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EFFICIENCY OF SUPPLY CHAIN MANAGEMENT. STRATEGIC AND OPERATIONAL APPROACH

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ABSTRACT. Background: One of the most important issues subject to theoretical considerations and empirical studies is the measurement of efficiency of activities in logistics and supply chain management. Simultaneously, efficiency is one of the terms interpreted in an ambiguous and multi-aspect manner, depending on the subject of a study. The multitude of analytical dimensions of this term results in the fact that, apart from economic efficiency being the basic study area, other dimensions perceived as an added value by different groups of supply chain participants become more and more important.

Methods: The objective of this paper is to attempt to explain the problem of supply chain management efficiency in the context of general theoretical considerations relating to supply chain management. The authors have also highlighted determinants and practical implications of supply chain management efficiency in strategic and operational contexts. The study employs critical analyses of logistics literature and the free-form interview with top management representatives of a company operating in the TSL sector.

Results: We must find a comprehensive approach to supply chain efficiency including all analytical dimensions connected with real goods and services flow. An effective supply chain must be cost-effective (ensuring economic efficiency of a chain), functional (reducing processes, lean, minimising the number of links in the chain to the necessary ones, adapting supply chain participants' internal processes to a common objective based on its efficiency) and ensuring high quality of services (customer-oriented logistics systems).

Conclusions: Efficiency of supply chains is not only a task for which a logistics department is responsible as it is a strategic decision taken by the management as regards the method of future company's operation. Correctly planned and fulfilled logistics tasks may result in improving performance of a company as well as the whole supply chain. Fundamental improvements in supply chain efficiency may be ensured by analysing theoretical models on the strategic level and implementing a selected concept.

Key words: efficiency, supply chain management, strategic approach, operational approach.

INTRODUCTION

The present evolution of the logistics field, including research studies relating to the exploration of the interdependencies in logistics systems, is currently at the stage of the supply chain development theories. The present scientific bases of the supply chain management constitute the main factor influencing the development of new views on the concepts of real goods and services streams management. This factor also has impact on changes in this field. Simultaneously, the dynamics of the development of the supply chain management theories includes several issues which have not been resolved or have been treated in a superficial manner.

One of the most important issues subject to theoretical considerations and empirical studies is the measurement of efficiency of activities in logistics and supply chain management. Efficiency is one of the basic problems in

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economics and management, depending on the phenomena described. There is a relatively large number of publications in the discussed fields relating to the process of defining and clarifying the term "efficiency". However, neither domestic nor foreign publications on logistics and supply chain management devote a lot of attention to the issue of efficiency, which highlights the difficulties in defining the true nature of efficiency in logistics operations.

Simultaneously, efficiency is one of the terms interpreted in an ambiguous and multi-aspect manner, depending on the subject of a study. The multitude of analytical dimensions of this term results in the fact that, apart from economic efficiency being the basic study area, other dimensions perceived as an added value by different groups of supply chain participants become more and more important.

The objective of this paper is to attempt to explain the problem of supply chain management efficiency in the context of general theoretical considerations relating to supply chain management. The authors have also highlighted the practical implications of efficiency in a process perspective by giving examples of efficiency measurements in relation to certain logistics processes within supply chains.

EFFICIENCY FROM THE POINT OF VIEW OF THE SUPPLY CHAIN THEORIES

The issues connected with efficiency were initially analysed in the context of the processes in which the field of logistics was interested in. One of the rules of logistics claiming that all activities in the logistics field must be undertaken in the most effective manner unambiguously defines the significance of thinking in terms of efficiency in logistics. Efficiency has also been analysed as a key area of company's strategic management and frequently connected with the efficiency of logistics management. Apart from strategic decisions, the following factors are of key significance for efficiency: systems, structure, mission, human resources, organisation culture or incentive systems. The above-mentioned factors are connected by certain relations resulting in synergy effects determining the efficiency of implemented logistics processes. The presented approach to efficiency mostly related to studying economic efficiency of logistics processes and operations. Lack of IT systems controlling real-time efficiency of all activities may result in the lack of synergy effects, which explains lower efficiency of logistics systems in the past. This is confirmed by the downward trend as regards the logistics expenditures observed over the last decades.

Development of the system theory and its influence on logistics resulted in common usage of formal recording of logistics processes in a form of a logistics model. The presentation of the entire logistics activity in a form of a system yields benefits consisting in the possibility of defining close relations between selected subsystems, which makes it possible to conduct in-depth studies as regard efficiency. The basis for considering efficiency of logistics systems is adoption of a correct model to be subsequently analysed. This model reflects actual processes to be analysed within a given logistics system. A correct mathematical recoding method for a logistics system is of key importance for efficiency measurements. It must take into account all dependencies, limits and boundary conditions connected with the specificity of the system studied. The least complex case in the logistics system theory is a system encompassing relations between one provider and one recipient. More complex systems include numerous providers and numerous recipients plus intermediate phases, e.g. crossdocking, which makes the system structure and relations among its elements more complex.

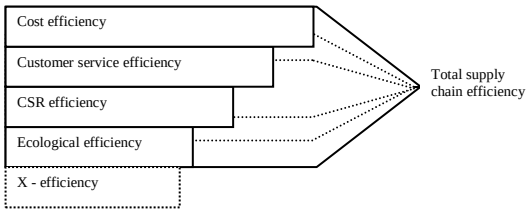
While considering the possibility of studying efficiency of logistics systems with complex structures, one must assume, a priori, static or dynamic character of the representation of the logistics processes in the system. The system dynamics provides both theoretical bases and tools facilitating elaboration of simulations regarding efficiency of both open and closed logistics systems (e.g. i-think or powersim applications).

The modern stage of logistics development, during which the studies mostly concentrate on recognition and explanation of the supply chain operation mechanisms, defines new research areas. As it has already been mentioned, the measurements of efficiency in logistics were studied in previous research work, however, due to the difficulties in selection of methods, scope and time horizon for the studies, these problems connected with supply chain management are still considered as basic and up-to-date issues. The problems regarding supply chain efficiency measurements results mostly from the characteristics of the subject of the studies, i.e. a supply chain. Modifications of an approach to a supply chain, in particular the differences in defining its scope, constitute the reason for ambiguous understanding of its efficiency. Assuming, in line with the latest definitions, that the scope of a supply chain comprises a set of processes between the provider's provider and customer's customer, the issue of the comprehensive measurement of supply chain efficiency arises. The lack of necessity to define the beginning and the end of a supply chain mostly results from the development of the supply chain organisation and transformations of its architecture, which exerts impact both on the increase in supply chain length and volume. The problem of efficiency measurements is partly resolved by referencing five main supply chain efficiency areas to defined values, i.e. a benchmark, e.g. using one supply chain reference model (e.g. SCOR, etc.) [Śliwczyński 2012]. Thus efficiency is perceived in the context of a set of indicators referring to processes within a supply chain, e.g. customer service.

Moreover, the supply chain theory does not provide exhaustive bases for comprehensive evaluation of supply chain efficiency [Khan et al 2010]. However, it describes numerous issues vital for its operation, i.e. algorithms and their properties, estimation of costs, optimisation and control theory elements [Daganzo 2003]. The formal notation describing a supply chain within the supply chain theory makes the decision-making process additionally difficult both on the strategic and operational level.

AREAS OF SUPPLY CHAIN MANAGEMENT EFFICIENCY MEASUREMENTS

The dominating approach consisting in perceiving the supply chain efficiency exclusively as economic efficiency and referring to using indicators that monitor the supply chain processes fails to provide solutions to numerous issues, e.g. environmental efficiency [Bretzke 2013]. Thus we must find a comprehensive approach to supply chain efficiency including all analytical dimensions connected with real goods and services flows. Presently, the majority of companies concentrate on studying the efficiency of areas exerting direct impact on the financial results, consciously omitting areas having negligible impact on these results. See Figure 1 for the analytical dimensions of supply chain management efficiency.



Source: proprietary compilation.

Fig. 1. Analytical dimensions of supply chain management efficiency
Rys. 1. Wymiary analityczne efektywności zarządzania łańcuchem dostaw

Thus supply chain efficiency should be perceived as a function of efficiency within the following areas: costs, customer service quality, ecology and business responsibility.

$$Esc=f(E_c,E_{cs},E_e,E_b) \quad (1)$$

The suggested comprehensive approach to the issue of measuring supply chain efficiency has been formulated from the point of view of an added value creation model. Depending on the perception of the above-mentioned areas, the contribution to the synthetic measure of supply chain efficiency will vary. Thus overestimation of areas results in deviation

from single-dimensional (purely economic) understanding of efficiency and concentrating on other areas contributing to the increase in supply chain efficiency.

In practice, we frequently encounter a situation in which a vast majority of companies participating in a supply chain mostly concentrates on measuring efficiency of a few operational elements. In order to enhance work efficiency, financial incentives are often created for the personnel (e.g. piecework systems, bonus schemes related with efficiency, etc.).

STRATEGIC DETERMINANTS OF A SUPPLY CHAIN

However, the best possibilities of improving efficiency are present on a strategic level. By elaborating different theoretical models of supply chains, a solution more effective than others may be found. According to the Pareto rule (i.e. 80% of product manufacturing cost results from its design), it may be assumed that the same rule applies to a supply chain as a whole. Thus 80% of the supply chain costs are determined during the designing stage. The following factors influence the above: distribution of facilities (warehouses, plants, selection of sub-suppliers), selection of products and locations in locations in which they are manufactured, storage, selection of distribution channels, distances from sales markets or number of links in a supply chain (employing commercial middlemen or direct access to end users). All these factors determine approx. 80% of the chain architecture costs. It means that the other systems, i.e. ERP, or enhancing personnel's efficiency may exert impact on the remaining 20% of costs. This shows why companies' managements should focus on supply chain efficiency already during its designing stage, before decisions are made on the strategic level.

While analysing activities undertaken by numerous leaders (press releases regarding closing down or relocating production) of individual industries, it may be concluded that solutions concentrating production within one or just a few plants located in each continent vital for a given business become increasingly popular. This trend consisting in minimising the number of manufacturing locations is clearly visible, particularly during the economy slowdown periods. Main sub-suppliers are frequently located in the vicinity of such plants. Another trend can also be observed here, i.e. creation of supply chains in regions, which applies both to the supply and distribution process. Among others, Poland together with its neighbours belongs to such a region. While analysing trends set by individual leaders, it may be concluded that we more and more frequently witness creation of distribution systems based on one distribution centre operating a few or even several countries located around it. In other common cases, a supply chain leader bases their production on one plant from which products are distributed all over the European market, directly to a retail network, omitting additional links in the supply chain (distributors, wholesalers, a commercial network can also be a supply chain leader). In the majority of cases, a supply chain leader is responsible for its efficiency. This entity defines conditions of cooperation which determine suppliers' activities including logistics services. Contracts concluded with suppliers usually include expectations connected with delivery methods, product quality and services in terms of their promptness, completeness of delivery in relation to orders, timeframes, etc. Such requirements have direct impact on efficiency of the entire supply chain. They make it more or less effective.

An effective supply chain should be:

- cost-effective (ensuring economic efficiency of a chain);
- functional (reducing processes, lean, minimising the number of links in the chain to the necessary ones, adapting supply chain participants' internal processes to a common objective based on its efficiency), Functionality may also be defined as correct preparation of goods facilitating their acceptance in warehouses or shops. Goods should be labelled in a manner ensuring their faultless and fast identification so that the time devoted to their acceptance is reduced to the necessary minimum. Implementation of RFID-based

technologies significantly accelerates this process;
- ensuring high quality of services (customer-oriented logistics systems);
- socially responsible (taking into account stakeholders' social interest and maximally reducing environmental impact).

When a supply chain leader implements an adopted solution, it will determine (in a perspective of at least a few years) the obtained efficiency level for the adopted model on the strategic level. Further enhancement of efficiency of the adopted supply chain is possible to be ensured as a result of operational modifications and more effective utilisation of its resources.

OPERATIONAL DETERMINANTS OF A SUPPLY CHAIN

The phrase "Efficiency improvement" seems to be a favourite buzzword for all senior managers in each organisation. However, this phrase mostly refers to improving efficiency on the operational level.

Currently, activities aimed at streamlining supply chains are mostly based on analyses of processes present within a given chain and measurements of indicators (KPI) for individual elements of this process. Even such factors as implementation of KPI measurements and correct transfer of information to interested parties result in the fact that a given process becomes more effective. This results from purposeful or involuntary evaluation of the way personnel do their work. However, to extensive number of such indicators may result in blurring the vital ones so it is necessary to concentrate on such indicators which most effectively describe processes within a supply chain. It must also be remembered that the analysed indicators should include all perspectives (e.g. BSC), but not only the ones with have impact on one of them (elements belonging to the financial or quality areas are most often evaluated). A typical example of indicators yielding contradictory results may be focusing on distribution costs, not taking into account the customer service costs (promptness or completeness). Benchmarking other teams implementing similar processes, e.g. in different locations, introduces an element of competitiveness and rivalry. As a result, personnel strive to improve their processes. Introduction of a "stop number indicator" among carriers delivering general cargo to customers has yielded similar results as introduction of an additional charge for stops. Increase in efficiency has been similar in both cases.

LOGISTICS OUTSOURCING AS A METHOD OF ENHANCING OPERATING EFFICIENCY OF A SUPPLY CHAIN

Outsourcing certain tasks to external bidders releases funds for developing areas vital for company's business. The outsourced tasks do not belong to core competencies, i.e. skills and functions being basic sources of the competitive edge. Maintaining own logistics potential results in the fact that a company generates fixed costs regardless of the current market demand or seasonal trends. Outsourcing means flexibility in shaping a logistics system used to implement supply and distribution processes, i.e. using only such a number of employees and vehicles as well as an amount of storage space that is required during a given period. Thus it results in transforming fixed costs into variable costs. Depending on operations and their complexity, different savings resulting from outsourcing may be obtained.

While taking a decision regarding cooperation with an external logistics services operator, one must decide which costs are connected with such services but also how they can influence customer service and what services they may ensure. Numerous studies show that a method employed for logistics activities has much more extensive impact on company's results than its logistics costs [Goebl, Froschmayer 2011].

Logistics operators (supply chain integrators) play the role in integration of all links of a supply chain as they are more and more frequently present in the whole chain as

one of its key elements. Thanks to effective connection networks, the provide supplied both on the local and global level. Apart from effective movement of goods, an information flow in a supply chain is also very important. Employing homogenous information exchange systems contributes to improving efficiency and allows for implementing increasingly more advanced solutions.

CONCLUSION

Efficiency of supply chains is not only a task for which a logistics department is responsible as it is a strategic decision taken by the management as regards the method of future company's operation. Decision-makers must always remember that a supply chain must first be planned in the most effective manner taking into account numerous aspects influencing its operation. Correctly planned and fulfilled logistics tasks may result in improving performance of a company as well as the whole supply chain. Disregarding the importance of the designing and strategic analysis processes will surely make a supply chain less effective. In a company aware of its importance, supply chain management may play a key role exerting the same impact on its performance as sales, marketing or production. Management itself is a success in establishing correct rapport among individual functional departments of a company. Elaboration of a correct new model or streamlining the existing supply chain may be extremely beneficial for an organisation both as regards its market position and economic results. It may be particularly important in the coming period when each, even the slightest, element can have impact on future of the organisation.

The above considerations show that fundamental improvements in supply chain efficiency may be ensured by analysing theoretical models on the strategic level and implementing a selected concept. Thus one must not disregard the importance of cooperation between science and practice in building effective supply chains and exchange of experiences resulting from observations of different existing models in comparison with theoretical considerations.

There are unique features of each supply chain which can be used as best practices in other models.

REFERENCES

Bretzke W., Barkawi K., 2013, Sustainable Logistics. Responses to a Global Challenge, Springer Verlag, Berlin Heidelberg

Daganzo C. 2003, A Theory o Supply Chains, Springer Verlag, Berlin Heidelberg

Goebl M., Froschmayer A., 2011, Logistik als Erfolgspotenzial [Logistics as Profit Potential], Gabler Verlag, Weisbaden, p. 232

Khan M.Z, Al.-Mushayt, O., Alam J., Ahmad J., 2010, Intelligent Supply Chain Management, J. Software Engineering & Applications, 3: pp. 404-408

Śliwczyński B., Koliński A., 2012, Efficiency Analysis System of Material Management, Logforum 8 (4), pp. 297-310.

EFEKTYWNOŚĆ ZARZĄDZANIA ŁAŃCUCHAMI DOSTAW. PODEJŚCIE STRATEGICZNE I OPERACYJNE.

STRESZCZENIE. **Wstęp:** Jednym z najistotniejszych zagadnień, które stanowi przedmiot zarówno rozważań teoretycznych jak i badań empirycznych jest pomiar efektywności działań w logistyce i zarządzaniu łańcuchami dostaw. Efektywność jest jednocześnie jednym z pojęć, które są interpretowane w sposób niejednoznaczny i wieloaspektowy w zależności od obiektu badania. Wielość wymiarów analitycznych pojęcia efektywność powoduje, że oprócz efektywności ekonomicznej, która stanowi podstawowy obszar badań coraz większe znaczenie zyskują inne wymiary postrzegane jako wartość dodana przez różne grupy uczestników łańcucha dostaw.
Metody: Celem artykułu jest próba wyjaśnienia problemu efektywności zarządzania łańcuchami dostaw na tle ogólnych rozważań teoretycznych odnoszących się do zarządzania łańcuchami dostaw. Autorzy wskazali na determinanty

i implikacje praktyczne efektywności zarządzania łańcuchami dostaw w ujęciu strategicznym i operacyjnym. W badaniach wykorzystano krytyczną analizę literatury logistycznej, metodę wywiadu swobodnego z przedstawicielami najwyższego kierownictwa przedsiębiorstw sektora TSL.
Wyniki: Istnieje potrzeba całościowego spojrzenia na efektywność łańcuchów dostaw, obejmująca wszystkie wymiary analityczne, które są związane z przepływami dóbr realnych i usług. Efektywny łańcuch dostaw powinien być optymalny kosztowo (zapewniający efektywność ekonomiczną łańcucha), funkcjonalny (redukujący procesy, lean (minimalizujący ilość ogniw w łańcuch do rzeczywiście niezbędnych), dostosowujący procesy wewnętrzne uczestników łańcucha dostaw do wspólnego celu opartego na jego efektywności) oraz zapewniający wysoką jakość obsługi (systemy logistyczne zorientowane na klienta).
Wnioski: Efektywność łańcuchów dostaw nie jest jedynie zadaniem działu logistyki, jest ona strategiczną decyzją zarządu, co do sposobu funkcjonowania przedsiębiorstwa w przyszłości. Dobrze zaplanowane i zrealizowane zadania logistyczne mogą wpłynąć na poprawę wyników nie tylko firmy, ale również całego łańcucha dostaw. Zasadniczą poprawę efektywności łańcucha dostaw można uzyskać opierając się na rozważaniu modeli teoretycznych na poziomie strategicznym a następnie wdrażaniu wybranej koncepcji w praktyce.

Słowa kluczowe: efektywność, zarządzenie łańcuchem dostaw, podejście strategiczne, podejście operacyjne.

DIE EFFIZIENZ DES SUPPLY-CHAIN-MANAGEMENTS. STRATEGISCHER UND OPERATIVER ANSATZ

ZUSAMMENFASSUNG. Einleitung: Eine der wichtigsten Fragen der Effizienz-Orientierung des Supply-Chain-Managements als des Gegenstandes der theoretischen und empirischen Forschung ist es, die Effizienz der Logistik und des Supply-Chain-Managements zu messen. Die Effizienz ist zugleich auch eines der Konzepte, die je nach dem Forschungsgegenstand als mehrdeutig und facettenreich interpretiert werden können. Die Vielzahl der analytischen Dimensionen des Konzepts der Effektivität verursacht, dass neben der Wirtschaftlichkeit, die den Grundbereich der Forschung darstellt, auch andere Dimensionen zunehmend an Wert gewinnen, und oft als eine Wertschöpfung durch verschiedene Gruppen von Teilnehmern der Lieferkette wahrgenommen werden.
Methoden: Das Ziel dieses Artikels ist ein Versuch, das Problem der Effizienz des Supply- Chain-Managements im Rahmen von allgemeinen, theoretischen Überlegungen in Bezug auf das Management von Lieferketten zu klären. Die Autoren weisen auf die Determinanten und die praktischen Auswirkungen der Effizienz-Orientierung des Supply-Chain-Managements in Bezug auf strategische und operative Ebene des Problems hin. Die Studie nimmt eine kritische Analyse der logistischen Literatur, sowie die Methode des Frei-Form-Interviews mit Vertretern des Topmanagements von Unternehmen aus der TSL-Branche in Anspruch.
Ergebnisse: Es besteht ein Bedarf an umfassender Betrachtung der Effizienz der gesamten Lieferkette, einschließlich aller analytischen Dimensionen, die mit den Bewegungen der realen Gütern und Dienstleistungen verbunden sind. Eine effektive Lieferkette sollte aus Kostenperspektive (um die Wirtschaftlichkeit der Kette zu gewährleisten) optimal, funktional (Reduzierung der Prozesse) und schlank (die Anzahl der Kettenglieder muss bis auf die Erforderlichsten minimiert werden) sein. Die internen Supply-Chain-Prozesse der einzelnen Teilnehmern müssen auf das gemeinsame, auf die Effizienz fokussierte Ziel konzentriert sein und eine hohe Qualität der Dienstleistungen (kundenorientierte, logistische Systeme) gewährleisten.
Fazit: Die Effektivität der Lieferkette ist nicht nur die Aufgabe der Logistikabteilung sondern eine strategische Entscheidung des Vorstandes für die Art und Weise der zukünftigen Funktionsausübung innerhalb seines Unternehmens. Denn gut geplante und ausgeführte Logistikaufgaben können nicht nur die Ergebnisse des Unternehmens, sondern auch den gesamten Supply Chain positiv beeinflussen. Die fundamentale Verbesserung der Supply- Chain-Effizienz kann durch die Abwägung von theoretischen Modellen auf der strategischen Ebene und die Umsetzung des ausgewählten Konzeptes in die Praxis erzielt werden.

Codewörter: Effizienz, Supply-Chain-Management, strategischer Ansatz, operativer Ansatz.

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