



E-LOGISTICS AND E-SCM: HOW TO INCREASE COMPETITIVENESS

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ABSTRACT. Background: Recent technology development and the rise of e-commerce activities influenced changes in the logistics field and have "forced" companies to change their approach to logistics. On the other side, we are witnessing new developments in logistics service providers and their transformation. Competitiveness today doesn't depend only on price but also on customer service and delivery time. This can be influenced by the implementation of modern methods in logistics. Thus, logistics service providers in the global market are looked at as business partners and the relationship with logistics service company is considered as a partnership.

Because of the development in technology e-logistics concept has become more frequently used since it gives concepts for information sharing and information transparency within partners within supply chains. Thus, one of the important tasks of e-logistics is to share information with its partners and with that, it can have an influence on their competitiveness. The main aim of the paper is to show that the right logistics service provider in the modern supply chain can help companies to gain and maintain competitiveness and especially by using different modern digital tools in doing business.

Methods: Paper has been written based on the analyses of the reviewed literature together with determining potential influence e-logistics and e-SCM have on company's competitiveness. The case of DHL included in this study has been selected to present potentials which e-logistics have on creating a competitive advantage.

Results: Research results show that use of advanced logistics operator can help companies in increasing their competitiveness in today's market

Conclusions: Customer experience, new entrants, technology collaboration vs. competition are major characteristics of the new trend and logistics service providers will need to adapt to these changes. Improved running in one of the previously mentioned areas will create and maintain the company's competitiveness and as more modern technological tools and solutions will be used, companies will be able to have more benefits.

Key words: e-logistics, e-SCM, logistics service provider, competitiveness, DHL.

INTRODUCTION

Logistics activities represent an important part of the functioning of companies. The main goal of logistics is securing the availability of all necessary resources for the effective running of the production process. Logistics processes have undergone significant changes in recent years due to the increasing importance and creation of the integrated and strategic process. The modern logistics operations became a significant way of

efficiency improving (material flow, reducing distribution costs) and at the same time development of modern, IT contributed to the logistics market expansion and to the promotion of logistics related technologies [Yu et al. 2016]. To maintain unchanged market position, logistics companies need to constantly make effort in gaining and retaining competitiveness in relation to other companies which are present in the market. This can be done by establishing business partnerships which are based on trust and adaptation to modern IT technologies [Vasiliev 2015].

Companies need to properly understand logistics operations to be able to gain a competitive position in the market. Competitiveness in the modern global world can be gained through conduction of rational activities and by using modern logistics tools [Wieczorek 2017].

The main aim of the paper is to analyze the influence and connection of e-logistics and e-SCM processes to competitiveness and how the companies can apply different e-logistics and e-SCM tools and methods in gaining and maintaining their competitive advantage on the market. In the first part of the paper, we will define e-logistics and give its development since it was introduced. Then, it is followed by an examination of e-SCM and range of tools through which the e-SCM may be exercised. In the third part of our paper, we will analyze the connection between competitiveness and e-logistics and its tools. In the fourth part, we will analyze what DHL and its approach to e-logistics can do for the competitiveness of its clients. Finally, in the last part, we will give the conclusion of our research and give a proposal for further studies about this increasingly important part of the business.

E-LOGISTICS

Today e-commerce is fast-tracking the way the companies are managing logistics along the whole value chain and it represents one of the important megatrends. Shipment's size is shrinking, their frequencies are increasing, and the Internet's ubiquity is creating new challenges and opportunities for companies serving customers who are geographically dispersed, difficult to predict and sensitive to price and service levels [Wang et al. 2004]. Song and Hu [2004] studied the differences between traditional and e-logistics and the results of their research are presented in Table 1.

Presented differences between traditional logistics and e-logistics show challenges for companies which are involved in logistic processes if they want to create and maintain competitiveness in the market [Moroz et al. 2014]. E-logistics is presented as logistics concepts applied through Internet use and it

means necessary processes for transferring goods which are sold online to their buyers (Figure 1).

Groznik [2008] stated that more sophisticated aspect of e-logistics is the wide-ranging topic of supply chain integration that eliminates intermediaries (such as wholesalers or retailers) and fosters the emergence of new players, like logistics operators who adapt traditional logistics chains to meet the requirements of e-business. Quirk et al. [2003] stated that e-logistics use Internet based technologies for supporting the acquisition of material, warehousing, transportation and enables distribution through routing optimization with inventory tracking. They conclude that e-logistics is the result of the introduction of e-commerce in logistics. E-logistics can be used for describing three main back-end processes needed to receive the order after the "buy" button is pressed until the bottom line: warehousing, delivery, transportation, and customer interaction. Last processes usually include call center communication where the customer has the possibility to ask questions, place orders, check his/her order status and if needed arrange returns of shipments. In the modern world on many occasions, different companies are handling each of these separate functions and managing them effectively and instantaneously requires a full understanding of each part of the process. And if the company wants to integrate them with companies' systems is even harder.

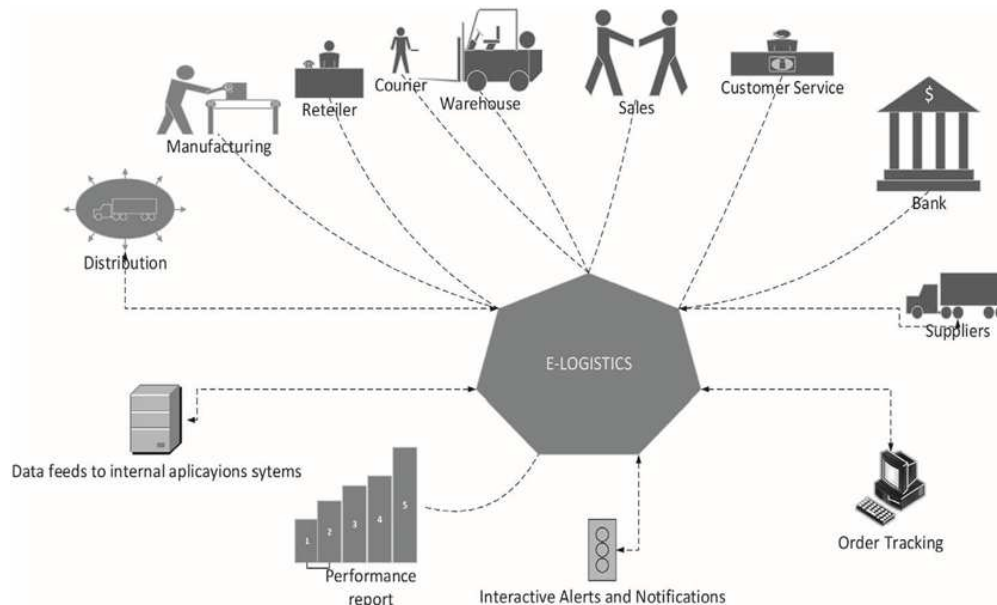
Wang and Pettit [2016] studied historical developments of e-logistics systems in the last 50 years through several characteristics (typical e-logistics system, emergent IT trends, integration focus, business application and supporting computer technology) while Merali, Papadopoulos and Nadkarni [2012] presented four-step changes in ICTs since the 1960s, which had a major influence on the e-logistics development:

- connectivity (between people, applications, and devices);
- capacity for distributed storage and processing of data;
- reach and range of information transmission;
- rate (speed and volume) of information transmission.

Table 1. Difference between traditional and e-logistics

	Traditional logistics	E-Logistics
Shipment type	Bulk	Parcel
Customer	Strategic	Unknown
Customer service	Reactive, Rigid	Responsive, Flexible
Distribution model	Supply-driven push	Demand-driven pull
Inventory / Order flow	Un-directional	Bidirectional
Destinations	Concentrated	Highly dispersed
Demand	Stable consistent	Highly seasonal, fragmented
Orders	Predictable	Variable

Source: Song and Hu 2004



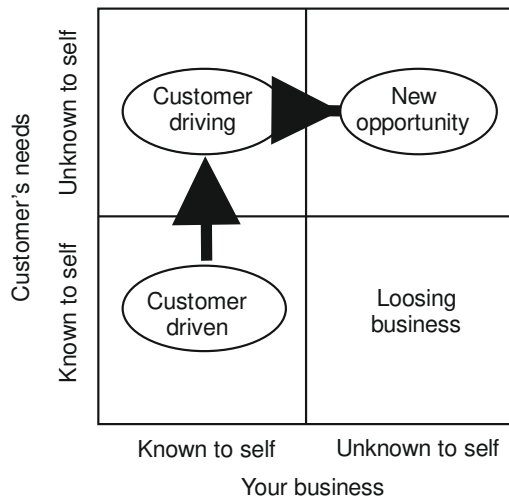
Source: Moroz et al. 2014

Fig. 1. E-logistics

Today's logistics has become one of the most important means of improving the efficiency of material flow, for reducing distribution costs in various industries. On the other side, the development of e-commerce contributed to the logistics market expansion and promoted the development of technologies related to logistics [Yu et al. 2016]. This has also influenced large numbers of studies related to the e-logistics [Bask et al. 2012, Masmoudi et al. 2014, Ramanathan et al. 2014]. Some studies examined logistics performance as a significant characteristic of e-commerce and last mile delivery [Agatz et al. 2008], while other studied the company's logistics capacity and its influence on e-commerce logistics performance [Joong-Kun Cho et al. 2008]. Bourlakis et al. [2018] presented a model which allows companies to determine if they are novice, intermediate or

innovative e-commerce user. Based on their position in the model value chain companies can decide and take actions to succeed in cross border e-commerce space. Companies in e-commerce need to be more integrated, agile and flexible in their work. This is opening new opportunities to e-logistics companies in capturing new businesses and opening new revenue streams. The companies which will accept the new digital age to increase customers' service will be more competitive in the market.

Wang and Pettit [2018] proposed value generation model via e-logistics. For the starting point of the process, they pointed identification of the need and value generation from the customers perspective (Figure 2).



Source: Wang and Pettit 2018

Fig. 2. Value generation via e-logistics

The starting point is customer value which gives purpose to e-logistics managing. The bottom left quadrant stresses using the capability of e-logistics for fulfilling the current customer's need with minimum costs. Thus, for unlocking e-logistics potential it is necessary to move to the upper-left quadrant of the shown model. In this part of the model, e-logistics can be used for entering new markets and creating a new demand type. Upper right quadrant is unfamiliar areas where new and/or emerging technologies continues pushing the business expertise boundaries and can sometime have disruptive properties on current practices. A lower-right part is a place where no company wants to be. Value generation can be reached by improving current operational efficiency and/or offering innovative products and services. At this stage the company needs to build e-logistics capability for integration, building and reconfiguring internal and external competences for quick response to the changing environment. This capability will be then hard for duplication and imitation of its competitors. This capability needs integration of all the company's resources – processes, technology, and people.

E-SCM

The supply chain management (SCM) system encompasses all activities associated with the flow of resources, information, goods, and money among the entities along the chain. SCM focuses on improving the flow of

products, information, and services as they move from origin to destination. The SCM is an integrated system consisted of interrelated subsystems; processes and activities that continuously should be improved to bring significant enhancement to all parties engaged in. SCM system is a predecessor of e-SCM.

The development of information and telecommunication technologies opens new challenges for the SCM. It leads to the creation of e-SCM, as an integral part of emerging e-business model of organization based on the use of electronic means to conduct business organization internally and externally [Bartels 2016]. E-SCM is the result of the synergy between the SCM and IT technologies. According to Luo et al. [2001], e-SCM is an “emerging business strategy which incorporates e-commerce into the physical supply chain to speed up information exchange, reduce transaction costs, streamline the manufacturing process and better satisfy customers' needs”. Poirier and Baurer [2000] have defined e-SCM as the synergy of internet technology applications, intellectual resources of organizations and traditional SCM practices of the businesses. Handfield and Straight [2004] suggest that e-SCM is the use of internet technologies in the so called “5C” - Coordination, Content, Community, Commerce, and Communications. As key elements of e-SCM, Holten et al. [2002] have recognized: e-commerce, e-design, e-supply chain, e-planning, e-logistics, and e-production. Norris et al. [2000] provide more detailed definition and according to them, e-SCM is a collaborative use of technology to enhance business to business processes and improve speed, agility and real time control and customer satisfaction.

E-SCM TOOLS

A key driver to e-SCM is coordination and integration among all the participants in the supply chain, primarily through sophisticated information systems and management software. The efficiency and effectiveness of e-SCM are determined by the existence of information networks and interactive software. The primary types of information systems used

in managing supply chains could be categorized in:

- Supply Chain Software,
- Web and mobile applications,
- RFID, and
- Emerging digital tools.

Supply chain software

Supply chain software is a tool that provides real-time analytical systems that manage the flow of information and goods through the supply chain network. The software solutions could be focused on individual or modular functions and processes of the supply chain or could offer solutions for integrated SCM systems within the Enterprise resource planning (ERP) systems.

ERP systems are developed like an integrated solution that provides the possibility for managing, controlling and tracking organizational resources [Monczka et al. 2009]. Reix et al. [2011] defined ERP systems as a computer application: configurable, modular and integrated, which aims to bring together and optimize management processes of the company by providing a single repository and relying on standard business rules. According to Gunasekaran and Ngai [2004] ERP are systems that connect different functions within an organization as well as an organization's supply chain partners (suppliers, distributors, third party logistics providers), enabling the various business partners and organizational entities to share information, such as order status, product schedules, sales records, as well as to plan production, logistics and marketing promotions. ERP as a cross-functional system is designed to improve organizational performance and competitiveness by streamlining business processes and eliminating duplication of work and data [Kwahk, Ahn 2010]. The SCM solution system can be developed and applied also as separate module software. SCM software plays a significant role in the ability of firms to reduce costs and increase the responsiveness of their supply chain [Chopra, Meindl 2015]. SCM software is information systems enable the coordination of information between internal and external customers, suppliers, distributors and other partners in

a supply chain [McLaren et al. 2004]. SCM software creates the ability to transmit data in real time and helps organizations to transform supply chain processes into a competitive advantage. The companies use a real time data transmission system to assist in routing, tracking and delivering the goods. To be successful in the digital economy, companies need digital supply chains that are fast, agile and intelligent enough to profitably serve production on demand. It means the ability to produce any product in any quantity, with any modification and in any segments [SAP 2018].

Digital supply chains software tools open the opportunity for customization or to produce tailor-made products and services with predictive capabilities to anticipate potential jams and prevent against them. The new SCM software tools contribute to supply chain transformation. Due to, the digital supply chain becomes a fundamental function in today's digital economy. Today's trend of the digital economy is the direct selling and personalization experience which gives manufacturers more control and direct feedback from the customers. To respond to this new trend, the companies need responsive supply chain management that quickly adjusts and responds to the design, production and delivery services.

Web and mobile applications

Contemporary e-SCM strategy requests dynamic web application capabilities which will result in the customer – centric system oriented towards gathering and analyzing data and knowledge about customers; identifying collaborators to perform the functions needed in the supplying chain; moving the function to the channel member who will perform them most effectively and efficiently; sharing the knowledge about customers, available technology and logistics challenges and opportunities within the chain members; and developing products, services and executed the best logistics, transportation and distribution methods to deliver products and services to consumer. Web application technology consists of software platforms which relate the members of the chain. The software components of the platform consist of tools for providing services like trading, message,

transaction, and other services [Verwijmeren 2003]. The upper level of digitalization of SCM is the mobile SCM. It means the use of mobile applications and devices to help the execution of supply chain activities and then support firms to obtain cost reductions, supply chain responsiveness and competitive advantage [Kurt et al. 2016]. Mobile technologies enable firms and users the flexibility to apply wireless technology to any supply chain function and extend existing SCM capabilities [Eng 2006]. Mobile technologies and applications offer an advanced level of efficient and effective communications among business partners in supply chains adding flexibility and greater visibility to the business processes. Stieglitz et al. [2015] made a distinction between mobile business apps that do not need any or only less customization and mobile enterprise apps that are developed for the specific firm and task. Yuan and Zheng [2009] stress four basic features of mobile enterprise apps: mobile notification, location tracking, navigation system and real-time assignment of tasks. Mobile supply chain management services and applications aimed at enhancing the performance of activities along the supply chain and facilitate collaboration with partners since information sharing can be conducted in real time. For example, mobile inventory applications alert suppliers if given stock of products or materials has fallen below a predetermined level, but also allow for remotely checking the availability of items in warehouse and reordering in case of unavailability [Jelassi, Enders 2014]. M-SCM architecture consists of three layers [Sathyan et al. 2013]:

- The terminal user level - encompass the end users of products, second-tier suppliers or distributors, retailers, or merchandiser, people working on products and maintaining warehouse or people in the sale
- The network layer - involved in the transfer of information. Mobile SCM apps enable information flow between different business functions throughout the supply chain.
- The system platform layer - manages the main areas in the supply chain like logistics, supply and marketing manufacturing, and inventory.

According to Muller-Versee et al. [2001], the main m-SCM applications are m-Inventory and m-Tracking. Ruhi and Turel [2005] have classified mobile application on the base of the activities in the company: logistics, operations, marketing and sales, and services.

RFID TOOLS

Another kind of mobile technology which rapidly leads to a redefinition of the supply chain processes is wireless product identification technology as a Radio Frequency Identification system (RFID). RFID chip is used for monitoring the stock level at the warehouses or store locations. RFID tags can be attached to products, pallets which carry goods, shelves, forklifts, mounted in freight and shipment pathways. The main idea of RFID system is as customers pick up the tagged product, signals are transmitted through the wireless network to the merchandise management system, which tracks the number in stock and issues alerts to clerks carrying Personal Digital Assistant (PDA) [Blau 2006]. The automatic notification of inventory management system by an RFID reader alert when inventory gets depleted below a certain level is an example of wireless technology application. It facilitates an efficient and streamlined process flows in warehouse and inventory management system [Taniar 2009]. RFID offers numerous benefits in the managing of the supply chain such as improved speed, accuracy, efficiency and security of information sharing, reduced storage, handling, and distribution expenses, increased sales through reduced stock outs and improved cash flow [Jones et al. 2004, Kakkainen 2003]. Major retailers around the world such as Metro and Walmart rely on RFID as a solution to ensure inventory online in the store is seamless.

Emerging digital tools

The evolution and digital transformation of e-SCM are moving towards more connected, smart, responsive and predictive tools and systems. The new digital SCM solutions not only connects every aspect of internal operations but also enables real-time workforce engagement; supplier collaboration;

outcome-based consumer experience and other real-time operations engaging new technologies such as artificial intelligence (AI), Internet of Things (IoT) and Big Data.

New innovative web and mobile applications and software manage data from any source, integrate and extend business processes with an open digital platform. The cloud solutions offer a range of capabilities refers to digital business planning and digital logistics and order fulfilment.

E-LOGISTICS AND E-SCM FOR COMPETITIVENESS

Global market and need to be competitive influences companies connected to the logistics sector. Some online retailers have expanded their logistics services and offering. As result, they are reducing the use of external logistics providers but not completely. Others use different analyses of customer data to increase logistics efficiency. Companies like large grocery chains started to offer own logistics services and combine their two supply chains - brick-and-mortar and online. All included in logistics service will need to improve their businesses processes and technology they are using (robotics, drones, 3D printing) (Figure 3).



Source: Tipping and Kauschke 2017

Fig. 3. Complex competition

The previous figure presents a complex competition situation in logistics services and e-SCM in today's market. Customer experience, new entrants, technology collaboration vs. competition are major characteristics of the new trend and logistics service providers will need to adapt to these changes.

According to the research conducted by Iharrington group [Harrington 2018] companies (e-retailers, producers, etc.) will need to create a strategy for supply chain digitalization to access new technology and to establish a way to gain the benefits and stay in front of their competition. Most important areas of digitalization are big data analytics (73%),

cloud-based applications (63%), the Internet of thing (54%), blockchain (51%), machine learning (46%) and sharing economy (34%). On the hardware side, the most important areas for gaining competitiveness in e-logistics are robotics (63% of respondents), AVs (40%), 3D printing (33%), and augmented reality and drones (both with 28%).

The ultimate objective of Supply Chain Management is to achieve a sustainable competitive advantage [Ling 2007]. The emergence of e-Business has influenced the coordination among different stages in the supply chain. Information technologies have changed customer contact mechanisms and information flows. It has enabled organizations

to gain immediate feedback from customers and markets and share information with suppliers as well as collaborating decision making throughout the supply chain. E-SCM is considered as one of the milestones of e-Business. It is regarded as a critical element of successful e-business implementation [Croom 2005]. E-business applications and web-based information technologies have basically changed the way companies conduct their business and the way in which they compete [Sanders 2007]. Incorporating e-business approach in supply chain management has been proved as a competitive method for increasing value to be added and improving process visibility, agility, speed, efficiency, and customer satisfaction. Firms and their suppliers create highly competitive supply chains by collaborating, otherwise, it can result in inefficiencies like an increase in material cost, distortion of information or slow response to product design and development. All phases of the design, sourcing, manufacturing and distribution processes that are integrated within e-SCM tools helped the company to enhance its market position across sectors. Li et al. [2006] provide empirical justification that firms with high levels of SCM practices as e-SCM have improved the organization's competitive advantages through price/cost, quality, delivery dependability, time to market and product innovation.

If e-SCM is one of the crucial modules in e-Business, at the same time e-logistics is the critical function in the firm's supply chain because logistics directs the flow and storage of products and information. Successful e-SCM synchronizes e-logistics with other functions such as production, procurement, forecasting, order management, and customer services. Logistics elements that are integrated into the supply chain management need to assure smooth product flow. Due to, the e-logistic could be identified as a determinant of the overall supply chain performance and considered a crucial tool that provides a strong competitive advantage. The employment of emerging ICT technology – software, web, mobile, cloud, IoT, block chain solutions and AI will provide additional new value to e-Business, e-SCM and e-Logistics processes. It will be in the direction of achieving higher visibility into a network of partners and

customers; track and trace the movement of raw materials and final goods across the network and get insights into the status of delivery. The critical value of e-SCM processes for the competitive advantages of the company was described by Barne [2006]. He stated that historically the competitive advantages of a company's supply chain were under-rated. Companies competed on products and services, not processes. But those days are over. The intensity of global competition is forcing companies to compete on the strength of their supply chains.

DEUTSCHE POST DHL

Deutsche Post DHL Group is one of the world's largest mail and logistics company. Company's focus is on being the first choice for customers, employees, and investors in its core business activities worldwide. They are making a positive contribution by connecting people and enabling global trade while being committed to responsible business practices, purposeful environmental activities, and corporate citizenship. The group is working under two brands Deutsche Post and DHL. The company is one of the largest 3PL logistics companies in the world. Based on DHL's understanding of global Internet and market, it provides different services in professional services in express, air freight and ocean shipping, ground transportation, and international postal service areas, etc. [Liu and Wen 2012]. Besides the delivery services, DHL offers contract logistics and enterprise solution services which are connected to the supply chain management and enterprise information solution.

In our paper, we will examine influence DHL Express can have on increasing the company's competitiveness being their e-logistics partner. DHL Express services cross-border premium e-commerce with its core Time Definite international product, supplemented by its deferred Day Definite solution. Delivering e-commerce shipments door-to-door through its international Express network that spans more than 220 countries and territories. Door-to-door Time definite international delivery services can allow retailers to reach customers quickly just about

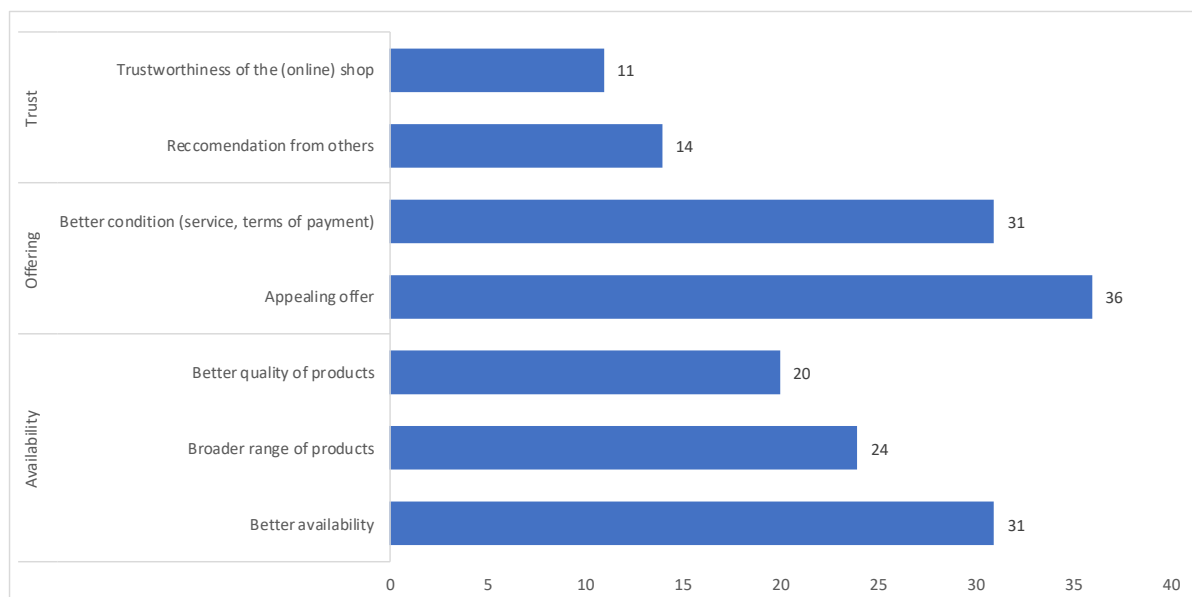
anywhere in the world without the need to establish warehousing or distribution chains; even where they have a centralized supply chain, it can also allow them to hold less buffer inventory. What this means for e-commerce customers is that they can open their web shop to a global market, where studies have even shown that offering an express solution will result in higher basket values, more returning visitors and increased sales.

DHL role in increasing competitiveness

DHL's express business is growing in demand due to the increase of international e-commerce and the increasing significance of SME's in international trade. Importance of DHL as an e-logistic partner can be seen in their 38% market share based on TDI deliveries and in the fact that 70% of all online purchases are made in international sites in 2017 which is an increase of 6% in relation to the previous year [DHL 2018]. DHL is working closely to buyers and sellers in the supply chain to deliver satisfaction for both sides through delivery experience and delivery options. They developed several services (i.e.

On Demand Delivery) which are enhancing the customer's experience and supporting web merchants as they access new markets. The company uses their advanced market intelligence tools to identify web shops which receive traffic from abroad and with that describing potential international sales. DHL's customers (i.e. web shops, distributors, etc.) are then receiving different website engagement metrics which is helping them to reduce potential bounce rates in addition to a cross-border express delivery option. As part of the service, DHL is offering advice to the web shop owner how to optimize their online presence and how to create competitive advantage through offered shipping options.

DHL services are creating an opportunity for small businesses and entrepreneurs to open new markets for their products and services. This is creating a new trend in business – an accidental exporter [DHL, 2018]. Importance of this trend can be seen in the motivation of consumers for cross-border e-commerce (Figure 4).



Source: DHL, 2017

Fig. 4. Motivations of consumers for cross-border e-commerce shopping in %

Based on the previous research conducted by DHL and Google [DHL, 2017] it is possible

to see that one of the motivators for visiting and purchasing at certain web shop is “better

conditions (services, terms of payment)”. This is the area where DHL comes as a characteristic for an increase of the competitiveness of merchants.

Once the customer comes to the international online shop and selects the products he would like to purchase, the next important decision is a shipping option which is everything but not simple. With the delivery options, e-retailers can gain and increase or completely lose competitiveness. Right and carefully selected delivery options and transporter in modern e-commerce creates an important competitive advantage. This was confirmed in research (DHL, 2017) where for the e-retailers the competitive advantage comes through an e-logistics partner. Customers noted that guaranteed delivery time (22% of the respondents), the speed of delivery as the most important logistics need (37% of the respondent) and transparent trace and track possibility (17% of the respondents) represents significant parts of formula which create a competitive advantage for e-retailers. Additionally, for the customers and e-retailers stated logistics related characteristics as the biggest challenge in e-commerce with most significant barriers in high shipping costs (74% of all respondents) and complex logistics (67% of all respondents). The previous data shows the importance of having good e-logistics partner as DHL is for creating and maintaining competitiveness in the market.

A possibility which offers DHL – premium shipping – represents a gold standard for some product categories (i.e. medium to high priced fashion) and this creates a competitive advantage for the e-retailers which offer time definite shipping. In the same time, this is maybe not attractive for other product categories or lower-priced products since the trade-off between price and speed is not clear in these categories. Although for them premium shipping is important addition since customers like having choices and with that e-retailer can have a competitive advantage just for having it in its delivery possibility – without it, the customer can change mind and leave web shop and buy somewhere else. This is another benefit which DHL gives to their partners in creating a competitive advantage for them and based on their data [DHL, 2017]

almost 20% of international sales are shipped with an express option and e-retailers who offered express (premium) shipping grew 60% faster than the companies offering only standard shipping option.

Further influence of e-logistics on the competitiveness and DHL as the provider can be seen in the further development of digitalization since it has a significant influence on the supply chain and operations. Companies (e-retailers, producers, etc.) will need to create a strategy for supply chain digitalization to access new technology and to establish a way to gain the benefits and stay in front of their competition [Harrington, 2018]. The digitalization process will include DHL as their respected partner who is already applying digital technology in their current business footprint which delivers extraordinary customer experience with increasing efficiency for their customers. The company is already using digitalization as augmented reality tools in their warehouse operations which is increasing efficiencies in picking times. This is shortening the time employees need for packaging service and with that, it is possible to lower the price of the service and consequently, DHL’s customer (web retailer) can be more competitive on the market.

Another field in which DHL is increasing competitiveness for its clients is the use of artificial intelligence (AI). Today’s AI systems are more accessible, less expensive, and more powerful than ever. By including AI into the company’s core process, the company can invest more in strategic growth imperatives to modernize or eliminate legacy application systems. This will increase the efficiency of current assets and infrastructure and at the same time, it will provide time for the workforce to improve their skills and capabilities. AI in logistics enables new value creation models with increased use of AI with digital and physical logistics networks, support through self-learning systems and back office automation, forecasting and intelligent logistics. AI can help logistics with renewing of operating model i.e. from reactive to the proactive and forward-looking tactic. This move will have a significant impact on different activities and sectors in logistics such as customer contact activities, operations, and

back office and resulting in increased efficiency and competitiveness.

CONCLUSIVE REMARKS

Companies serving modern customers need to invest in new technologies and start creating and using its e-logistics and e-SCM applications. They are equipped with Internet and cloud computing and have access to global factories and global supply chains. So, the only differentiator in being competitive in the market is to understand and satisfy customer needs. Companies need to be more customer-centric and not only customer-aware. This is where e-logistics and e-SCM can help companies in creating and maintaining a competitive advantage.

Developing technology allows companies to offer more customized services – ordering, pick-up, and delivery options. To be able to meet their customers need and keep them from going to the competition, they need to offer and/or use services with embedded digitalization in all areas of business. Companies can create their services with the use of supply chain software, web and mobile applications, RFID and different emerging digital tools. Companies need to adapt to a complex competition situation in logistics services and e-SCM in today's market.

Customer experience, new entrants, technology collaboration vs. competition are major characteristics of the new trend and logistics service providers will need to adapt to these changes. Improved running in one of the previously mentioned areas will improve the company's competitiveness and as more modern technological tools and solutions will be used, companies will be able to have more benefits. E-logistics needs to support company's process with information sharing within the company and within the supply chain. Thus, companies can create and maintain their competitive advantage through their e-supply chains strengths. Applying of e-logistics and e-SCM tools can improve the supply chains total reaction and as a result, make a new foundation for competitive advantage.

The presented case of DHL is showing how one company (a part of supply chain) as 3PL (or 4PL) can help companies in creating and maintaining a competitive advantage in today's globally competitive market.

To further increase knowledge about how e-logistics and e-SCM can increase competitiveness we propose further research:

- To monitor e-logistics and e-SCM users (i.e. DHL's customers) to find how DHL's activities influence their competitiveness
- To quantify possible reductions in running a business by using e-logistics and e-SCM tools.

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REFERENCES

- Agatz N.A., Fleischmann M., Van Nunen J.A., 2008. E-fulfillment and multi-channel distribution–A review, *European Journal of Operational Research*, 187 (2), 339-356, <http://doi.org/10.1016/j.ejor.2007.04.024>.
- Bask A., Lipponen M., Tinnilä M., 2012. E-Commerce Logistics: A Literature Research Review and Topics for Future Research, *International Journal of E-Services and Mobile Applications*, 4 (3), 1-22, <http://doi.org/10.4018/jesma.2012070101>.
- Barne D., 2006. Competing supply chains are the future, *Financial Times*. Available on the Internet: <https://www.ft.com/stream/59d55e5c-cb83-49dc-bacb-26dcc51566d0> (08/25/2018).
- Bartels A., 2016. The difference between e-business and e-commerce. Available on the Internet: <http://www.computerworld.com/article/2588708/e-commerce/e-commerce-the-difference-between-e-business-and-e-commerce.html>, (07/25/2018).
- Blau J., 2006. RFID-the price must be right, *Financial Times*. Available on the Internet:

- <https://www.ft.com/content/37315a64-efee-11da-b80e-0000779e2340> (07/10/2018).
- Bourlakis M., Julien D., Ali I., 2018. The next industrial revolution – How e-commerce is transforming B2B. Available on the Internet: https://www.dhl.bg/content/dam/downloads/bg/express/campaigns/express_campaign_industrial_revolution_bg_en.pdf, (07/27/2018).
- Chopra S., Meindl P., 2015. *Supply Chain Management: Strategy, Planning, and Operation*, Pearson Education Limited, Harlow, Essex, England.
- Croom S.R., 2005. The impact of e-business on supply chain management: An empirical study of key developments, *International Journal of Operations & Production Management*, 25 (1), 55-7, <http://doi.org/10.1108/01443570510572240>
- DHL 2017. The 21st Century Spice Trade: A Guide to the Cross-Border E-Commerce Opportunity. Available on the Internet: http://www.dhl.com/content/dam/download/g0/press/publication/g0_dhl_express_cross_border_ecommerce_21st_century_spice_trade.pdf, (06/23/2018).
- DHL 2018. Press Release - 95% of companies are yet to realize the full benefits of digitalization technologies for their supply chains. Available on the Internet: http://www.dhl.com/en/press/releases/releases_2017/all/logistics/95_percent_of_companies_are_yet_to_realize_the_full_benefits_of_digitalization_technologies_for_their_supply_chains.html, (04/07/2018).
- Eng T., 2006. Mobile supply chain management: Challenges for implementation, *Technovation*, 26, 682-686, <http://doi.org/10.1016/j.technovation.2005.07.003>.
- Groznič A., Kovačič A., Zorič B., Vičič D., 2004. E-logistics: Informatization of Slovenian Transport Logistics Cluster [in:] *Proceedings of 26th International Conference on Information Technology Interfaces*, 101-106. <http://doi.org/10.1109/ITI.2004.242952>.
- Gunasekaran A., Ngai E.W.T., 2004. Information systems in supply chain integration and management, *European Journal of Operational Research*, 159, 269–295, <http://doi.org/10.1016/j.ejor.2003.08.016>.
- Handfield R.B., Straight S., 2004. How mature is your supply chain? The SCRD capability maturity model [in:] *Proceedings of ISM's 89th Annual International Supply Management Conference*, Philadelphia, USA, 512–515.
- Harrington L., 2018, Digitalization and the supply chain: Where are we and what's next? Available on the Internet: http://dhl.lookbookhq.com/ao_thought-leadership_digital-physical-1/research-report_digitalization-and-the-supply-chain, (02/07/2018)
- Holten R., Dreiling A., Muehlen M., Becker J., 2002. *Enabling Technologies for supply chain process management report*. Available on the Internet: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.24.2367&rep=rep1&type=pdf>, (05/07/2018)
- Jelassi T., Enders A., 2014. *Strategies for e-Business: Creating Value through Electronic and Mobile Commerce*, 3rd edition, Pearson Education Limited, Harlow, United Kingdom.
- Jones P., Clarke-Hill C., Shears P., Comfort D., Hillier D., 2004. Radio frequency identification in the UK: opportunities and challenges, *International Journal of Retail & Distribution Management*, 32 (3), 164 - 171, <http://doi.org/10.1108/09590550410524957>
- Joong-Kun Cho J., Ozment J., Sink H., 2008. Logistics capability, logistics outsourcing and firm performance in an E-commerce market, *International Journal of Physical Distribution & Logistics Management*, 38 (5), 336-359, <http://doi.org/10.1108/09600030810882825>
- Kakkainen M., 2003. Increasing efficiency in the supply chain for short shelf life goods using RFID tagging, *International Journal of Retail & Distribution Management*, 31 (10), 529 -536, <http://doi.org/10.1108/09590550310497058>

- Kurt O., Kalem G., Vayvay O., Kalender Z.T., 2016. The Role of Mobile Devices and Applications in Supply Chains, *International Journal of Economics and Management Systems*, 1, 94–103.
- Li S., Ragu-Nathan T.S., Ragu-Nathan B., Subba Rao S., 2006. The impact of supply chain management practices on competitive advantage and organizational performance, *The International Journal of Management Science Omega*, 34, 107-124, <http://doi.org/10.1016/j.omega.2004.08.002>
- Ling L., 2007. *Supply Chain Management: Concepts, Techniques and Practices*, World Scientific Publishing, Singapore, <http://doi.org/10.1142/6273>.
- Liu J, Wen Y., 2012. Study of Competitiveness - A Case Study of DHL. Available on the Internet: <http://www.diva-portal.org/smash/get/diva2:545580/FULLTEXT02>, (06/22/2018).
- Luo Y., Wirojanagud P., Caudill R., 2001. Network-based optimization and simulation of sustainable e-supply chain management [in:] *Proceedings of the 2001 IEEE International Symposium on Electronics and the Environment*, 185-190.
- Masmoudi M., Benaissa M., Chabchoub H., 2014. Optimization of E-commerce logistics distribution system: problem modelling and exact resolution, *International Journal of Business Performance and Supply Chain Modelling*, 6 (3-4), 358-375, <http://doi.org/10.1504/IJBPSM.2014.065275>.
- McLaren T.S., Head M.M., Yuan Y., 2004. Supply Chain Management Information Systems Capabilities: An Exploratory Study of Electronics Manufacturers, *Information Systems and eBusiness Management*, 2 (2), 207-222, <http://doi.org/10.1007/s10257-004-0035-5>
- Merali Y., Papadopoulos T., Nadkarni T., 2012. Information systems strategy: past, present, future? *The Journal of Strategic Information Systems*, 21 (2), 125–153, <http://doi.org/10.1016/j.jsis.2012.04.002>.
- Moroz M., Nicu C., Pawel I. D.D., Polkowski Z., 2014. The transformation of logistics into e-logistics with the example of electronic freight exchange, *Zeszyty Naukowe Dolnośląskiej Wyższej Szkoły Przedsiębiorczości i Techniki. Studia z Nauk Technicznych*, 3, 111-128.
- Monczka R.M., Hanfield R.B., Giunipero L.C., Patterson J.L., 2009. *Purchasing and Supply Chain Management*, 4th edition, South-Western Cengage Learning, Mason, OH, USA.
- Müller-Verse F., Kohlenbach B., Bout D., Singh S., Golub G., Häyrynen J., Laitinen S., Autio E., 2001. UMTS - an investment perspective, *Joint Durlacher, Eqvitec and HuT Report*, Durlacher Research, London, United Kingdom.
- Norris G., Hurley J.R., Hartley K.M., Dunleavy J.R., Balls J.D., 2000. *E-Business and ERP: Transforming the Enterprise*, John Wiley & Sons, Inc., Canada.
- Poirier C.C., Bauer M.J., 2000. *E-Supply Chain – Using the Internet to Revolutionize Your Business*, Berrett-Koehler Publishers, Inc., San Francisco, USA.
- Quirk A., Forder J., Bentley D., 2003. *Electronic Commerce and the Law*, 2nd edition, John Wiley & Sons Ltd., USA.
- Ramanathan R., George J., Ramanathan U., 2014. The Role of Logistics in E-commerce Transactions: An Exploratory Study of Customer Feedback and Risk [in:] Ramanathan U., Ramanathan R. (eds) *Supply Chain Strategies, Issues and Models*, Springer, 221-233, http://doi.org/10.1007/978-1-4471-5352-8_10.
- Reix R., Fallery B., Kalika M., Rowe F., 2011. *Systèmes d'information et management des organisations [Systems of information managements in organisations]*. 7e édition, Vuibert, France.
- Ruhi U., Turel O., 2005. Driving Visibility, Velocity and Versatility: The Role of Mobile Technologies in Supply Chain Management, *Journal of Internet Commerce*, 4 (3), 95- 117, http://doi.org/10.1300/J179v04n03_06
- Sanders N.R., 2007. An empirical study of the impact of e-business technologies on organizational collaboration and

- performance, *Journal of Operations Management*, 25 (6), 1332-1347, <http://doi.org/10.1016/j.jom.2007.01.008>
- SAP 2018. Creating the Digital Supply Chain for the Digital Economy: A Smart, Connected, Digital Supply Chain of One, SAP Thought Leadership Paper, Available on the Internet: https://d.dam.sap.com/m/PUAPAb/23795-3_Digital_Supply_Chain_Whitepaper_r13.pdf, (07/29/2018)
- Sathyan J., Narayanan A., Narayan N., Shibu K.V., 2013. A Comprehensive Guide to Enterprise Mobility, Taylor & Francis Group LLC, Boca Raton, FL, USA.
- Song Y., Hou, H., 2004. On traditional M. F and Modern M. F, *Journal of Beijing Jiaotong University (Social Sciences Edition)*, 3 (1), 10-16.
- Stieglitz S., Lattemann C., Brockmann T., 2015. Mobile Applications for Knowledge Workers and Field Workers, *Mobile Information Systems*, 2015, 1-8, <http://doi.org/10.1155/2015/372315>.
- Taniar D., 2009. Mobile Computing: Concepts, Methodologies, Tools and Applications, Information Science Reference IGI Global, Hershey, PA, USA.
- Tipping A., Kauschke P., 2016. Shifting patterns – The future of logistics industry, PwC's future in sight series. Available on the Internet: <https://www.pwc.com/sg/en/publications/assets/future-of-the-logistics-industry.pdf>, (06/30/2018).
- Verwijmeren M., 2004. Software component architecture in supply chain management, *Computers in industry*, 53, 165-178, <http://doi.org/10.1016/j.compind.2003.07.004>.
- Wang J., Yang D., Guo D., Huo Y., 2004. Taking Advantage of E-Logistics to Strengthen the Competitive Advantage of Enterprises in China [in:] *Proceedings of The Fourth International Conference on Electronic Business*, Beijing, 185-189.
- Wang Y., Pettit S., 2016. E-logistics: an introduction [in:] Wang, Y., Pettit, S. (eds.) *E-Logistics: Managing Your Digital Supply Chains for Competitive Advantage*, Kogan page, 3-31.
- Wieczorek A., 2017. E-logistics as a source of modern tools affecting the competitiveness of enterprises, *Transport Economics and Logistics*, 68, 117-123, <http://doi.org/10.5604/01.3001.0010.5327>
- Yu Y., Wang X., Zhong R.Y., Huang G.O., 2016. E-commerce Logistics in Supply Chain Management: Practice Perspective, *Procedia CIRP* 52, 176 – 185, <http://doi.org/10.1016/j.procir.2016.08.002>.
- Yuan Y., Zheng W., 2009. Mobile task characteristics and the needs for mobile work support: a comparison between mobile knowledge workers and field workers [in:] *Proceedings of the 8th International Conference on Mobile Business*, Dailan, 7–11, <http://doi.org/10.1109/ICMB.2009.9>

E-LOGISTICS I E-SCM: JAK ZWIĘKSZYĆ KONKURENCYJNOŚĆ

STRESZCZENIE. Wstęp: Rozwój technologii, który postępuje w ostatnim czasie oraz wzrost aktywności związane z e-commerce, wymusza zmiany w obszarze logistyki jak również podejście wielu firm do obszaru związanego z logistyką. Z drugiej strony można obecnie zaobserwować rozwój dostawców usług logistycznych i ich przekształcenia. W obecnych czasach konkurencyjność nie polega jedynie na cenie ale również na jakości usług oraz czasie realizacji. Wpływa to również na wdrażanie nowoczesnych metod w logistyce.

W związku z rozwojem technologii, koncepcja e-logistyki jest coraz częściej wdrażana, umożliwiając wymianę informacji oraz jej przejrzystość dla wszystkich uczestników łańcucha dostaw. Dlatego też jednym z najważniejszych zadań w-logistyka jest przekaz informacji pomiędzy partnerami, co wpływa na ich konkurencyjność. Celem tej pracy jest zaprezentowanie właściwej postawy dostawcy usług logistycznych we współczesnym łańcuchu dostaw, która może pomóc uzyskać firmom przewagę konkurencyjną poprzez między innymi stosowanie najnowszych rozwiązań technologicznych.

Metody: Na podstawie przeglądu literatury dokonano analizy obecnej sytuacji, następnie określono wpływ e-logistyki oraz e-SCM na konkurencyjność firmy. Na przykładzie firmy DHL zaprezentowano potencjalne korzyści e-logistyki dla podwyższenia przewagi konkurencyjnej.

Wyniki: Otrzymane wyniki wskazują na uzyskanie przewagi konkurencyjnej przez operatora logistycznego, stosującego zaawansowane rozwiązania technologiczne.

Wnioski: Doświadczenie klienta, nowi użytkownicy, współpraca w zakresie używanych technologii versus konkurencyjność to główne elementy charakteryzujące nowy trend, który muszą wdrożyć do swojej praktyki dostawcy usług logistycznych. Poprawa w którymkolwiek z powyższej wymienionych obszarów stwarza możliwość do utrzymania konkurencyjność firmy. Wraz ze wzrostem stosowanych nowoczesnych rozwiązań technologicznych, firmy uzyskują więcej korzyści.

Słowa kluczowe: e-logistics, e-SCM, dostawca usług logistycznych, konkurencyjność, DHL.

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