CHAPTER 3
MODERN MANAGEMENT TECHNOLOGIES

MANAGEMENT ANALYSIS OF SUPPLY CHAIN PERFORMANCE AND EFFICIENCY

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Abstract. *The article presents the results of a study on the peculiarities of performance and efficiency analysis of supply chains. It demonstrates that the economic activities of enterprises in an increasingly dynamic external environment require prompt and comprehensive solutions, significant resource potential to respond to external and internal destabilizing factors. In turn, this promotes the integration of enterprises into various forms of organizational and economic interaction to address the tasks of ensuring their competitiveness. It has been found that channels, chains, and supply networks are the most common among such forms. It has been proved that today's scientific literature lacks methodological approaches to the management analysis of supply chains as modern integrative economic formations. The focus of modern research is identifying opportunities of management analysis to assess an individual enterprise in different areas of its activities. In this case, the basic objects of management analysis are the study of operational activities, enterprise expenses, their composition and structure, the use of production resources, and the assessment of performance results. It has been found that to date there have been only isolated publications on the use of management analysis for management assignments within channels and supply chains. To gain a deeper understanding of the issues, the paper analyses alternative views regarding the essence of the supply chain as an economic entity and elucidates the modern concept of supply chain management. The main dimensions of the supply chain have been identified: the substantive dimension, which is infrastructure and material and technical resources, and the subjective dimension, which covers businesses that interact with each other and represent its individual links. And defined the processes of planning, organization and control of the supply chain, which are subject to the modern concept of management "Supply Chain Management" (SCM). In the process of research of features of realization of toolkit of the administrative analysis for the decision of tasks of diagnostics of productivity and efficiency of supply chains the following results are received: the system of base postulates of the administrative analysis of these economic objects is formulated; levels of the administrative analysis of the supply chain are established; the basic criteria of measurement of productivity and efficiency of a chain are defined; assessment indicators of degree of achievement of its purposes are identified; the conceptual algorithm of realization is offered.*

Keywords: *supply chain, management analysis, business unit, supply chain, performance, efficiency, social responsibility.*

JEL Classification: G14, L23, M21

Formulas: 0; fig.: 5; tabl.: 5; bibl.: 12

Introduction. Amid the ever-growing dynamics of external factors, economic activity of enterprises calls for immediate and complex decisions and significant resource potential to respond to external and internal destabilizing factors. This in turn facilitates their integration into various forms of organizational and economic interaction. Among such forms, the most common are supply channels, chains, and networks. Strategic and tactical supply chain management against the background of

growing competition is impossible without the use of reliable tools for diagnosis and analysis of their condition. In today's economic environment, supply chain becomes a new and important object of management analysis. The main issue is the lack of approaches to management analysis of supply chains as modern economic structures. Management analysis of supply chains requires attention of researchers and practitioners from the theoretical and methodological, scientific, and practical points of view.

Literature review. Theoretical aspects of the issue related to management analysis were tackled in papers of domestic researchers, such as R. Brukhanskyi [1], O. Haidayenko [2], T. Mulyk [3], O. Mnykh [4], O. Tomchuk [5], I. Farion [6] and others. In their papers, the authors illustrated various aspects of modern understanding of the nature, significance, and role of management analysis in tackling challenges of day-to-day and strategic management of enterprises and organizations of various forms of ownership, organizational and legal forms of management. Some scholars focus on researching methodological approaches to management analysis in terms of integration processes. However, the research focus is identifying the potential of management analysis to assess a particular enterprise in various areas of its activities. The main objects of management analysis are the study of a company's operating activities, expenditures, their composition and structure, use of production resources, and evaluation of performance. Assessing scholastic developments regarding management analysis, only single publications have so far been devoted to the use of management analysis to solve management objectives from the supply chain perspective. For a deeper understanding of the issue, the supply chain as an economic object has been studied and the modern concept of its management has been clarified. The analysis of professional publications on supply chain management reveals the following [7-16].

Considerable attention is paid to the study of the supply chain by well-known foreign researchers such as D. Bowersox [7], M. Christopher [8], D. Waters [10], J. Stock [11] and D. Lambert [11], R. Handfield [14]. Among national scholars it is worth noting the research papers of Ye.Krykavskyi [9], L. Syhyda [13], O. Sumets [12], N. Chukhrai [15-16] and others. According to M. Christopher: "… nowadays an organization can no longer act as an isolated and independent entity in competition with other similarly ‘stand-alone’ organizations..." [8, p. 25].

The scholar points out a rapid movement of modern markets into the "era of supply chain competition". James R. Stock and Douglas M.Lambert define supply chain management as the integration of key business processes from end user through original suppliers that provides products, services and information that add value for customers and other stakeholders [11, p. 52]. According to D. Waters "… the supply chain is composed of the series of activities and organizations that materials move to their journeys from initial suppliers to final customers…" [10, p. 69]. "… The motivation for forming logistics supplies is mainly driven by the expectation of "materialization" of the potential of external factors of general entrepreneurial nature, which includes the basic megatrends of modernity, including globalization, individualization, informatization and environmentalization…" according to Ye. Krykavskyi [9, p. 154]. Professor O.Sumets explores the supply chain organizational

and infrastructural elements [12, p.97]. He believes that the logistics infrastructure is the mechanism that provides the synthesis, interconnection, and interaction of economic processes through the efficient organization and timely use of logistics at different levels of goods movement [12, p.97]. In her works, Professor N. Chukhrai emphasizes that: "… the formation of the supply chain involves comprehensive support of this process, with the marketing, logistics, information, and communication dimensions to underpin it, while the establishment of modern supply chains is based on the identification and elimination of "bottlenecks" in the supply chain..." [16, p. 94]. Thus, the supply chain is an association of economic entities that interact with each other in the process of creating and promoting specific value for a consumer. In most cases, the value means a certain range of products that meet specific needs of a significant number of customers. Supply chain operations indicate that the form of interaction among participants can be different and even change under the influence of various factors. In the supply chain, it is important to have an established partnership environment between the participants, which implies their trust in each other and the presence of common values and standards of activity. The chain is often interpreted as an integrated process, which is characterized by a certain structure of partial processes. Such a chain can be identified as a network of interconnected entities involved in various processes and actions, which is aimed to deliver a full range of products and services to the end consumer. It is characterized by two main dimensions, i.e., the material-based dimension, composed of raw materials, auxiliary products and cooperative elements that are purchased in the supply market and allocated for the production process, as well as the finished products being transferred from the production field to points of sale; entity-based dimension, in which it covers enterprises that interact with each other and constitute its individual parts. The planning, organization and control of supply chains is subject to the modern concept of Supply Chain Management (SCM).

The objective of supply chain management is to maximize the overall value generated by the supply chain. According to this concept, supply chain management includes the following stages: planning, sourcing, manufacturing, delivery, and return [9]. Some aspects of management analysis of supply chains are studied in research papers of Ye. Krykavskyi [9], L. Syhyda [13], N. Chukhrai [16]. The most systematic analysis of modern approaches to the supply chain performance evaluation as an object of management analysis is in papers [13].

Aims. The article aims to study the implementation of management analysis tools to diagnose the performance and efficiency of supply chains.

Methods. For the research purposes general scientific and specific methods were used. Formalization method is for formulating basic starting points for the implementation of management analysis of supply chains. To assess the analytical input in the chain management process, the methods of analysis (comparative and system-oriented) and synthesis were used, as well as the methods of concretization of activities at each level and interpretation of the content of works. To create an algorithm for the implementation of supply chain management analysis, methods of induction, idealization and modelling were used. Expert evaluation and determination of the

evaluation components in logistics systems were used as specific methods in the research process.

Results. For the correct implementation of the methodology and tools of the supply chain management analysis a range of basic principles were outlined in the paper, namely, analysis is always comprehensive and is carried out to assess the achievement of actual goals of individual business entities and other elements of the chain compared to projected goals; basic measurement criteria are the performance and efficiency of the supply chain as the main evaluative indicators to measure the achievement of goals as to actual realization of its competitive advantages compared with declared competitive advantages; the effectiveness of management analysis is determined by the availability of sufficient, relevant and complete marketing, operational and financial data about the activities of all entities and links in the supply chain. One of the features of the supply chain analysis as a complex economic object is its comprehensive nature, which provides for the mandatory analysis at all hierarchical levels shown in Figure 1. At the level of an individual business entity, management analysis is usually carried out using traditional tools. Depending on the tasks, it can be retrospective, operational, and prospective ones. The second level of management analysis is aimed at assessing the performance and efficiency of the supply chain. In addition to analysing individual participants (suppliers) of the chain, it involves analysing contract activities, rationality and efficiency of the channel, analysis of reliability and efficiency of supplies, compliance of actual deliveries with contracts, analysis of the channel performance and cooperation of its participants.

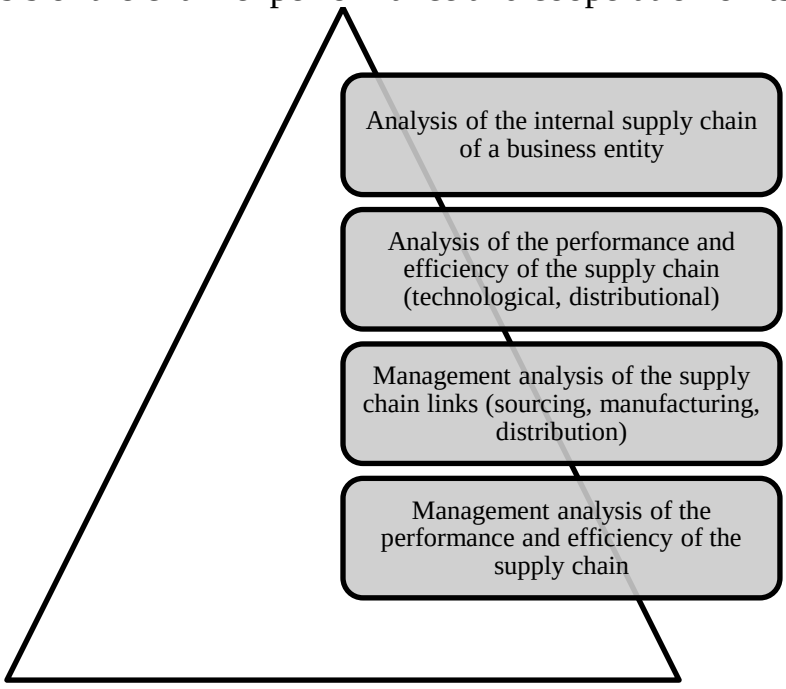

Figure 1. Levels of supply chain management analysis

Source: compiled by the author

The third and fourth hierarchical levels of management analysis differ only in scope of analytical input. Thus, the supply chain management analysis is carried out at the level of individual entities, the level of entity-based interaction (supply channels) and level of individual links in the supply chain and the supply chain as a whole. In

this study, the emphasis was on the study of methodological approaches to management analysis of supply chains and the identification of its features.

Discussion. The algorithm for implementing management analysis of the supply chain is given in Figure 2. The first stage of this algorithm is a choice of methods and techniques of management analysis of the performance and efficiency of supply chains and their components. Conceptually, one should choose management analysis methods aimed at tackling management tasks in the context of the modern SCM concept. Under this concept, the profitability of business units of the chain is analysed through diagnosing the increase in sales revenue by improving the quality of service, reliability of supply and accuracy of demand forecasting, analysing the dynamics of cost reduction as a result of minimizing inventories, measuring cost reduction in sourcing, warehousing and marketing, as well as assessing the growth of production and logistics capacities.

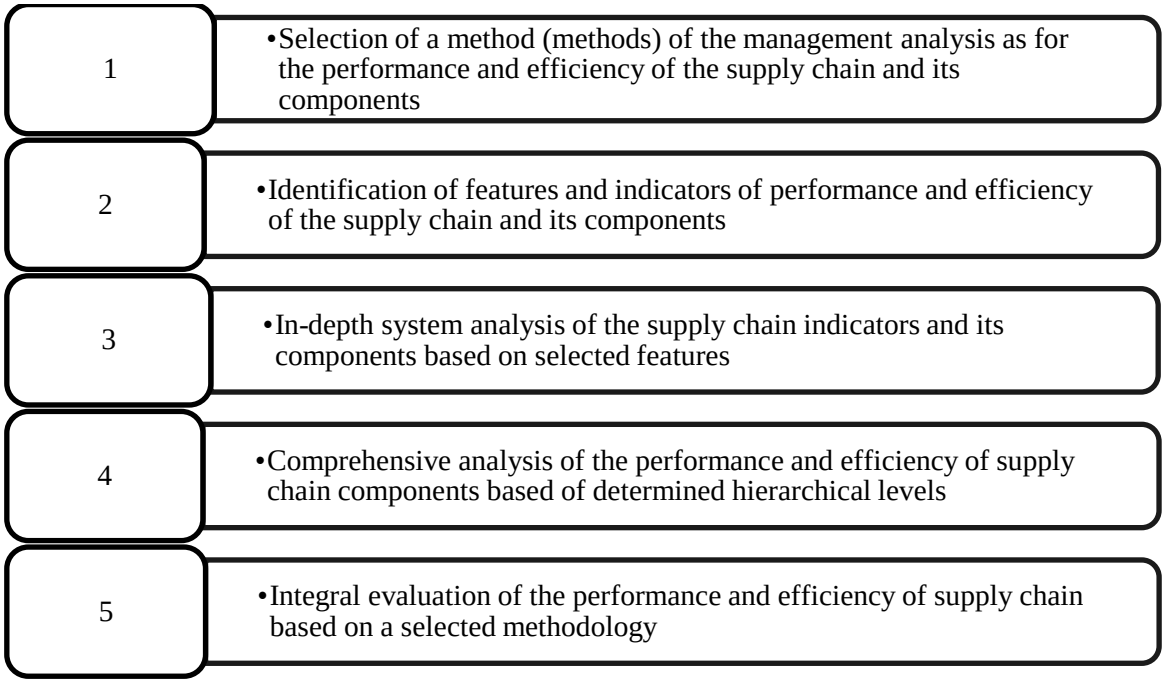

Figure 2 Algorithm for the implementation of supply chain management analysis

Source: compiled by the author

The second stage of the supply chain management analysis is to determine the components and indicators that objectively reflect the main economic effects of SCM and, above all, performance, and efficiency. Researchers' approach to the choice of such components differs. The composition of the indicators depends on the aspects of chain evaluation. As such, the aspect of supply chain compliance, marketing-based, logistics-based, as well as marketing and logistics aspects are chosen. The most comprehensive is the approach from the point of view of supply chain compliance [9, p. 137]. Within its framework the following components are identified, including internal efficiency; elasticity; customer service; environmental friendliness; product development and social responsibility. For each of the above components, a number of inherent indicators and diagnostic parameters are selected. For each of the parameters

it is necessary to determine sources of information, and to establish reference points for each of the specific indicators that are monitored.

For example, in the case of the sourcing function, such sources may be the services of economic entities of a separate technological or distribution supply channel that keep warehousing and financial records. After obtainment of an array of parameters following the diagnostics, it is necessary, at the third stage, to process them and conduct a system analysis of indicators for each component. The profitability analysis is the priority analysis area in the concept of SCM. To analyse the profitability of the chain it is necessary to diagnose the growth in product sales revenue through the improved quality of service, reliability of supply and accuracy of demand forecasting; assess the dynamics of cost reduction which takes place due to minimizing the level of inventories, reduction of sourcing costs, warehousing, and marketing expenses, as well as an increase in the utilization of production and logistics capacities.

The fourth stage envisages a comprehensive analysis of the performance and efficiency of the components of the supply chain at certain hierarchical levels. To solve analytical tasks regarding the performance and efficiency of the supply chain for individual business processes it is important to choose only quantitative and price, quality and time, and other parameters related to a particular business process, and within its parameters those related to individual product groups. In the field of production accounting, it is important to consider the cost of manufacturing resources and performance of manufacturing processes, product quality parameters, technological flexibility indicators, etc.

For example, the management analysis of chain operating cycles results in management decisions to ensure the rationality of production elements of the chain, reduce the risk of imbalance of production plans and supplies and improve the quality of operational production management through continuous monitoring of supply chain elements.

The management analysis of the supply chain at this stage also includes the analysis of implemented decisions on outsourcing. To conduct such an analysis, it is necessary to constantly monitor the cost of resources and assess their savings in comparison with autonomous operating activity decisions. In addition, important aspects of the analysis of outsourcing solutions are the quality of services and the flexibility of their provision scenarios.

The final stage of management analysis is an integrated assessment of the performance and efficiency of the supply chain, considering the analysis of synchronization of business processes in the chain, along with the dynamics of demand. The implementation of the proposed management analysis algorithm results in a chain of effective management decisions elaborated by the company management aimed to balance supply and demand and improve customer service in target and regional markets, reduce inventory in all its parts, shorten the duration of the production and commercial cycle and synchronize its components.

Conclusion. A system of basic principles has been determined in the paper for proper implementation of the methodology and tools of the supply chain management analysis. Main principles of supply chain management analysis include feasibility,

adequacy, complexity and sufficient information. It is established that the supply chain analysis as a complex economic object features comprehensive nature, which involves analysis at all its hierarchical levels and activities. An algorithm for implementing supply chain management analysis is proposed. Methodological approaches to the management analysis of the supply chain and identification of its features are formed.

The main features of applying management analysis in diagnosing the supply chain performance are: the use of indicators to assess performance based on the modern concept of SCM; management analysis of the supply chain is carried out at three levels: the level of individual entities, the level of entity-based interaction (supply channels) and the level of the chain as a whole; the priority area of the supply chain management analysis is the analysis of profitability; the analysis of the profitability of business units within the chain is performed by measuring the increase in sales revenue through improved service quality, reliability of supply and accuracy of demand forecasting, as well as assessing the dynamics of cost reduction by minimizing inventory, reducing costs in sourcing, warehousing and sales, and determining the utilization of production and logistics capacities. The supply chain management analysis also includes the analysis of decisions on outsourcing. To conduct such an analysis, it is necessary to constantly monitor the cost of resources, measure their savings compared to traditional solutions, as well as assess the quality of services and the flexibility of scenarios for their provision.

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