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SELECTED TOOLS OF INFORMATION FLOW MANAGEMENT IN LOGISTICS

Introduction

Analysing the logistics processes implemented in the individual companies and entire supply chains, we consider the three streams of flow: goods, funds and information. From the point of view of the efficiency and effectiveness of supply chains become increasingly emphasized the role of information as an integrating factor operators making up the supply chain. Ensuring availability of information determines the best execution of logistics processes.

The role of information flow in logistics processes

The starting point for the exchange of information between supply chain partners is the realization of the proper flow within the enterprise. Effective logistics management in the enterprise is based largely on the flow of information, that should occur as smoothly and quickly as possible, so as to provide managers with comprehensive knowledge. The information provided within the company must meet several conditions, which determine their usefulness in decision--making. These can include:

- adequacy (completeness) of information, which is dependent on the measurement methods, its accuracy and degree of interference,
- reliability of the information, which affect the characteristics set input and output channels and types of decision rules present to the receivers
- usefulness, or relevance for senior and middle managers[1].

[1] J. Bendkowski, M. Kramarz: *Logistyka stosowana*. Wydawnictwo Politechniki Śląskiej, Gliwice 2006, p. 484.

Mindfulness for the collection and production of information with the highest value should be the pursuit of all companies forming the supply chain, because the quality of individual information attests to the quality of the information stream. While an information stream combines elements of various subsystems of economic organization and management system with a set of algorithms for data processing and an information system, which is the foundation of the company. The information system is a multi-level structure or functional element of the decision-making in the management system, enabling through appropriate procedures and specific information processing models of input on the desired output information.

Logistical decisions, which are closely linked with other activities in the sphere of management, require acquiring information obtained, collected and processed in the entire business' logistics system. The usefulness of the information determined by such characteristics such as: timeliness, relevance, completeness, and reliability of absorption[2]. Availability of information that meets the above conditions is possible thanks to the logistics information system. According to J.C. Coyle, E.J. Bardi, and C.J. Langley[3] "The logistics information system is a structure of interconnected people, equipment and procedures to ensure logistics managers for the relevant information needed for planning, execution and control of logistics activities". To develop and strengthen the position of the logistics information system contributed to the development of computer technology, computer tools have been applied, so that it becomes possible to the functioning of the logistics information system as part of enterprise-wide information system. According to J. Kisielnicki and H. Sroka[4], an information system is a "multi-level structure that allows the user to transform this system to enter specific information about the desired output by means of appropriate procedures and models". The information system meets certain features, like:

– planning individual logistics processes, such as demand forecasting, planning, material requirements, creating relationships with customers,
– coordination of the flow throughout the chain of movement of goods,

[2] L. Bukowski: *Problemy przetwarzania informacji logistycznych w zintegrowanych systemach produkcyjnych*. In: Wybrane zagadnienia logistyki stosowanej. Materiały VII Konferencji Logistyki Stosowanej – Total Logistic Management. Oficyna Wydawnicza TEST, Kraków 2004, p. 223.

[3] J.C. Coyle, E.J. Bardi, C.J. Langley Jr: *Zarządzanie logistyczne*. PWE, Warszawa 2002, p. 524.

[4] Kisielnicki J., Sroka H.: *Systemy informacyjne.* Placet, Warszawa 2005.

– monitoring and control of logistics processes, such as purchasing, sales, gathering and maintaining inventory,
– control processes at the operational level particularly in supply, transport and storage.

The information activities resulting from the above-mentioned functions vary depending on the specific processes occurring in the enterprise. Cz. Skowronek and Z. Sarjusz-Wolski[5] distinguished three main functions of information and decision-making:

– developed planning functions in the processes of purchasing, production and distribution. In making their decisions an important role is played by information technology tools for demand forecasting, market research, operative production planning and material requirements planning. These processes are dynamic, and therefore any created database should be continuously updated and developed to allow for the flexibility to satisfy the needs of clients and effectively collaborate with suppliers.
– coordinating functions, which in logistics processes play a particularly important role, and their highly complex nature of the resulting flow of supplies and information streams for many of the organizational business requires coordination of many individual events and processes. With this it is possible to obtain high efficiency of the entire logistics system, but it is necessary to use computer systems not only in the enterprise, but also in conjunction with suppliers and customers.
– monitoring and control of logistics processes that affect a broad spectrum of phenomena that are described in the databases of computer systems. This function includes records of inventories, supplies, sales, costs, which gives the possibility to obtain information for assessing the efficiency of logistics processes, and enables other functions of an information system, which may include planning and control of logistics processes.

M. Christopher[6] however indicates the four functions that have to meet the information systems for logistics, to which include logistics information system (LIS – Logistics Information System). Containing a collection of data allows managers the freedom to analyse logistic processes. Depending on the needs, they are general analysis or more detailed statistical analysis. The most important functions that it meets for the companies are:

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[5] Cz. Skowronek, Z. Sarjusz-Wolski: *Logistyka w przedsiębiorstwie*. PWE, Warszawa 2008, p. 343.

[6] M. Christopher: *Strategia zarządzania dystrybucją*. PLACET, Warszawa 1999, p. 120.

- **planning** – one of the fundamental characteristics of the logistics information system is the ability to predict customer behaviour, their demand for specific products. In this regard, it must be able to predict demand. With prognostic information and the time necessary to execute the supplies, the company is able to plan their inventories,
- **control** – this feature is to control all processes taking place in the whole logistics system, logistics companies mentioned herein may be: customer service, sales and delivery. Appropriate standards are established processes for which data are collected,
- **co-ordination** – this function is responsible for establishing cooperation between specific actions to carry out the sale in accordance with accepted standards in the enterprise customer service and controlling its implementation. Coordination requires a smooth flow of information between cells, interacting with each company,
- **communication and customer service** – in order to fulfil the tasks set by the company's customers, it is necessary to organize effective communication--based telecommunications and data transmission channels of communication. The importance of communication is particularly the case for urgent and non-custom orders – when the flow of information depends on the ability of companies to implement them.

With the implementation of these Logistic Information System functions, individual companies forming the supply chain have both a positive and a negative nature. What is important is the positive role played by information in the supply chain management, or integration partners. However, a negative phenomenon occurs when the information is treated as a factor contributing to the competitive struggle between enterprises in the chain, and does not affect the creation of value-added chain as a whole.

Using IT solutions in logistics system

The effective functioning of the logistics information system requires the use of computer hardware and technology transfer. The development and implementation of information systems should take into account the information needs of a company at various levels of management. Initially, computer programs functioned as independent modules. The flow of data from one system to another, created the necessity to manually move and enter them into the program. The solutions used in the individual companies were not compatible, it would also be impossible to combine them, because of the diversity of data formats and input output systems. With the development of information techno-

logy one started to pay attention to the strategic importance of IT systems. Consequently, programs developed in the direction of their solutions to combine and thus create more complex solutions. Individual systems began to be treated as modules. This allowed integrating different areas of enterprise information, such as supply and distribution, as well as closing cooperation of companies. Placing economic partners within a single information system significantly strengthens contacts between them, clearly reducing, at the same time, the circulation of the flow of goods and accompanying documents[7]. The resulting Integrated Information Systems, which as a result of extending the scope of the entire company became a very powerful and indispensable tool in strategic management. The integrated system is characterized by a modular structure. Its analysis is based on an examination of the efficiency of individual modules, as well as the quality of existing links between these networks and relationships. The whole design reflects the phenomena generally occurring in the enterprise information.

Activities in the area of logistics, which are closely related to other activities of management, require information gathered, collected and processed within the whole information system in the enterprise. The used information systems might contribute to improvement or delay in the process of decision-making at different stages of management. Difficulties to define proper information support for corporate governance in public companies originate from problems with determination of fundamental mission of the company – is it supposed to consist in maximization of shareholders value or to realize social and economic policies. States can strive for realization of both goals, which is often difficult to compromise. Proper corporate governance must be clearly defined, which is possible to be achieved through adherence to good disclosure standards. Performance of these tasks is possible through employing external auditing firms with good reputation to attract attention of shareholders to individual aspects connected with risk and poor results. Audits should be carried out according to international auditing standards.

Total disclosure of critical information in right time must encompass at least: financial results with clear explanation of unusual transactions; entire remuneration of all the directors and members of the board; key risk factors; details of the most important events and changes which might considerably impact on enterprise's results; enterprise goals; access of general public to information. In public companies, being entirely controlled by the state, typical aspects of corporate governance, such as enhanced enforcement of shareholders

[7] A. Śmigielska: *Integracja systemów informatycznych a zmiany biznesowe*. In: *Strategie informatyzacji i zarządzanie wiedzą*. Ed. by Z. Szyjewski, J.K Grabara, J.S. Nowak. WNT, Warszawa 2004, p. 193.

rights (especially minority shareholders) are of low priority. Independently of this fact, good practices relating to shareholders are a strong signal which proves how seriously the enterprise treats the issue of corporate governance. Considerable impact on corporate governance is from respecting procedures by the board of directors and management. In the case of public company, which is under total control of the state, the board is the only body which manages company's operation, being potentially able to guarantee themselves the scope of competence independent of state interests connected with implementation of its policies and of interest of management appointed by the state. Proper governance also depends on transparently defined roles assigned to the directors and managers. Their ability of efficient work is also determined by the quality, experience, skills and qualifications necessary for holding particular positions. They should be capable of, and even obliged to make independent decisions to the best interest of the company.

The main purpose, for which the company continues to invest in modern information technology, is a desire to meet the growing demands of customers and gain a competitive advantage. Improving information systems are interestingly influenced by a number of logistic processes[8]. However, while individual programs, optimize only specific areas, is an integrated information system by treating the company as a consolidated whole, allows for complex optimization.

Used in logistics integrated ERP systems is planning and allows one to:

- obtain information for strategic planning and decision-making management of the enterprise,
- provide information to planning and decision making at the level of middle management,
- obtain information needed in operations and control, the possibility of processing orders and handling transactions.

There are different solutions for functional requirements, which have common characteristics, which include basic scopes of business: finance, production and distribution. Individual users have specific tasks performed by linking computer packages, i.e. data processing tools. As noted by J. Majewski[9] the computer system takes some action of man and becomes a participant in the organization. Elements forming systems are both computer algorithms and procedures, as well as people, computer equipment and supplementary procedures. Information systems for implementing the objectives are elements of integrated logistics ERP.

[8] Ibid.
[9] *Logistyka*. Ed. by D. Kisperska-Moroń, S. Krzyżaniak. ILiM, Poznań 2009, p. 321.

The areas of use include elements of business systems requiring access and exchange of information both on the physical movement of goods, as well as cash flow and its projection in the form of financial analysis. There is considerable variation applied to solutions resulting from the nature and scale of operations, the maturity degree of workers to the use of modern tools, and the individual needs arising from the specific company activities[10].

All logistics are based on information obtained from different databases structured and managed by IT systems. Data relevant to the logistics, which are subjected to processing, must be properly obtained from outside, stored and transmitted outside the system. This flow is aided by information systems, without which today modern logistical implementation would be inefficient[11]. ERP (Enterprise Resource Planning), which supports the company mainly in the sphere of planning, production and distribution are made up of a number of applications that integrate different areas of the business. They bring many benefits to business operations. Several major may include:

- extending the possibilities of using multiple information in a manner without losing their accuracy and transparency,
- integration of the various organizational units of the distributed enterprise and facilitating management of the global market,
- impact on the growing importance of information systems for companies that do not serve solely as auxiliary functions, but serve to comprehensively implement operational and strategic functions aimed at improving the competitiveness of companies in the market,
- minimize the difficulties found in existing systems that were less flexible. ERP systems are tailored to the individual needs of the enterprise,
- outreach to users, a large number of employees with access to the system helps to increase its transparency and thereby facilitate the use of the available data[12].

Important elements of the solutions used are sourced data which is the starting point in deciding on the type of application used in specific units and substantially determining the effectiveness and efficiency of supply chains.

Moved in logistic channels and stored in nodes of logistic systems, information pertaining to huge quantities of various goods and their current position need to be continuously monitored and recorded. Such action may take place by manually entering information into the computer system on the basis of documents relating to the exchange of goods or through automatic identification (Automatic Identification) or automated collection (ADC *Automatic Data*

[10] I. Fechner: *Zarządzanie łańcuchem dostaw.* WSL, Poznań 2007, p. 149.
[11] J. Majewski: *Informatyka dla logistyki.* ILiM, Poznań 2006.
[12] *Instrumenty zarządzania logistycznego.* Ed. by M. Ciesielski. PWE, Warszawa 2006.

Capture). Thanks to the use of identification technology it is possible to control the movement and location of materials, as well as gather information about the progress of each operation in the chain[13]. A detailed breakdown of activities and the potential benefits of automatic identification, is shown in table 1.

Table 1

Activity during product flow in the supply chain
and streamline obtained through automatic identification

LOGISTICS ACTIVITIES IN THE SUPPLY CHAIN	POTENTIAL BENEFITS OF THE APPLICATION OF AUTOMATIC IDENTIFICATION
Goods modifications according to individual customer requirements	Better understanding of expectations and ability to respond to individual needs
Collecting information about the level of wear or deterioration	Minimization of possible misconduct, quick response by obtaining information in real time
Supervision of parts and materials inventory	Increase efficiency by integrating operations with the information obtained
Required maintenance work on schedule	Facilitate decision making related to planning activities
Provide after-sales service	Quick identification of the defective product or a danger to the user

The recorded data are transmitted directly to a database system that stores information about the products. Providing high quality information system is only possible thanks to the complex information obtained from logistic labels after the manufacture of a product derived.

The use of automatic identification technology has a significant impact on the flow of information within logistics chains. It allows one to obtain the information necessary to effectively implement the management process. It is commonly used as an essential element in management systems, as well as contributes to the management of electronic data interchange (EDI).

Conclusion

The implementation of logistics processes in supply chains operating today relies heavily on the shaping of an effective system of information, ensuring collaboration in the supply chain partners to implement a common policy on the

[13] C. Bozarth, R.B. Handfield: *Wprowadzenie do zarządzania operacjami i łańcuchem dostaw*. HELION, Gliwice 2007, p. 604.

exchange of information, choice of tools related to streamlining the supply chain processes and methods for their monitoring. The implementation of information policy as formulated in the supply chain entails the need to implement standardized procedures and to identify clear directions for action. Furthermore, it is also planning the development of applied information systems based on the proper choice of software and sets of clearly defined procedures for the control and flow of information. The main tasks in terms of availability of information faced by companies in supply chains include:

- application systems that allow the implementation of chain operation principles on a partnership basis, which allows for overcoming the prevalence of information gaps,
- the use of an information system allowing for the collection, processing, sharing and analysing data that are processed into useful information,
- having staff training, which is considered as a decisive factor in the increase or decrease the quality of information,
- accuracy and availability of information,
- configuration of information systems architecture for the development in line with future business needs with regards to information.

Implementation of the above requirements for systems used to support the management process allows one to ensure the efficient flow of information, which is essential to the proper execution of business processes.

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