



NEW TECHNOLOGIES IN THE RETAIL LOGISTICS: SOLUTION OF RISK SITUATIONS

¹Marek TOMAŠTÍK, ²Eva JADERNÁ, ³Katerina VÍCHOVÁ, ¹Markéta HABROVÁ

¹UTB -Tomas Bata University in Zlín, Faculty of Logistics and Crisis Management,
Zlín, Czech Republic, EU, mtomastik@utb.cz, m_habrova@utb.cz

²SKODA AUTO University, Department of Marketing and Management, Mladá Boleslav,
Czech Republic, EU, eva.jaderna@savs.cz

³UTB -Tomas Bata University in Zlín, Faculty of Applied Informatics, Zlín,
Czech Republic, EU, kvichova@utb.cz

Abstract

The paper aims to present new technologies used in retail logistics. Firstly, it focuses on an identification of risks associated with retail logistics. Secondly, the essential elements of retail logistics are described. Such as transporting goods to a retailer, storing and preparing products for sale and finally, it includes moving goods in a retail store when purchasing a consumer. New technologies used in these elements of retail logistics are identified and addressed to help some of the risks associated with retail logistics.

Keywords: EAN, ECR, retail, retail logistics, risks in retail logistics, RFID

1. INTRODUCTION

The primary goal of retail logistics is to ensure the availability of retail products. Retail logistics, therefore, deals with the transfer of goods from the manufacturer/distributor to the retailer, and then through the mediation to the final consumer to fulfill his requirements and ideas. Often, the so-called Omnichannel Approach, which is mostly geared toward creating the distribution conditions that are most suitable for the customer, is very often approached. [1] The Omnichannel approach, however, requires process integration, information flow, improved equipment, and a measurement system. [2] This involves the use of new technologies to make these processes more comfortable and more transparent. It is also necessary to respond to the ever-increasing power of e-commerce. This is becoming a phenomenon in many areas of retail. Customers need to offer this option [3]

In the omnichannel approach, however, re-enforcing e-commerce is still complemented by sales in retail. They must strive to improve the physical aspects of retail and to improve the logistics processes associated with the operation of the store. [4] These processes facilitate the introduction of new technologies in all elements of retail logistics. We are talking about the transfer of goods from the manufacturer/distributor to the retailer, the movement of products in the retail store connected with the storage and subsequent preparation for sale and, last but not least, the movement connected with the purchase of the consumer.

This article translates the possibilities of using new technologies in all of these logistics processes associated with retail store operations. These technologies are designed to help speed up primary retail activities, such as receiving, storing and stocking, as well as preparing for sale, offering customers and selecting goods. Last but not least, attention is focused on the possibilities of sale and payment of products, or their delivery. All these processes involve many risks associated with an imperfect logistics system.

Authors have divided logistics processes into 3 major phases: transport of goods to a retailer, storage and preparation of goods for sale, and the movement of goods in a retail store when buying a consumer. According to literature review, this approach has not been followed yet. The retail logistics solves logistic problems in the retail store. But many retailers deliver merchandise themselves. This approach can help to solve a research gap.

Authors have identified the usage of some new technologies in these processes. Some technologies are not newly explored, but recently used in retail logistics. Therefore, authors have called the article New technologies in Retail Logistics and the article describes the usage of these technologies, as a new trend in Retail.

First, the analysis of secondary data and literature review was provided. The key uses of secondary data is for an exploratory research and preparing primary research. Authors want to show the research gap, the solving of the retail logistics crisis situations in the recently defined 3 phases. The article presents the identified crisis situations, and describes the solution due to the usage of new technologies in retail logistics.

2. USING NEW TECHNOLOGIES IN RETAIL LOGISTICS

Retail logistics deals not only with the transport of goods from the manufacturer/distributor to the retailer but also with the movement of products in the retail store and subsequently the sale and delivery to the final customer. It is necessary to ensure all processes related to the flow of goods so that the products reach the customer intact, in the right time and quantity. Owing to the ever-changing and increasing demands of consumers for service, logistics processes are becoming more and more complicated. [5] It is also because of this that there is a growing risk of business risk associated with business logistics.

2.1 Identification of risks associated with retail logistics

Retail logistics in its true nature is associated with many risks. If there is no clear labeling system, a shop assistant may encounter not having clear information about the stock status. Orders may be inconsistent with the state of inventory, or stocks may be difficult to trace. Also, unauthorized movement of goods and reduced control may occur. If data is incorrectly loaded, it is necessary to repair the data. [6]

As part of in-store logistics, we can also encounter a problem in deciding where to move goods, how to place them or provide a price tag. Besides, retailers want to ensure sufficient stock and excellent customer service. [7] Customers then expect the fastest purchasing process that new technologies allow. But retailers also have high demands on the carrier. [8] The most demanding requirements for retailers on carriers are, for example, the need to ensure the lowest possible freight costs, the most profitable delivery time and eliminate unfulfilled deliveries. [9] This creates adverse situations that might improperly affect the entire logistics process. The most significant risk of shipping is still a human factor and weather conditions that can hardly be eliminated. [10] Also, there is a high risk for the transport companies to steal the car. All these risks can be resolved by new technologies much more effectively. [11]

2.2 New technologies - risk management solutions in retail logistics

Retail logistics is not only about the transport of goods from a manufacturer/distributor to a retailer, but also about the logistics processes associated with the storage, relocation, and preparation of products for sale. [12] From the customer's point of view, these are processes related to the purchase, payment, and delivery of products from the retailer. [13] It is, therefore, possible to quickly classify business logistics for the transport of products from the manufacturer/distributor to the retailer, then storage and preparation of the products for sale, and in the final stage also the movement of goods in the retail store when purchasing the consumer. All these processes are an attempt to achieve the optimal form of logistics processes. New technologies can help ensure these activities and also eliminate the risks associated with business logistics. [14]

In the case of the transport of goods to a retailer, new CRM systems are being increasingly used, which can solve the stock condition and thus accelerate the transportation planning process. If businesses are intertwined with a standard CRM system, such as sharing stock information, this can be one of the most critical issues, not delivering on time. In this context, the Collaborative Planning Forecasting and Replenishment (CPFR) system, which is based on full data exchange between businesses and is used to forecast and predict demand, is also being used. This system can help to respond faster to retailer's needs and opportunities. Large retail

companies implemented new logistics technologies to support these activities: the advertising, the process of ordering and other transactions with suppliers and to develop the relationships with other business entities. [15]

Intelligent semitrailers are increasingly used to transport to facilitate the whole process of carrying goods from the manufacturer/distributor to the retailer. These semi-trailers have so-called telematics. It has been used for a long time to locate the vehicle by a dispatcher. This can solve the problem of theft of the car, but it also helps to reduce transport costs. Besides, the dispatcher can check the route and time and delivery conditions (cooling, etc.). Intelligent semi-trailers also feature DWC OptiLoat, which ensures automatic load distribution between tractor and semi-trailer axles.

GPS technology enables similar functions where the dispatcher can track the route and conditions of transport. It can respond to the speed and position of the car. These responses are much faster and help reduce transport costs. These technologies also transmit the state of the vehicle information to help address other crises that arise in the event of vehicle failure. GPS, of course, supports the drivers themselves, who use it to navigate and determine the appropriate route, which again can mean a reduction in transport costs.

An essential tool for speeding up loading and unloading is barcode scanners, which are also equipped with an electronic signature function, which can significantly shrink the process. Scanners are used by warehouse workers thousand of times a day, they can control the temperature of the product, too. [16] It is also common nowadays to provide driver terminals for non-cash payment if required in the transaction. These technologies reduce transport costs, which is one of the primary goals of business logistics.

Storage and preparation of goods for sale is another element of business logistics associated with logistics processes directly in the retail store. It monitors the movement of goods in the group, storage, and distribution of assets in the store. In this case, the barcode readers or devices responding to the RFID product codes are relieved. This method is now much more useful than traditional EAN codes. RFID codes and other e-business technologies are a new opportunity and threats to logistics and supply chain management. [17] They carry more information and are usable in many ways RFID chips, tags help to store stock records efficiently, identify the movement of goods in the unit. An important helper in warehouse management is smart shelves that, with RFID chips on products, track their actual stockpiles.

Placement of goods in a unit is by merchandising and space management plans. Electronic Shelf Labels (ESL) are used to facilitate price tagging. These are not much used in the Czech Republic, but they are an excellent tool for marketers and salespeople. Additionally, the logistics processes in the retail store make it easy to change the price and customer orientation. ESL's are able to update content on shelving signage quickly and efficiently, without the need to print paper tags or to deploy multiple employees to change them manually.

The third element of business logistics is also associated with the customer, namely the movement of goods in a retail store when buying a consumer. As part of the purchase, the customer uses many modern technologies to help, among other things, the efficiency of logistics processes. These are, for example, smart scales that do not need to search for items on the screen, but IBM has developed a weight that recognizes the product itself and prints the price tag.

Another significant help in logistics processes in the store is customer scanners/shopping assistants. You can activate them by a customer card. The merchandise code is scanned, and the entire purchase is stored and pays off when leaving the shop without having to unload the purchase at the cash desk. A mobile application can replace the scanner. RFID chips can replace product codes (EANs), and then you can use a so-called smart cart into which goods with an RFID chip are only inserted, and the whole purchase is retained. Hoister mobile application helps a customer similarly. It scans to QR code and select the item, allocates the user and in 30 seconds are clothes delivered via a system of steel cables, hangers and slides. It is shopping model, using an automated warehouse picking technology to handle the inventory. [18]



Technology, which is already widely used in the Czech Republic, is a self check-out. These are customized so that the customer himself makes the posting of the purchase and then is asked to pay and take out the goods. Self check-outs are also an appropriate way to speed up the movement of goods within the unit and from the group.

3. CONCLUSION

Firstly, the paper addresses the identification of potential risks associated with retail logistics whether it is the transport of goods or the movement of products in a retail store. The most significant risk factors are human resource failure or weather conditions that can not be affected. However, situations such as car theft, stock mismatches, bad recordings, etc., can be eliminated or resolved faster with the usage of new technologies.

New technologies are a critical means of innovation in logistics processes in retail. This paper deals not only with the identification of technologies within the retail store that make logistics processes more efficient but also focuses on the first element of business logistics, namely the transport of goods from the manufacturer/distributor to the retailer.

New technologies used in transport, such as smart semi-trailers, barcode / RFID scanners, means of deploying CRM or CPFR systems have been identified. Besides, GPS applications, navigation, are used extensively in the transport. As part of the movement of goods in the retail store, including the storage system, the EAN / RFID codes mentioned above are used, as well as the electronic shelf label. In connection with the purchase, intelligent scales, customer scanners or mobile apps for purchase, or self check-outs are named.

Nowadays, the increased usage of robots in warehouses, and the Internet of Things (IoT) influences the plan of logistics and it is necessary to change supply chains, logistics systems, and the skills to be able to operate in this new environment. [19] New opportunities are connected to IoT and usage of robots and many risk factors will be eliminated - included human factor risks.

ACKNOWLEDGEMENTS

This paper was supported by the Development Project of the Organization, Tomas Bata University in Zlín ROV/FLKR/2018/004 and Faculty of Logistics and Crisis Management and by the Integral Grant Agency, Tomas Bata University in Zlín IGA/FLKR/2018/006 and Faculty of Logistics and Crisis Management.

REFERENCES

- [1] ANG, Alvin and TAN, Albert. Designing Reverse Logistics Network in an Omnichannel Environment in Asia [online]. *Scientific Journal of Logistics* [online]. 2018. vol. 14, iss. 4, pp.519-533. [viewed 2018-12-14]. Available from: DOI: <http://dx.doi.org/10.17270/J.LOG.2018.307>.
- [2] HÜBNER, Alexander, WOLLENBURG, Johannes and HOLZAPFEL, Andreas. Retail logistics in the transition from multi-channel to omni-channel [online]. *International Journal of Physical Distribution & Logistics Management* [online]. 2016. vol. 46, iss. 6/7, pp.562-583. [viewed 2018-12-14]. Available from: DOI: <https://doi.org/10.1108/IJPDLM-08-2015-0179>.
- [3] BARKI, Edgard and PARENTE, Juracy. Challenges and opportunities of the last mile for the base of the pyramid: the case of Brazil [online]. *The Journal of Field Actions Science Reports* [online]. 2014. vol. 7, iss. 12, pp.1-4. Online since 21 October 2014 [viewed 2018-12-14]. Available from: DOI: <http://journals.openedition.org/factsreports/3671>.
- [4] ANG, Alvin and TAN, Albert. Designing Reverse Logistics Network in an Omnichannel Environment in Asia [online]. *Scientific Journal of Logistics* [online]. 2018. vol. 14, iss. 4, pp.519-533. [viewed 2018-12-14]. Available from: DOI: <http://dx.doi.org/10.17270/J.LOG.2018.307>.



- [5] PFOHL, Hans-Christian and MÜLLER Katja. Collaboration and Communication in a Networked Economy [online]. *LogForum* [online]. 2015. vol. 11, iss. 2, pp.139-149. [viewed 2018-12-14]. Available from: DOI: 10.17270/J.LOG.2015.2.2.
- [6] HESKOVA, Marie. *Category management*. 1. st ed. Praha: Profess Consulting, 2006, p. 17.
- [7] SAMPLI, Coskun A. POHLEN, Terrence L. and JACOBS Laurence. Developments in Retail Logistics. Towards Generating More Consumer Value [online]. *Journal of Marketing Channels* [online]. 2005. vol. 13, iss. 2, pp. 81-98. Published online: 08 Sep 2008 [viewed 2018-12-14]. Available from: DOI:10.1300/J049v13n02_05.
- [8] YUN, Vincent F. HU, Kuo-Jen and CHANG, Kuo-Jen. An interactive approach for the multi-objective transportation problem with interval parameters [online]. *International Journal of Production Research* [online]. 2015. vol. 53, iss. 4, pp. 1051-1064. Published online: 23 Jul 2014 [viewed 2018-12-14]. Available from: <https://doi.org/10.1080/00207543.2014.939236>
- [9] MENA, Carlos and BOURLAKIS, Michael. Retail logistics special issue. *International Journal of Physical Distribution & Logistics Management* [online]. 2016. vol. 46, iss. 6/7, pp. 1051-1064. Published online: 2016 [viewed 2018-12-14]. Available from: <https://doi.org/10.1108/IJPDLM-03-2016-0098>.
- [10] MOUSSAOUI, Issam, WILLIAMS, Brent D. HOFER, Christian, ALOYSIUS, John A. and WALLER Matthew A. Drivers of retail on-shelf availability: Systematic review, critical assessment, and reflections on the road ahead [online]. *International Journal of Physical Distribution & Logistics Management* [online]. 2016. vol. 46, iss. 5, pp.516-535. Published online: 2016 [viewed 2018-12-14]. Available from: <https://doi.org/10.1108/IJPDLM-11-2014-0284>.
- [11] TSAI, Ming-Chih, LIAO, Chun-Hua and HAN, Chia-shing. Risk perception on logistics outsourcing of retail chains: model development and empirical verification in Taiwan [online]. *Supply Chain Management: An International Journal* [online]. 2008. vol. 13, iss. 6, pp.415-424. Published online: 2013 [viewed 2018-12-14]. Available from: <https://doi.org/10.1108/13598540810905679>.
- [12] HOLLSTEIN, Christian and HIMPEL Frank. Supply Chain Risk Management [online]. *LogForum* [online]. 2013. vol. 9, iss. 1, pp.21-25. [viewed 2018-12-14]. Available from: http://www.logforum.net/pdf/9_1_3_13.pdf
- [13] PANTANO, Eleonora. New technologies and retailing: Trends and directions. *Journal of Retailing and Consumer Services* [online]. 2010. vol. 17, iss. 3, pp.171-240. Published online: May 2010 [viewed 2018-12-14]. Available from: <https://doi.org/10.1016/j.jretconser.2010.03.004>.
- [14] BOUZAABIA, Rym, BOUZAABIA, Olfa and CAPATINA, Alexandru. Retail logistics service quality: a cross-cultural survey on customer perceptions. *International Journal of Retail & Distribution Management* [online]. 2013. vol. 41, iss. 8, pp.516-535. Published online: 2013 [viewed 2018-12-14]. Available from: <https://doi.org/10.1108/IJRDM-02-2012-0012>.
- [15] RENKO, Sanda and FICKO, Dejan. New logistics technologies in improving customer value in retailing service. *Journal of Retailing and Consumer Service*. [online]. 2010. vol. 17, iss. 3, pp.216-223. Published online: May 2010 [viewed 2018-12-14]. Available from: <https://doi.org/10.1016/j.jretconser.2010.03.012>.
- [16] MURDEN, Sam. New food logistics technologies deliver the goods. *Food&Beverage Industry News* [online]. 2016. Published online: 17 May 2016 [viewed 2018-12-14]. Available from: <https://foodmag.com.au/new-food-logistics-technologies-deliver-the-goods/>.
- [17] BRIGGS, Charles A. Information Technology: The Engine of Supply Chain Sustainability, An Exploratory Concept. *International Journal of Business Research & Information Technology* [online]. 2016. vol. 2, iss. 1, pp.60-77. Published online: 22 December 2015 [viewed 2018-12-14]. Available from: <https://trove.nla.gov.au/version/226554887>
- [18] ANGELEANU, Andra. New Technology Trends and Their Transformative Impact on Logistics and Supply Chain Processes. *International Journal of Economic Practices and Theories* [online]. 2015. vol. 5, iss. 5, pp.413-419. Published online: October 2015 [viewed 2018-12-14]. Available from: http://www.ijept.org/index.php/ijept%20/article/view/New_Technology_Trends_and_Their_Transformative_Impact_on_Logistics_and_Supply_Chain_Processes/pdf
- [19] GOLDSBY, Thomas J. and ZINN, Walter. Technology Innovation and New Business Models: Can Logistics and Supply Chain Research Accelerate the Evolution? *Journal of Business Logistics* [online]. 2016. vol. 37, iss. 2, pp.80-81. Published online: 28 June 2016 [viewed 2018-12-14]. Available from: <https://doi.org/10.1111/jbl.12130>.