

FUNDAMENTAL NATURE OF LOGISTIC PROCESSES AND OPPORTUNITIES TO DIGITALIZATION

Assoc Prof.S.Demirova
Technical University of Varna, Bulgaria

s_demirova@tu-varna.bg

Abstract: *Industrial development has brought about qualitative changes in the very foundation of innovation and automation. The distinctive features of enterprises with such a type of production are becoming increasingly blurred by the growing tendency for global industrial development. They become heavily dependent on the pace of development of automation, industrial technologies, communications and ever more determined by the factors that most affect and shape the trends of that development. It is therefore of utmost importance to carefully define the distinctive features of modern logistics processes that form the foundation of the respective digital development policies, which is also the primary objective of the proposed paper. These policies are undoubtedly enforced by the very evolution of technology and are likely to define the new directions of cyber development.*

Key words: LOGISTICS, LOGISTICS PROCESSES, DIGITALIZATION, DIGITAL DEVELOPMENT

1. Essence of the term “Logistics”

This section aspires to explore the applied, theoretical and methodological aspects of logistics, i.e. the information provision of the logistic process, full awareness of the practices and methods for organising and managing the information flows within the logistics systems, the basic functional principles of the logistics information systems and the modern information and communication technologies in logistics, as clearly defined by various authors.

Logistics is necessary both for the economic growth of the country and for its prosperity. It can also be described as an integral part of the supply chain management as it allows for the proper planning, implementation and strict control over the efficient and effective movement of the flow and storage of goods and services. Maintains and joins or links the information between the point of origin and the point of consumption.

The word “logistics” was initially used as a military term to refer to the delivery of consumable items to those serving in the army. Nowadays, the concept encompasses activities starting from the business, with its materials, commodity and information flows, raw materials and terminating with the end-user. This is an area of growing importance, developing in line with the local and international trade. Logistics, in a general business sense, is the science that is concerned with the organisation of the management of the process of popularization and promotion of goods and services by suppliers of raw materials to consumers, the entire work related to the distribution of products, goods, services, inventory management and provisions, development of proper infrastructure to enable unimpeded movement of goods.

As for the company, logistics addresses problems concerning the coordination of wholesale purchases, sorting and splitting of bulk shipments, transportation, storage and sale of goods. Logistics provides for the accounting and optimisation of the commodity-financial flows that arise in the course of the company's business activities.

The definition of logistics, being employed by different users and addressing diverse needs results in minor variations. Its path goes through the strategic concept that outlines the business model of the company and along to the designation of transportation or description and formation of the production process.

In other words, the customer receives the desired product in the right place, at the right time and at the right price. Logistics has gradually developed into a key factor for the enterprise that is associated with competitiveness and environmental sustainability and brings about reduction in business expense/reduced business costs. The customer and the market have attained a central position in logistics, i.e. the customer's needs are not simply addressed but completely fulfilled. On the whole, this is a platform, a resource base that facilitates the occurrence of strategic actions and gaining considerable competitive advantages for the enterprise.

The logistics process comprises the following parts: materials supply, production and distribution. Distribution covers transport,

management and storage. Storage is also considered as a part of the materials supply and production.

There is a growing need for logistics services among manufacturers and trading companies due to the increased globalization of business and pressure of competition. The primary goal is to make the products and services easily and readily available on the market. All in all, the logistics service provider industry ranges from several substantial representatives offering basic transport services to long-established market leaders with a wide range and scope of logistics services (e.g. one-time purchases) to niche companies with a more diverse portfolio of interests [1,2].

The new service strategies have been triggered by the transformation of the scope and characteristics of the services offered by the service provider. Such an intense interest and accelerated development of more personalised services arises from the strong desire to strict customer compliance requirements and improved service levels [3,4]. The transformation of the scope and characteristics of the services offered by service providers trigger the development of new service strategies. These novel strategies are contingent upon the initial base of the capabilities which is likely to have a strong impact on the subsequent stages of the company's. The trend towards higher value added services afford providers the opportunity not only to differentiate their business from the competition but also to strengthen relationships with their customers.

As a result of the improvement in personalized services, the pressure applied to the industry of logistics service providers is characterised by strategic influence in terms of market coverage, enhanced level of service and increased flexibility to respond to changing customer requirements. For example, the so-called “green logistics” has become one of the basic requirements in our time.

Research in the field of green supply chain management has expanded significantly over the last few decades in view of the growing importance of the environmental components in the management of these chains. “The green supply chain” is a broad concept that takes into account different approaches adopted by the companies in their work with the respective supplier and/or customer to boost the environmental performance of their operations.

According to some authors, such an approach has two main objectives:

- Consistent implementation of certain environmental performance criteria among participants throughout the supply chain and fostering responsible corporate environmental behaviour;

- Helping suppliers become cognizant of the full significance of dealing with immediate environmental problems and actively supporting them in setting up their own initiatives for improvement [5,6,7].

Some authors share the opinion that investing in environmental initiatives is environmentally sound and beneficial to the business, as it increases the efficiency of the business itself by saving

resources, eliminating waste and increasing productivity. Such initiatives can also open the way for major competitive advantages in the areas of innovation and operations [8]. The "Green" initiatives are of great importance for logistics transport. Logistics providers are gradually transforming the scope of their services by offering a shift from a single business to a business model based on a wider range of services. With such a process in progress they seem quite enthusiastic about adopting eco-friendly transportation options, along with some non-transportation-related activities or a Practitioners and scientists tend to interpret the concept of Logistics in their own way. There are some who believe that Logistics is a sphere of economics, that characterizes the interaction between the supply, production, distribution, demand and consumption. There are others who define Logistics as a new scientific direction referring to the development of rational methods for managing material and information flows in the process of meeting the demand for goods and their supply to the consumer with minimal cost of resources.

Logistics service - non-automated process and without the use of information systems and technologies

The difficulty in clarifying the concept of Logistics lies in the fact that it comprises a multitude of directions and areas, wherefore even the highly-qualified professional cannot be an expert in all or most of these directions concurrently.

Author	Definition
FLOW-ORIENTED LOGISTICS: FORMULATION OF THE DEFINITION PFOHL, H.-Chr.	Logistics refers to all activities to plan, manage, implement and control the product transformation in space and time and the associated transformations with respect to product quantities and types, product characteristics of the services and logistics determinations of the products. Through the joint action of these activities, the product flow must be activated by connecting the point of departure to the point of destination (receipt) as efficiently as possible.
The seven "R's" of logistics	The seven "R's" defines Logistics as ensuring the availability of the right (appropriate) product, in the right quantity, in the right place, at the right time, with the right quality, for the right customer, at the right (optimal) costs.
Council of Logistics Management (CLM)	Logistics is the process of planning, implementation and control of the efficient and cost-effective movement and storage of raw materials, semi-finished and finished products accompanied by the relevant information from the point of departure to the point of destination (receipt) in full compliance with the customer requirements.
European Logistics Association (ELA)	Logistics is the organisation, planning, control and implementation of a product flow from its development and from the purchase through its production and distribution to the end user in order to meet market requirements with minimum cost and minimum use of capital.
KLAUS, P.	Logistics is a specific way of perceiving by way of interpreting economic phenomena and interconnectedness as flows of objects moving steadily through chains and networks of activities and processes in an effort to optimise them in terms of cost reduction and value increase as well as to enhance their ability to adapt to changes in consumer needs and surrounding environment.
DANDY	Logistics is the management of the product flow throughout the entire enterprise from the moment the order arrives to the moment when the customer receives the finished product as cost-effectively for the enterprise itself as possible.
BAUMGAR TEN, BOT, HAGEN	Organisational logistics covers planning, management, implementation and control of all material and information flows within and between the enterprises from the customer to the provider. The supply chain, production, distribution, reverse and transportation logistics are critical sub-domains of logistics involved in all process chains and process revolutions.
MAGEE, J.F.	Logistics refers to the management of the flow of materials and products from the source to the manufacturer. The logistics system includes the total flow of materials – from the supply of raw materials to the delivery of the finished products to the end users, although traditionally a given company takes direct control over part of the overall logistics system for its products.
LIFE CYCLE ORIENTED FORMULATION OF THE DEFINITION OF LOGISTICS: Society of Logistics Engineers (SOLE)	Logistics is the right management which, during the life cycle of a product, ensures efficient use of resources and adequate capacity performance of logistics elements throughout all the

combination of them. Introduced have been approaches based on the development of an integrated package of initiatives designed to improve the environmental sustainability of services that logistics companies provide to their customers [9,10].

Logistics – well-established terms and definitions

The global economic literature provides myriads of definitions of the concept of Logistics. And yet, it eludes any precise or specific definition. The ambiguity is ascribed to the different perspectives from which it can be applied in practice.

Logistics cannot be a matter of concern only to the manager or the Marketing Specialist. It touches upon a new model of development, where technical and economic opportunities are used reciprocally and much better than ever before to meet the requirements of the market.

Nevertheless, among the huge variety of definitions, there are three descriptions that can be set apart:

- flow-oriented formulation;
- (product) life cycle oriented formulation;
- service-oriented formulation.

Compiled in Table 1 is part of the most widely used definitions and their respective authors [11].

Table 1. The most widely used definitions and their respective authors

	phases of the life cycle, so as to ensure effective resource management by timely intervention in the system.
SERVICE-ORIENTED FORMULATION OF THE DEFINITION OF LOGISTICS: PFOHL, H.-Chr.	Logistics is a process of coordination of all intangible activities, which, for the implementation of a given service, should be performed as cost-effectively for the customer as possible.
BLAGOEV, V.	Logistics includes all the company's functions related to the storage, transportation, cutting, packaging, receiving, dispatching and customer service, including planning these activities in such a way as to ensure customer satisfaction while achieving company's goals.
SERVICE-ORIENTED FORMULATION OF THE DEFINITION OF LOGISTICS: PAVEL DIMITROV	Logistics is an integrated (interconnected) management of material (and related information) flows from the point of their inception through all the phases and stages of movement to the end-users, in order to ensure the required level of customer service in the most efficient and cost-effective way. From the point of view of the individual company, the application of the logistics concept means an integrated management of the three phases of the movement of material flow – incoming, internal and outgoing, in respect to the three areas of company management – supply, production/operations and distribution and further inclusion in the process of integration of suppliers (and their suppliers/customers) and their customers/across the total or part of the so-called supply chain.
SIYKA DEMIROVA	Conventional logistics – a logistics activity, which is managed centrally, and whose separate components are unable to communicate independently with each other. Cyber-logistics – a decentralised logistic management activity, in which the individual components can make independent decisions and the entire logistics process is subject to the cyber-physical requirements of the system. Digital logistics – the complete logistics process is digitised and its proper functioning is impossible without a digital foundation.

Applicable as well are the following definitions:

Communication logistics – the unit connecting, by means of communication, the company with the customer provides information about the price, delivery time, informs the customer if the contract expires, etc.

Information logistics – another name for information system. The customer calls the agent, the agent looks into the CRM system database with all the information and documents that relate to the customer, then looks into the information system to see the product's price, its characteristics, etc. Information logistics strives to ensure the achievement of the key logistics operational objectives on the basis of constant monitoring and maximum impact of management on logistics processes, through relevant information provision [12]. The information most necessary for the attainment of the above objectives unfolds gradually while performing various logistics operations accompanies the movement of material flow at all stages of its occurrence. From this perspective, the information

flow is regarded as a flow of information with fixed start and end points.

There is a **logistics work-flow system** featuring the tariffs that are automatically transferred to the information system.

Electronic logistics (e-service) – based on the use of any electronic information systems, distribution, financial, etc.

Communication and information logistics are sub-components of e-logistics.

Financial logistics discloses details about the customer's account, payment due date, etc.

Supply – the accepted definition of the common objectives of logistics functions states that the organization should obtain the requested material resources in the right quality and quantity, at the right time, in the right place, by a reliable supplier, providing excellent customer service (both before and after the transaction), at a bargain price.

All in all, the flow-oriented formulation of logistics is viewed as the most common and widely applied both in science and practice.

Other terms used in logistics

Knowledge is information that has been processed and perceived by a person or group of people.

Information logistics – the science for the application of methods for collecting, processing, storing and disseminating information in industrial and economic systems and their environment based on rules of logistics (strengthening the importance of information in the right quantity, at the right time, in the right place and at optimal price).

The information standards describe the structure and type of documents to be transmitted over the information network.

The information process is a process in which information is considered a primary object with a certain sequence of changes.

The information is to be obtained subsequent to appropriate processing of data that reveal the content of numbers, symbols and words that give details on the event.

The communication standards determine the characteristics of signal reception, signal transformation and the speed of data transmission.

Logistics information system (LIS) - a coherent set of proper software, hardware and operational rules for integrated information space with the intention of ensuring the efficient and effective functioning of the logistics chain.

Logistics information flow – refers to prevailing or organised within the frameworks of LIS information about the traffic in a particular direction provided that these data have a common source and a common receiver (for example: a set of data transmitted from one unit of the system (orders-source department) to another unit (for example, an industrial department - addressee).

Information flow - movements in any medium of data expressed in a structured form.

Electronic business - the implementation of most business functions by electronic means (in particular through e-commerce via online network services).

Timeliness - logistics information has to enter the management system within a reasonable time frame as required by a variety of logistics technologies, especially those based on the concept of "just-in-time". Timeliness of information is of paramount importance for almost all complex logistics functions. In addition, myriads of tasks in the area of transport, operational management, order and inventory management are processed in real time. The requirement for timely receipt and processing of information is carried out through advanced logistics technologies for storage, barcoding, electronic data exchange.

Orientation - Information in the logistics information system should be steered towards proper identification of additional opportunities for improving product quality, services, reducing logistics costs. The methods adopted for obtaining, transmitting, filing and pre-processing of information should help identify "bottlenecks", resource-saving reserves, et al.

Flexibility - the information circulating within the logistics information system is to be adjusted to become easily applicable to the requirements of specific users.

Data - basic information obtained as a result of a direct observation of an event within an object in the form of numbers, symbols, characters and words.

Information logistics - – the science for the application of methods for collecting, processing, storing and disseminating information in industrial and economic systems and their environment based on rules of logistics (strengthening the importance of information in the right quantity, at the right time, in the right place and at optimal price).

In conclusion, it can be inferred that in practice there are varied definitions, numerous terms and concepts of logistics, which, in essence, bear the characteristic features of the type, purpose, nature and trends in the development of this process.

Conventional logistics

Conventional logistics differentiates between the following concepts and definitions for the main components of logistics in terms of the scope, structure, the way in which the matter is approached, the function it serves, etc.

Logistic flows, Logistics Systems

Logistic flows. Established in conventional production principles are the following definitions for flows running in parallel: material flow, information flow, financial flow.

Material flows. The most important ones are the material flows of goods and raw materials. Second in importance are the financial flows or the provision of the material flow with financial support. The information is assigned the secondary role, which is to support and maintain the physical process of the movement of goods from the supplier to the consumer, but only as accompanying information.

Information flows. With regard to the corporate activity, the flow of information is a set of circulating messages within the corporate system, and also between the internal system and the external environment, an essential prerequisite for the control and management of core and ancillary processes and operations. Of course, the auxiliary information system, predominant or aligned within the information system, pertains to the traffic in a particular direction provided that these data have a common source and a common receiver.

Modules are system blocks for information processing (for example, taking orders or allocating inventories by order). Data files are the infrastructure of the information system where information is stored, divided into functionally homogeneous groups, such as: data management and input is a type of interface through which the logistics system receives information from external sources: from those who make decisions within the company itself, or from other companies. The reports contain information about logistics operations and cross-functional collaboration. Communication channels (information exchange channels) ensure the interaction of the elements of the information system both internally among themselves and externally with the outside world.

Affiliation of operations, processes and activities to logistics

Signs of identity

It is particularly necessary to allocate information that contributes to the main strategic resource of logistics in the "supplier-consumer" model. The use of modern computer processing models or techniques makes it possible to reduce costs due to a more efficient management of information flows, increased speed and coordination. The term "information resource" is considered an economic category. Information resource management means:

- assessing the needs of information at every level of the logistics system and in each function of logistics management;
- research and rationalization of documentation, organisation of effective exchange of electronic documents;
- overcoming the incompatibility of typical data;
- creating a data management system.

Creating a digital environment. The above-mentioned operations, processes and activities can all serve as a sound basis for creating optimum conditions for the digitisation of the logistics process. It follows from here that a process identity environment should be created both horizontally and vertically. In practical terms, this requires a precise identification, differentiation and grouping of affiliated operations, or marking off those operations and processes that mostly serve logistical purposes. This activity can be envisaged as the first stage of the digitisation of logistics systems. The second stage should be the construction of a system that would promote and enhance the digital dimensions of logistics processes.

Conclusion

Finally, it can be concluded that digitisation of logistics systems is a complex issue closely related to and dependent on the digitisation of other production activities and processes. This also implies the need for the gradual digitisation of logistics processes and systems, namely:

- First, determining the affiliation of operations and processes to logistics activities;
- Digitisation of logistics processes and systems.

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