E-LOGISTICS AS A SOURCE OF MODERN TOOLS AFFECTING THE COMPETITIVENESS OF ENTERPRISES

Abstract

Nowadays, the competitive position of enterprises depends not only on prices, but also on factors such as quality, customer service, and execution time, which can be improved by implementing modern solutions into the logistics processes. This paper presents the influence of e-logistics on competitiveness. It also describes several e-logistics technologies and points out the benefits of using such technologies as wearables, 3D vision, or Pick-by-Voice and Pick-by-Light systems.

Keywords: logistics, e-logistics, competitiveness

Introduction

Logistics operations constitute an inseparable part of the effective functioning of enterprises. The main task of logistics is to ensure the availability of all resources necessary to carry out the primary process of production (the main activity of an enterprise). The evolution of logistics processes observed in recent years indicates a growing demand for the creation of integration and strategic processes. In order to maintain a stable position in the market, enterprises have to make a constant effort to gain competitive advantage over others in the market. A proper understanding of logistics operations allows to secure such a position. Conducting rational economic activity and using up-to-date logistics tools facilitate gaining competitive advantage (Godzisz, Ścibisz, 2013). The complex relations occurring within supply chains render the functions of logistics relevant enough for it to become a source of innovative solutions used in enterprises (Chaberek, 2014). The aim of this review paper is to present e-logistics solutions which can
improve the competitive position of enterprises based on such sources as books, journals, and Internet sites dedicated to this topic.

1. E-logistics and competitiveness

Logistics operations have an undeniable influence on the functioning of the economy and the entities that comprise it. Logistics is defined as a field of knowledge that studies the product and information flows within the economy and its sectors (Skowronek, Sarjusz-Wolski, 2011). Its attention is focused on resources and on delivering them to the right place at the right time in the right quantity, etc., in accordance with the 6R principle (Chaberek, 2011). A list of a number of areas of logistics operations could be devised, but the most important thing is to perceive them as a coordinated whole. The systemic understanding of logistics offers a division into logistic subsystems (Wieczerzycki, 2012):

- distribution logistics,
- production logistics,
- supply logistics.

Such a wide range of logistics operations comes with numerous difficulties related to the coordination of primary and support processes. Enterprise management is practically impossible without using modern information technologies. The bigger the company, the more difficult it is to implement new technologies. Small and medium-sized enterprises often do not go beyond automating primary logistics processes. The implementation of transaction systems aimed at supporting shipping and warehousing operations can be an example. It is, however, only the first step in using information technologies. Primary processes can be properly and comprehensively supported by integrating support systems with particular production activities (Wieczerzycki, Wieliński, 2003). The implementation of integrated logistics systems, such as Enterprise Resource Planning (ERP), can be an example. Moreover, the dynamic development of IT brought about new solutions, e.g. augmented reality, wearable technologies, or Pick-by-Voice and Pick-by-Light systems.

E-logistics is strictly related to e-business, which can be defined as the use of ICT in business processes management (Wieczerzycki, 2012). The implementation of information technologies is mainly limited to digital products, which can be divided into (Cellary, 2008):

- documents,
- copyrighted works,
- money,
- digital “gadgets,”
- software.

In this context, documents can be described as digitally available (sometimes for a fee) information about various events, such as journals published in a digital form; copyrighted works – as digital products protected by copyright laws, such as art or literary pieces, scientific works, patented ideas and solutions; money – as a digital variety of information about financial resources stored on
computers, such as exclusively digital bonds, investment fund units, or shares; digital “gadgets” – as an authorial product offered by a number of companies in the market (from the possibility of sending text messages or using an unusual payment method to modern devices or services offered by specialized providers); and software – as a combination of zeroes and ones (bits) that supports the functionality of a particular device, thus serving as a foundation for e-logistics solutions (Wieczerzycki, 2008). Most of the products aimed at supporting logistics processes are special software programs and “gadgets.” The essence of e-logistics consists in using ICT solutions for supporting logistics processes. We can easily list the areas of logistics that can be thus improved (Wieczerzycki, 2008):

- control over order placement and execution,
- transport of resources,
- control over supply,
- storage and tipping,
- distribution of goods.

Better functioning of even one of these areas will contribute to the improved competitiveness of the company, but the more modern solutions are implemented, the more benefits can be achieved.

Logistics is responsible for the effectiveness of primary processes. Each customer expects that the product he generates demand for will be delivered in the right place at the right time in the right quality. To meet the growing needs of customers, enterprises have to make use of all possible technological solutions. In order to determine the influence of e-logistics on the competitive position of an enterprise, we should specify measurable objectives that they endeavour to achieve. In an attempt to do so, we can first distinguish the possible methods of gaining competitive advantage (Harrison, Hoek, 2010):

- “hard” methods,
- “soft” methods,
- auxiliary abilities.

Soft methods concern the product service system, which contributes to building customer trust. Hard methods are applicable to specific cost, time, and quality objectives. Auxiliary abilities relate to dealing with uncertainty (Harrison, Hoek, 2010).

Hard methods owe their name to their clearly determined benefits. Although cost advantages have less and less bearing on competitiveness, their influence is still noticeable. In the case of a specific group of products, their price can be precisely the factor that will encourage the customer to make a purchase. Another aspect related to hard methods is time. It is strictly connected with logistics customer service and, in this case, defined as the period between the placement of an order and the delivery of the finished product. The faster a company is able to deliver the product; the more customers will use its services. The last aspect relevant for hard methods is quality, which has the most significance for the customer. A product that does not break down (proper logistics handling of the primary process) or get excessively worn out will be the obvious choice.
The effects of soft methods, on the other hand, are not measurable. The customer will feel safe if the company respects the confidentiality of the information he provided in order to make a purchase and if the communication procedure is carried out in an effective and honest manner. Customer trust also depends on the quality of the delivered product.

Auxiliary abilities mainly help to deal with unexpected situations. The set time, price, and quality standards refer to standardized orders. Problems with reliability can arise when non-standard orders are being placed. For this reason, it is important to establish certain levels of reliability, as is the case in Vision Express. This company offers to assemble prescription glasses within an hour, at the same time stating that 95% of their customers will receive their orders in time. Although individualized products require a different approach, production companies should be able to guarantee a definite execution time as the measure of their reliability, keeping in mind the possibility of unexpected situations. A company has to be reliable, but also flexible in its reliability (Harrison, Hoek, 2010).

In many cases, e-logistics operations can affect not only the measurable factors, such as time and costs, but also the less measurable ones, such as quality, as well as auxiliary abilities and soft methods. A company can use less or more e-logistic solutions. Because the final result is the cumulative effect of the improved functioning of particular areas, e-logistics solutions give a chance to gain significant competitive advantage.

2. Examples of using e-logistics in practice

Today’s market is brimming with modern devices and solutions. Wearable devices become one of the most popular of them. Smartwatches and smartbands, endowed with the same functions as modern mobile phones, are the simplest example. However, their use can be much broader, if they are applied to improve logistics operations. Their main task is to facilitate communication between company units, and thus their productivity. Companies use devices such as smartglasses, smartwatches, smartrings, and smart armbands (Oracle, 2015). Their most important feature is that they are always turned on and the employees always have them on them. Using such technologies allows to increase productivity and security. They are most often used for warehousing operations. They enable direct transfer of information between warehouse employees and office employees, facilitate the location of goods and resources and the identification of dispatched and received products, and optimize the use of storage space. It is also worth noting that they make it easier for the workers to perform their tasks, as they leave their hands free. Appropriate devices also find application in production processes, e.g. to develop production plans and service activities. They provide more information in a shorter time, thus reducing the risk of human error (Oracle, 2015). In this form, the use of such devices allows to reduce production time and production costs and maintain a desired quality of the final product. For this reason, they can be classified as e-logistics solutions – hard methods affecting company competitiveness.
Another example of a technologically advanced solution is the so-called augmented reality (AR). It is, in a way, connected with wearable devices, especially smartgasses. Augmented reality allows to observe the world and, at the same time, obtain additional information about it. It is defined as a real-time view of the real world augmented by additional information generated by special computer devices, e.g. smartgasses (Carmigniani, Furht, 2011). AR can be achieved in four steps. The first step is to capture the live image which is to be augmented by information using appropriate devices. The second step is to identify the captured location by using landmarks or GPS coordinates. The third step is to process these data and find matching “augmented” information using the Internet or any database. The fourth step is to visualize the location using the information gathered in the third step (Glockner et al., 2014). Although AR is only at the first stages of implementation into logistics, it guarantees significant benefits. Most of all, it ensures that required information will be delivered in the right place at the right time and in the right quality, which is necessary for the effective planning of particular processes and supporting operations related to the optimization of loadings, and thus translates into high-quality customer service. AR can also be used to train new employees and plan the placement of goods in a warehouse (Glockner et al., 2014). It also finds application in transport optimization (improving completeness verification procedures, international commerce, driver navigation systems, loading of goods) and storage operations (improving order picking processes). Accuracy in order picking saves time and reduces the risk of damage in transport. Supporting international commerce facilitates information exchange between global service providers, real-time language interpretation, and automatic identification of goods. Navigation systems allow drivers to move faster and more efficiently, make punctual deliveries, and reduce the number of accidents (and thus company losses). AR would also make it possible for the person responsible for the loading of goods to be provided with information about the right placement of palettes on an ongoing basis, which would make loading and unloading processes faster (Glockner et al., 2014). There is more than one method of using augmented reality to gain competitive advantage. Implementing the AR technology in even one of the described areas results in shortened production time and reduced production costs. It therefore contributes to the image of a company as an effective entity in the market and can prevent non-standard situations from occurring.

Another example of a modern technology used in logistics is 3D technology, often used in tandem with and complementary to AR devices, especially smartglasses. It undoubtedly makes it easier to view the particular elements or a given product and its assembly method. Just like AR, 3D technology also facilitates storage processes by generating a three-dimensional plan of the storage facility; the possibility of viewing the object in 3D will make each paper blueprint more legible and understandable. It will also make it possible to reorganize and thus speed up the processes of producing complex goods (Thamer et al., 2014). The use of 3D technology is not, however, limited to 3D visualizations of storage facilities and products or device diagrams – it is also used in printing, allowing to reduce the costs of producing all the necessary components and to produce certain products
in much shorter time than using today’s technologies (Logistyka.net.pl, 2015). 3D technology is one of the most innovative solutions and thus it is still, in many aspects, underdeveloped. However, the described examples suggest that it is only a question of time before it becomes widely used. The first companies to exploit its possibilities will have the chance to gain advantage over their competitors by reducing production time and production costs, and even increasing the final quality of the product.

The next solution is less futuristic. It is constantly being improved, and yet is still underrated, which is why it can be a major tool in gaining competitive advantage. It is the Pick-by-Light system and its variation, Pick-by-V oice. These systems are used mainly in warehouses. Using light or audio signals, they provide information about the location from which a product needs to be picked up and where it needs to be delivered, serving as guides for warehouse employees (Dematic). An appropriate database, such as is used by the Pick-by-Light system, allows to transfer information between employees. An additional advantage of the Pick-by-V oice system is the possibility of voice communication with employees ensured by special headphones usually connected with a microphone (Sobczak, 2014). Using such systems in practice brings numerous benefits, among which we can list: reduction of the number of employee errors, additional savings, increased quality of customer service, faster realization of the order picking process, improved storage system, and increased productivity. Pick-by-V oice and Pick-by-Light are another systems that guarantee better functioning of logistics operations. Improvements can be made upon all factors subject to the influence of both hard and soft methods (reduction of execution time or improved customer service), thus strengthening the competitive position of an enterprise.

Conclusions

The solutions described in the paper are selected examples of modern technologies whose use in logistics support allows to optimize primary processes. They are innovative both in terms of their use and implementation and have a specific purpose based on the described “hard” and “soft” methods. The listed technologies are advanced enough that they improve more than one factor. Using any one of them results in reduction of execution time and production costs, higher quality of human and machine labour, increased security, and, most of all, higher quality of customer service—which are the factors most relevant for the competitive position of enterprises. It should be noted, however, that the discussed solutions are subject to constant improvements and thus their use is very costly. Using such technologies requires following certain rules—otherwise it may lead to results directly opposite to those intended. They are mainly implemented and used by large companies and their availability to others, especially small ones, is limited.
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