

# Micro-Logistical Aspects of Manufacturing Enterprises in Supply Chain

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Manufacturing companies are the crucial link in a supply chain; they shape goods directly as operational subject. Special consideration has been taken of the micro logistics area of these enterprises and the significance that the area plays in the formation of the chain. Production of goods is associated with managing multiple processes, both manufacturing and logistics, and therefore an important factor determining the proper functioning of an enterprises is their relative connection and systematization.

**Keywords:** micro-logistics, supply chain management, production logistics, logistic management.

## 1. INTRODUCTION

By taking considerations of the conditions of logistics management in manufacturing companies, it is necessary to refer to the reasons for development of this concept observed in the past few dozen years and to the strengthening of its role in management of enterprises. Major advancement and rapid development of theoretical foundations and practical solutions in economic activities is closely linked to changes occurring in enterprises and in their environment. The constant emphasis on improving competitiveness and taking operations on foreign markets, as well as changes in consumer behavior contribute to the increase in the role of logistics management. What can be observed more and more often, is a mutual interpenetration and interaction of different scientific disciplines such as management, engineering, computer science or economics, subordinated to implementation of tasks providing an economic development. Effective linking of achievements and their development due to being profoundly rooted in their logistics, enables synergy. The indication of the essence and the role of logistics management requires concentrating on the analysis of relationships between its individual elements and studying interrelationship, as well as determining the impact strength and the influence on functioning of production company.

## 2. LOGISTICS MANAGEMENT IN A PRODUCTION ENTERPRISE

Market orientation of enterprises based on an aspiration to provide customers with the service of the highest standards while, at the same time, ensuring the reduction of products' manufacturing and services costs, requires complex decision-making. Modern logistics management includes typical management processes, such as planning, commanding, organizing and controlling, that are associated with the movement of physical goods and information. As M. Soltysik states: 'because logistics shall be considered as a philosophy of proceedings or a way of thinking, logistics management can be considered as the management orientation' [22].

Logistics management can be characterized as "strategic management of procurement processes, movements and storage of materials, parts and finished products and associated with them information flow between the firm and its marketing channels in such a way that current and future profitability are maximized through the cost-effectiveness of tasks implementation" [2].

S. Abt expresses a similar opinion: [...] 'logistic management consists of strategy formulation, planning, command and control of (occurring in an efficient and minimizing the

global costs manner) flow processes and storage of raw materials, inventory, work in progress, finished goods and relevant information - from the point of acquisition to the point of consumption - in order to adjust to customers' needs and their satisfaction' [1].

In the literature, logistic management is defined as a comprehensive and systemic approach of logistical operations including the flow of information, materials, semi-finished and finished products [22]. This approach covers the entire value creation process that belongs to a comprehensive enterprise management system [16].

Recognition indicates the overall strategic logistics management functions which are more and more often indicated as an important factor in determining the direction of the company's activities on the market. As indicated by P. Blaik: 'Determining and agreeing on logistics goals within the structure of an enterprise is the basis for the development of logistics systems' [5]. The characteristics of logistic processes that are closely integrated with many other processes in enterprises, including those of material (e.g. manufacturing processes) and information character, determine their role in the management processes on strategic and operational level. It is important to highlight the changes that have occurred in the relationships between real and information processes. Not only are we dealing with recording events taking place in enterprises, but increasingly also with the fact that 'information processes are carriers of energy-material processes (the real ones)' [20].

One of the most important elements of logistics management in a modern enterprise is coupling of manufacturing processes and events that result from the environment in order to ensure the optimal interaction. Taking into account all the technical and economic aspects of the process, it is possible to build an appropriate optimization model whose criteria should include: [13]

- maximizing production of high quality products,
- possible use of manufacturing machines with defined parameters,
- minimizing time for selected products.

Modern approach to production logistics and proceeding according to specified criteria should ensure: a competitive advantage, productivity

growth and full customers' satisfaction. In the market economy, production logistics has a significant impact on the effectiveness of manufacturing enterprises.

In the era of information prevailing in all areas of life, in a significant way, effective logistics management in an enterprise is based on information flow processes that should occur smoothly, flawlessly and fast to make providing comprehensive knowledge about all processes possible.

Considering logistics processes from the point of view of implementation of logistics management functions, which ensures the availability of products and services to customers, it is necessary to identify the boundaries between the areas served by the enterprise, and cooperation with the environment. We are dealing with "make-or-buy" decision (produce or purchase) [18], determining, above all, the activities in the sphere of supply. Making decisions for the choice of goods selection sources necessary for production processes is connected with undertaking cooperative activities with other enterprises. Therefore, as far as logistics usually refers to activities performed within a single organization, in order to ensure availability of the product on the market, cooperation and coordination take place within supply chains. Logistics focuses on activities such as order processing, distribution, development of cooperation with suppliers and supply chain management. Beyond the typical logistics processes, it also includes activities such as marketing, new product development, finance and customer service. Wide perspective of the supply chain requires simultaneous improvements in both the quality of internal customer service and operational efficiency of companies (in a supply chain.) Noteworthy is the diversity that can be observed in foreign [15], [9], [10] and Polish [5], [12] literature: logistic is a name for processes from the purchase, through processing and storage, ending on delivery. However, a chain is a connection of several enterprises: from the manufacturer, through trading company to the final consumer (raw materials - product - the final recipient), yet in Poland, logistics is often identified with processes usually carried out within the same company and a broader term, encompassing both procurement, manufacturing and distribution is a 'supply chain' [26].

### 3. SUPPLY CHAIN MANAGEMENT IN THE CONTEXT OF THE FUNCTIONING OF PRODUCTION ENTERPRISES

Observed trends of integration between cooperating entities are on one hand, associated with the desire to maintain independence and decisiveness, but on the other hand with the necessity of close cooperation, which often requires resignation of individual efforts of enterprises in order to provide decisions for the common good of the whole chain. 'Supply chain management means an integrated planning and targeting, implementing the operation of (material and information) resources movement within the supply chain that occurs in logistics network consisting of direct and indirect suppliers, manufacturers, distributors and direct and indirect customers. Planning and implementation include areas of supply, production, distribution and returns in organizations of all participants in a supply chain'[11]. Operations implemented in a supply chain are included in three main groups of factors: the product created according to certain processes and resources used during their course [24]. The implementation of an efficient goods flow is especially important in manufacturing companies due to the necessity to ensure continuity of the processes, however, it is observed that the flow inside a chain is rarely continuous, and there are breaks occurring both in the whole economy (or a chain) and a single company. As a result, stocks are generated at interfaces between sub streams, resulting from differences in time, and supply and sale flow intensity. Apart from this primary function of inventory, there are others such as: assortment completion, constant readiness to meet the customers' needs, sales seasonality and technological considerations, which cause a growth in significance of information processing inside a chain and its role in supporting management decisions. Streams and information resources reflect the movement and inventory and they are also used in flow process control. In addition, information must be collected, properly classified, coded and used in decision making processes [4].

In these flows, we deal with controlling and property flow regulating information, as well as reporting and information control. The first extend in the opposite direction to property flow. They have their beginning on the market and they have a form of demand forecasts or customers procurement. Later these pieces of information

undergo appropriate transformation and they are the plans, programs and production schedules. Then the data about production plans flow to the phase of supply allowing the plans of material needs. These plans are the basis for the preparation of purchase plans, taking the form of contracts or agreements targeted to the market. The reporting and control data flow according to the direction of processes in kind of property processes. They reflect the realization of previous planning decisions. Factors creating the supply chains generate the need for measurement process planning of their integrity [19].

Cash flows are considered the integral part of logistics processes. In the cash streams, in terms of logistics processes the important elements are: the negotiations on the purchase price and sales, compliance verification of paid and received previously agreed prices, promptness of payment for delivered goods, calculations, and enforced consequences of delayed payment.

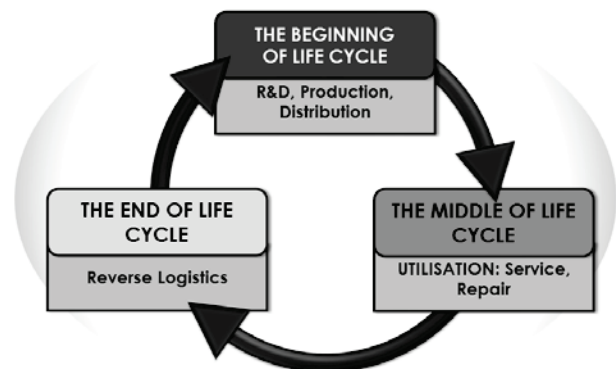


Fig. 1. Aspects of logistic management in relation to the product life cycle

Source: Study based on Hesselbach J., Herrmann C., *Globalized Solutions for Sustainability in Manufacturing: Proceedings of the 18th CIRP International Conference on Life Cycle Engineering, Technische Universität Braunschweig, Germany, May 2nd - 4th, Springer 2011, p. 48*

Thus, only those cash flows that are directly connected to the physical flows and, therefore the payment for the delivery should be considered part of the logistics process.

Determining the role of logistics and logistics management aspects in manufacturing companies requires reference to the product's life cycle [14] (Figure 1), which is associated, as noted by M. Fertsch with 'the planning, analysis, design, testing, production, distribution and the proper system operation (of a product) during its exploitation' [7].

Proper relations between logistical microsystem of an enterprise and its other functional departments constitute important elements influencing the functioning of the whole organization. Two main types of these relationships can be distinguished. Relation with manufacturing activities (basic), where the decisions on logistics processes of production, supply and distribution are associated with factors such as types of processes or production lines volume. What should also be distinguished are relations referring to marketing activities of companies that are related to the logistics system at many levels. Determining level of inventories or adjusting products delivery modes to the customer takes place with the use of the pieces of information acquired by marketing department. Also, designing new products require mutual exchange of data concerning the shape, dimensions, physical and chemical properties, in order to accommodate means of transport, methods of storage, and selection of the packaging or designing of distribution channels [3].

Particular role is played by factors determining the form of material goods flow. These include: specialization of production, organizational and technical infrastructure and the construction of a production system. Logistics decisions in production require firstly, careful planning that takes into account the complexity of the production processes and secondly adaptation to the form in which they occur in an enterprise. It is necessary to prioritize the different stages and the selection of a proper load of resources for carrying out actions. The main pillars of planning within the logistic management are proper communication, cooperation and coordination. This requires a reference to the company's strategic plans, which makes it necessary to take into account the following factors: [6]

- quick product launches,
- striving to consider the requirements for designed products, packaging, after-sales service,
- responsiveness to customer needs,
- creation of added value for customer service.

The desire to ensure customer service at the highest level requires concentration on fulfilling contracts in a timely manner. In the past, lack of cooperation between different departments of manufacturing enterprises in terms of supply and maintenance could be observed. Currently, these

tasks form the basic scope of the production logistics.

An important instrument for supporting management and coordination of production enterprises activity with other processes in the supply chain is production controlling.

Its functioning is primarily focused on achieving operational objectives and obtaining the value of the product that is being transformed into a manufacturing process. Areas and the extent of controlling, supporting the integration of production management with the supply chain processes is shown in Figure 13. Production controlling also includes in its activities areas related to: [23]

- customer service level,
- rationalization of total production costs,
- high levels of resources use in manufacturing process,
- lowering production inventory
- obtaining liquidity and systematization of manufacturing processes,
- elimination of bottlenecks by balancing tasks with capacity.

Among the objectives of production management and the operational management three main targets can be identified: efficiency, effectiveness and customer satisfaction. For efficiency it is an evident use of resources in the most productive way. In fact, it does not matter whether the company operates in public or private sector, or is a manufacturing or non-manufacturing one; optimal use of financial resources is always a desirable objective. Effectiveness must be examined in terms of its multi-dimensionality.

It focuses on optimization of multiple targets implementation, with the ability to determine their priorities. Nowadays, modern operational management has to focus on target customer service, people participating in the manufacturing processes, as well as on society, region and state. Thus, not only can production management systems be profitable and efficient, but they must also satisfy more and more customers. Both effectiveness and efficiency of production management systems can be measured based on four key dimensions: cost, quality, integrity, and reliability. These relate directly to the competitiveness of enterprises both on domestic and international market. Today's achievements in areas of creating new tools and methods, and entire systems such as automation, robotisation, flexible

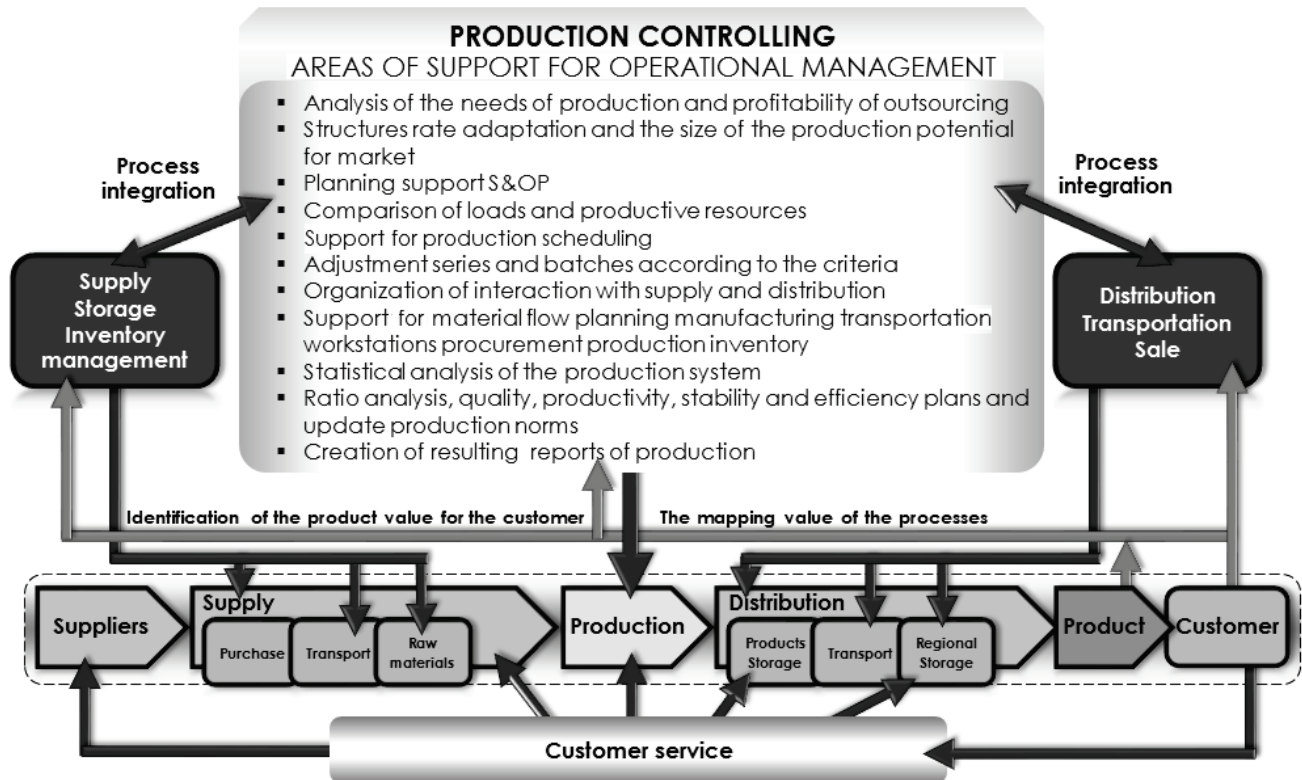


Fig. 2. The integration of production controlling with areas of supply chain management

Source: Study based on Śliwczyński B., *Controlling operacyjny łańcucha dostaw w zarządzaniu wartością produktu*, Wydawnictwo UE w Poznaniu, 2011, p. 303

manufacturing systems [21], CAD, CAM, CIM technologies [8] in TQM management, or operations research techniques [25], contribute to improvements in the cost, quality, reliability and flexibility, thus leading to better management performance [17].

#### 4. SUMMARY

Enterprises operating in the market are subjected to essential common laws influencing supply and demand. With respect to organization activities, one should also be guided by the basic functions of management, planning, organizing, directing and controlling. In order to be properly managed, the enterprise must base its structure on the four fundamental tasks that through common linkages form the backbone of the organization. Management should be treated as activities whose implementation can refer to both the whole of the company's systems and the processes therein. Recognition of processes management, in particular, reflects the activities of manufacturing enterprises, in which the production processes are shaping their market predispositions.

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