



# THE EFFECTIVENESS OF THE USE OF DIGITAL TECHNOLOGIES IN THE FIELD OF LOGISTICS

**A.A. Yuldashev**

PhD, Dean of the Faculty of Business Administration University of Millat Umidi

Article history:	Abstract:
<b>Received:</b> May 8 <sup>th</sup> 2023 <b>Accepted:</b> June 6 <sup>th</sup> 2023 <b>Published:</b> July 4 <sup>th</sup> 2023	This article discusses the concept and content of the digital transformation of logistics; problems of introducing digital technologies in logistics, analysis of the prospects for digital technologies in logistics, Types of digital logistics systems in the supply chain.

**Keywords:** Digital economy, digital logistics, digital technologies, supply chain management

The dynamism of market relations forces modern enterprises of various business areas to find different ways to increase the efficiency of their presence in the market. One of the most effective tools to maintain market positions is the use of an integration mechanism for building relationships with business partners. The peculiarity of integration, taking into account the new conditions of economic relations (focus on knowledge, globalization, innovation, large-scale use of e-commerce, transformation of producer-consumer relations) at the level of an economic entity is to combine the efforts of managing the distribution system of each individual participant without losing its autonomy.

The concept of "digital transformation" has long been an indispensable element of a highly developed business. Customers need speed and variety of scenarios, and digital transformation is indispensable. Digital transformation is a concept that has moved from the category of special requirements for business to a pool of necessary elements for its development. And if until recently it was believed that business would soon become digital, it can already be argued that the transition to the digital environment has occurred [2]. Thus, the chosen research topic is relevant. The purpose of the study is to identify the problems and prospects for the development of digital logistics in supply chain management.

Digital transformation is a concept that has long moved from the category of special requirements for business to a pool of necessary elements for its development. The transition to the digital environment has already taken place [2]. The digital transformation of business went through several stages, which were directly related to the emergence of new tasks. Initially, the scenarios were simple, such as: "Warehouse - store", "Supplier - warehouse". With the advent of online trading, as well as multi-channel and unique marketing models, new scenarios for the operation of the logistics complex have appeared: store - home; warehouse - house; warehouse - market - house;

warehouse - store (click&collect); store - postamat; market - market. This list of various delivery scenarios is not exhaustive.

CRM, ERP, WMS, TMS, loyalty programs and more - all elements of the supply chain must be changed in such a way that the growing desires of buyers can be realized in the near future. The digital transformation of the supply chain is no longer a "beautiful future", but a completely real one today, which will be realized with the help of SaaS format solutions – Software as a Service [2].

Underestimation of planning, its reduction to a minimum or complete failure often leads to significant economic losses and even bankruptcy. In conditions of economic instability, competition persists, and the need for planning is also preserved not only for various levels of government - the state, region, enterprise, but also for supply chains, since in modern conditions supply chains compete more often than individual enterprises.

It should be noted that the plan and the market are interacting and complementary components of the economic mechanism. The market successfully functions and develops with purposeful, planned behavior of its participants. The same parallel can be drawn in relation to the functioning of supply chains: the successful functioning and development of the supply chain can be ensured with integrated planning of all its links. This allows all participants in the supply chain to effectively redistribute their resources in time and space, so successful supply chains must carry out all types of planned activities: strategic planning, current and operational.

Strategic planning is the basis for the interaction of many internal and external economic processes, factors and phenomena. Therefore, strategic planning of supply chains is given special attention.

The term "Supply Chain Management (SCM)" – supply chain / supply chain management was proposed by American specialists (in particular, Arthur Andersen) in the early 1980s and subsequently gained great popularity. Since that time, scientists from different



countries and various scientific schools of logistics have been structuring and developing the concept of "supply chain" and "supply chain management".

Based on the fact that the main objects of modeling in supply chains are the network structure and the business processes occurring in them, in the modern interpretation of the theory of supply chain management, two main approaches to defining the supply chain can be distinguished: object and process [3].

According to the object approach, the supply chain is a set of organizations of three or more business units (legal entities or individuals) directly involved in

the external and internal flows of products, services, finances and / or information from the supplier to the consumer. At its core, supply chains are sequentially interacting suppliers and consumers: each consumer then becomes a supplier for the next, and so on until the finished product reaches the final user.

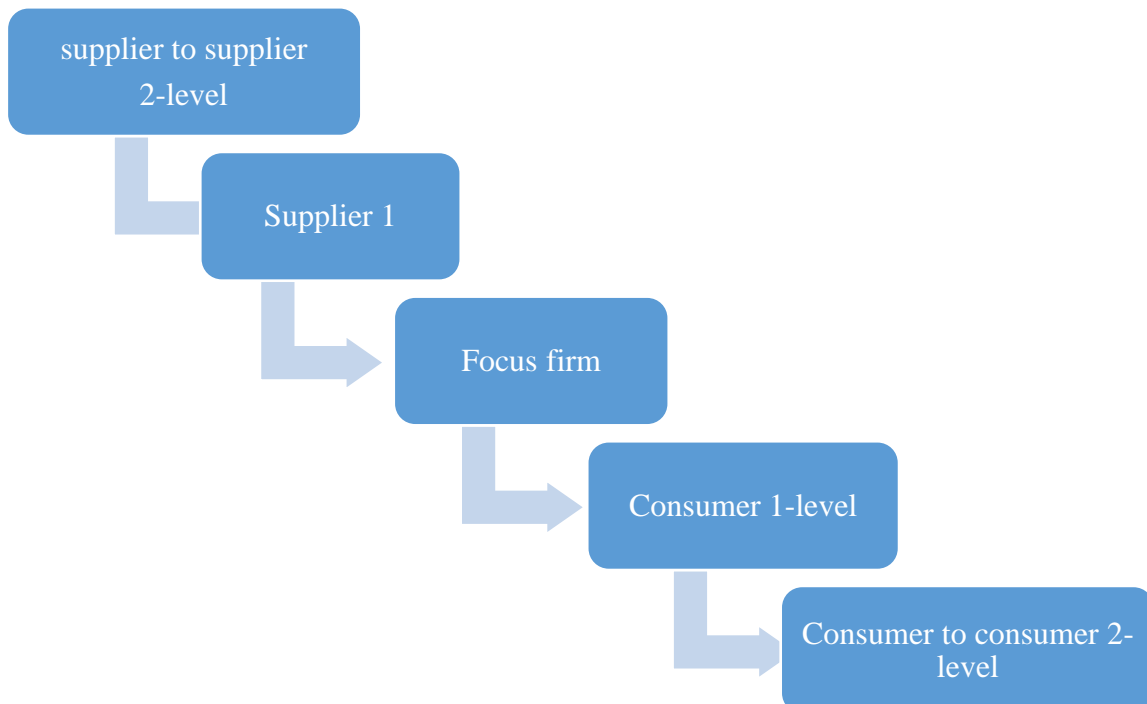
Based on this definition, we distinguish three levels of supply chain complexity: direct, extended, and maximum.

1. The direct supply chain consists of a company, a supplier and a consumer involved in the external and / or internal flow of products, services, financial and / or information flow.



**Picture 1. Direct supply chain**

12. *The extended supply chain includes the direct supply chain, as well as suppliers and consumers, at least the second level.*



**Picture 2. Extended supply chain**

3. *The maximum supply chain consists of a focus company and all counterparties (suppliers and consumers of all possible levels), from suppliers of raw materials to final consumers.*

It should be noted that sometimes the supply chain does not end at the end consumer, but

additionally covers the stage of processing and reuse of materials.

Each supply chain has a leader or focus company that determines the structure of the chain, suppliers and consumers, and various intermediaries as



the link with the greatest weight. Most often, this link becomes the manufacturer of the final product.

From the point of view of the process approach, the supply chain is the combination of all types of business processes necessary to satisfy the demand for a product or service - from the initial moment of receipt of raw materials or information to delivery to the final consumer. Supply chain management can also be considered from this perspective, although the number of key business processes in supply chains remains debatable. According to J. Stock and D. Lambert [2], supply chain management is the management of eight key business processes.

**Supply chain management** is the integration of key business processes that start with the end user and

span all providers of goods, services and information that add value to consumers and other stakeholders.

In this case, the integration of the following key business processes is considered:

1. Customer relationship management.
2. Customer service.
3. Demand management.
4. Order fulfillment management.
5. Support for production processes.
6. Supply management.
7. Management of product development and bringing it to commercial use.
8. Management of return material flows. The supply chain is characterized by parameters that establish the specifics of this supply chain.

#### **Length**

- Number of supply chain levels

#### **Width**

- number of suppliers/consumers included in each level

#### **Way**

- Distances between the initial and final participant in the supply chain. Calculated as the sum of the distances between participants in the supply chain

#### **Time**

- the time from the purchase of raw materials and materials by the initial participant in the supply chain to the receipt of the finished consumer goods

#### **Speed**

- Average arithmetic flow rate for all participants in the supply chain

#### **Power**

- The maximum number of goods that can be delivered to end consumers at a given time

#### **Reliability**

- Compliance with established delivery dates

#### **Sensitivity (reactivity)**

- The ability of the supply chain to quickly respond to changes in the external environment

**Picture 3 Supply chain parameters**



Each supply chain is characterized by certain parameters. Figure 3 shows a basic, but not exhaustive, list of supply chain parameters. It is possible to single out, for example, the parameters of technological regulation (standards, regulations, technical and environmental safety rules, etc.), the parameters of the external environment in which the supply chain operates, the parameters of control actions, etc.

Supply chains have a network structure. Therefore, one of the key elements of supply chain management is a clear knowledge and understanding of how the supply chain network structure is configured

## Key Aspects

(built). The three basic aspects of the network structure are (Figure 4):

1. Supply Chain Participants
2. Structural dimensions of the network
3. Types of business process links
4. Supply chain participants

Supply chain participants include all companies or organizations with which the focus company interacts directly or indirectly, i.e. through their suppliers or consumers. However, for a very complex network to be manageable, a distinction must be made between primary and secondary actors.

### Picture 4. Basic aspects of the network structure of the supply chain

Supply chain primary members include all independent companies or strategic units that actually perform operational and/or managerial activities in processes used to serve a particular customer or market.

Supply chain supporting members are companies whose involvement is limited to providing resources, knowledge, capabilities, or assets to key members.

For example, auxiliaries might include:

- agents providing the manufacturer on leasing, for example, trucks;
- banks issuing credit to a retailer;
- the owners of the building, providing it as a warehouse;
- companies supplying production equipment;
- Printing houses printing marketing literature;

- firms providing secretarial services of a temporary nature, etc.

Sometimes the same company can perform both primary and secondary functions. Such a company may perform core functions in one process and support functions in another. So, for example, a company that provides production or storage space to the main participant in the supply chain can simultaneously be its supplier and / or consumer of products. It should be noted that the differences between the main and auxiliary participants in the supply chains are not always obvious. However, establishing this distinction makes it possible to rationally simplify management decisions while maintaining the main characteristics of the truly key participants in supply chains [5].

Including all types of participants can cause chains to become unnecessarily complex - they grow at



the expense of participants that connect to the network at deeper levels. In this case, integrating and managing all process links with all participants in the supply chain often becomes unproductive, if not impossible. Therefore, it is important here to establish criteria to determine which participants are important to the success of the company and therefore should receive special attention from managers and receive resources from the company.

Determining the primary and secondary actors also helps to pinpoint where products originate and where they are consumed in the supply chain being analyzed. The point of origin in a particular chain is considered to be the site where there are no main suppliers. In this section, all suppliers are only auxiliary. The place of consumption is the area where there are no main consumers and where the product or service is used directly for its intended purpose. These sections respectively define the beginning and end of the supply chain.

When describing, analyzing and managing supply chains, it is important to consider three structural dimensions of the network: the length of the supply chain, the width of the supply chain, and the position of the focus company relative to the end points of the supply chain.

*The length of the supply chain* determines the number of levels in the supply chain. A single chain can be either long, with a large number of links, or short, when there are few such links. The width of the supply chain characterizes the number of suppliers / consumers included in each level. The third structural dimension is the position of the focus company relative to the end points of the supply chain. The company can be positioned at the beginning of the chain, i.e. close to the beginning of the primary source of supply, or at the end of the chain, i.e. close to the end consumer, as well as somewhere in the middle - between the end points.

Various combinations of these structural dimensions are possible. For example, a long narrow network structure on the supplier side can be combined with a short and (wide) structure on the consumer side. The structure of supply chains is influenced by product characteristics, the required level of customer service, logistics, marketing, production, etc. focus company strategies, use of outsourcing. These factors can greatly affect the length and breadth of supply chains, as well as change the overall position of the focus company.

### 3. Types of business process links

In supply chains, four types of business process links can be distinguished: managed, monitored, unmanaged, and links with objects that are not part of the supply chain, i.e. external [2]. These types of

connections are considered from the standpoint of their control over the focus company.

*Managed links* are links that the focus company considers necessary for integration and management. It may manage these relationships in collaboration with other companies in the supply chain.

*Traceable links*, compared to managed links between processes, are not as critical to the operation of the focus company, although they are also important, so they must be integrated and managed by other companies that are part of the overall supply chain. The focus company monitors or reviews how these links are integrated and managed as needed.

*Unmanaged connections* between processes are connections that the focus company is not actively involved in and which are not critical enough for it to allocate resources even for monitoring. In other words, the focus company either fully trusts other members to manage these links, or, due to limited resources, leaves them to the full discretion of other participants in the chain.

Relationships with entities outside the supply chain. Supply chains are influenced by decisions that are made in other similar chains that are somehow related to them. For example, a supplier of a focus company may act in the same capacity in the supply chain of its main competitor, which may affect the performance of both supply chains.

## CONCLUSION

Thus, we can conclude that the transition to the digital environment has already taken place, and all processes are somehow connected with digital technologies and universal digitalization. Supply chain management is undergoing a transformation, one of the main drivers of which is becoming digital technologies that cover all areas of the supply chain. As a result of the study, analytics were carried out to solve problems in supply chain management.

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