totality of which determines the area of admissible solutions S_D. Observing the performance characteristics are necessary to find the em-

pirical distribution density and taking the operator of mathematical exception $E\{*\}$.

Replacement of actual parameters and characteristics of initial data for design can lead to unpredictable results.

Therefore, in the synthesis of structures, management the formulation of the task, for the solution of which you can use heuristics and procedures.

Integral multi-level structure and functioning of the organizational-technological management system is presented as

$$S_{OTC} = S_{pr}, S_{or}, S_{in}, S_{Al},$$

where S_{pr} – the production structure reflects the composition and interrelationships of the parts of the units and other units and in closed production; S_{org} – an organizational structure that establishes a link between the various management functions and activities within the system; S_{int} – technical structure that reflects the location and operation of the meant of collection, transmission, and processing of information; S_{alg} – algorithmic structure reflecting the mathematical description of the task and the functions and their decision.

The production structure S_{pr} – is built a technical principle, reflecting the sequence of transformation of material recourses into finished products. One of the options S_{pr}:

$$S_{pr} = S_{MTS}, S_{Bp}, S_{Mar}, \qquad (3)$$

where S_{MTS}, S_{Mp}, S_{Mar} – the structure of the material and technical supply; main production; and sales of products.

The organization structure S_{org} reflects the composition and subordination between governing bodies of organizational and technological systems; its units production; officials in the decision making process. It assigns other functions to the subdivisions of the administrative apparatus, S_{org} it is multi-level and the relationship can be represented

$$S_{pr} = S_{MTS}, S_{Bp}, S_{Mar}, \qquad (4)$$

where S_{PP}, S_{OC}, S_{Om} – the structure of the production planning according; operational control; and operational management.

Information technical structure S_{iTec} intended for the modern, fully and qualities provision of information to officials and technical means, participating in the development of solutions, can be represented by the ratio:

$$S_{iTEc} = S_{ctd}, S_{in}, S_{Tc}, \qquad (5)$$

where S_{ctd}, S_{icn}, S_{Tc} – the structure is correspondingly to the system for collecting the transmission and processing of data; information networks; and technical controls.

Algorithmic structure S_{Alg}, reflecting the mathematical explanation of the problem and ways of the relation:

$$S_{Alg} = S_{cr}, S_{m}, S_{Alg}, S_{P}, \qquad (6)$$

where S_{cr}, S_{M}, S_{Alg}, S_{P} – the structure accordingly criteria of efficiency of solved problems; mathematical models; mathematical; algorithms; and software.

From the set of permissible structure of the functioning of the organizational technical system should choose the most preferable and the aggregate of technical indicators according to the expression (1). The chosen structure should be economical to ensure efficient production management in real time and minimum costs. Exclude an unreasonable multistage management. Change the production structure requirement of the perfection of the organizational, information, technical, and algorithmic structure.

Conclusions

The task of the synthesis the rational structure of logistics, organizational and technical systems, in the general case belongs to the class of poorly formalized. The solution of such task is dependent on their specific statement structuring, subject area, and applied formalized, heuristic or intellectual procedures are decide. This paper demonstrated the structuring of logistics management organizational – technological system. The task of

structuring is to develop a mathematical model, methods selection and rational analysis algorithms and synthesis of the structure of the logistics and organizational technological system based on the principles of decomposition and aggre-gation, identification, optimization and coordination of the rational decision to achieve the overall effect of systems, the excess amount of effects, receipts from each component to the logistics systems separately.

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About authors:

Safwan Al Salaimeh, Professor, Software Engineering Department, Aqaba University of Technology (79 Wasfi al-Tal Street (Gardens), Amman 11191, Jordan), Ph.D., ssalaimeh@aut.edu.jo

Amjad Miqdadi, Assistant Professor, Business Administration Department, Aqaba University of Technology (79 Wasfi al-Tal Street (Gardens), Amman 11191, Jordan), Ph.D. (Business Administration), amiqdadi@aut.edu.jo

All authors have read and approved the final version of the paper.

Об авторах:

Сафван Аль-Салаймех, профессор департамента инженерного программного обеспечения, Технологический университет Акабы (11191, Иордания, г. Амман, ул. Васфи Аль-Таль (Гарденс), д. 79), доктор философии, ssalaimeh@aut.edu.jo

Амджад Мигдади, доцент департамента делового управления, Технологический университет Акабы (11191, Иордания, г. Амман, ул. Васфи Аль-Таль (Гарденс), д. 79), доктор философии (по деловому управлению), amiqdadi@aut.edu.jo

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