

Banerjee, Amardeep; Siemens, Franziska

**Conference Paper**

## Logistics of E-Groceries.de

**Provided in Cooperation with:**

Hamburg University of Technology (TUHH), Institute of Business Logistics and General Management

*Suggested Citation:* Banerjee, Amardeep; Siemens, Franziska (2015) : Logistics of E-Groceries.de, In: Kersten, Wolfgang Blecker, Thorsten Ringle, Christian M. 978-3-7375-4059-9 (Ed.): Innovations and Strategies for Logistics and Supply Chains: Technologies, Business Models and Risk Management. Proceedings of the Hamburg International Conference of Logistics (HICL), Vol. 20, epubli GmbH, Berlin, pp. 91-116

This Version is available at:

<https://hdl.handle.net/10419/209252>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



<https://creativecommons.org/licenses/by-sa/4.0/>

**Amardeep Banerjee and Franziska Siemens**

# **Logistics of E-Groceries.de**



# Logistics of E-Groceries.de

*Amardeep Banerjee and Franziska Siemens*

Attended home delivery and customer retention remain the biggest challenges for an e-grocer. Same day delivery resulted in death knell for Webvan one of the pioneers of e-groceries. On time, reliable delivery of groceries is a competitive differentiator and enhances customer loyalty, understating the importance of the last mile problem. The following work aims to find out the key factors characterizing the fulfilment strategy for a German online grocer in solving the last mile delivery problem. Literature analysis and study of business models form the basis of the conceptual framework. Furthermore, expert interviews from retailers using two different business models i.e. multi-channel grocer and pure e-grocer are conducted for practical insights and validation of the work.

**Keywords:** E-fulfillment, Last Mile Problem, Omni Channel Groceries, KPI

## 1 Introduction

The increased usage of internet has fuelled great interest in "point and click" way of living. Instead of traditional store shopping, goods are ordered online which need to be shipped to the final customer (Bubner et al., 2014). E-commerce sales in Germany are expected to reach 900 billion Euros by 2018, which is double the value of the present sales (eMarketer, 2014b). According to a recent study, the online grocery market in Germany had a turnover of 1.08 billion Euros and it is expected that the market grow by 44.4% to 1.56 billion Euros. (IGD report, 2013). The fact that an average consumer visits a grocery shop 2.2 times a week (Kahn and McAlister, 1997) and 82 % of the online shoppers bought grocery online as a substitute to their frequent visits to the grocery store rather than one off stocking up or special occasion activity (Sneader et.al, 2000) makes online grocery an attractive proposition. Delivering the right product at the right time to highly price sensitive and internet-powered consumers is no easy task. The last mile is defined as the final stage in the distribution process in online retailing and is one of the most challenging parts of the supply chain (Esper et al., 2003). Recently, there has been increased usage of innovation and technology like usage of drones, smart bikes and refrigerated lockers (Gevaers, 2014) for on-time distribution of goods ordered online. For example, DHL implemented a research project for using drone delivery to the north German island of Juist. By using drone delivery, DHL wants to overcome infrastructural and delivery time related issues (Deutsche Post DHL, 2014b). It is estimated that the last mile accounts for 30% - 70% of the total logistics costs in a supply chain (Gevaers et al., 2011). The last mile problem becomes increasingly important for the grocery sector due to delivery of order promised within

fixed time windows and perishability aspect of groceries (Punakivi et al., 2001; Agatz et al., 2008a). Section 2 will discuss the state of the art studies in e-groceries and last mile. This is followed by identification of different factors important for efficient and responsive e-grocery supply chains.

## 2 Literature Review

Geoffrion and Krishnan (2001) identify three major parts of e-commerce i.e. consumer-oriented activities, business-oriented activities and the infrastructure oriented activities that are needed for the former two other parts to function. Multi-channel retailers are also referred to as “bricks-and-clicks” retailers (Xing and Grant, 2006). For outlining the scope of the work, it is important to differentiate that pure and multi-channel retailers face different logistical challenges and trade-offs (Johnson and Whang, 2002; Agatz et al., 2008b). Pure players do not sell their products via physical store presence but via the means of electronic networks whereas multi-channel retailers rely on a combination of traditional retail stores and online services. Pure players are exposed to complex logistical decisions. Order picking, routing and order delivery are three logistical processes to be performed (ring and Tigert, 2001). In particular, demand variance has contributed to the development of different logistics approaches and business models (Kämäräinen et al. 2001a).

### 2.1 State of Art on E-Groceries

An e-grocer has the advantage of comparatively low initial investment but needs to very efficient yet responsive to sustain the competition in a price

sensitive grocery market. According to Pyke et al. (2001), supply chains for online retailers comprise processes under two main categories i.e. supply management and order fulfilment. Supply management deals with the management of the supply and the inventory of the products, whereas order fulfilment includes all the processes from the point of a customers' buying decision until the moment when the good has been received. Different logistical processes will be triggered when a customer orders a product online. E-groceries are plagued with a variety of challenges ranging from design of a website to the pricing and execution of the final delivery process.

Challenges arise on different planning horizons from long term (e.g. network design) to short-term decisions (how to execute the final transportation). Delivering a product or a service to the customer has been proven as one of the most challenging tasks within the order fulfilment processes (Fernie and Sparks, 2009). Table 1 summarizes the recent studies related to framework development in online groceries. On a strategic and tactical planning level, providers have to make decisions choosing a certain delivery service level that balances customer convenience and efficiency in terms of costs (Agatz, 2008b).

Table 1 Recent studies on framework for online Groceries

Reference	Focus area and Methodology
Lunce(2006)	Descriptive framework for Strategic problem
Agatz (2008b)	Strategic, Tactical, Short term order routing
Boyer (2009)	Analytical and Simulation approach to the strategic problem.
Colla (2012)	Descriptive framework for Strategic problem
Ehmke (2014)	Analytical model for Short term routing

The presented frameworks have looked into short-term order routing strategic and tactical planning problems. Research methodologies used for these studies are literature overview, descriptive framework, analytical modelling, empirical studies or simulation based studies and case study research. The focus has been on analytical models for routing problems and development of descriptive frameworks. E-Grocery research has primarily delved into three areas i.e. customer service quality, design of conceptual frameworks and higher-level strategy based papers (Kuhn et al. 2014). On the strategic and tactical planning level of the last mile delivery, providers have to make decisions like choosing a certain delivery service level that needs to balance consumer convenience and efficiency in terms of costs (Chakravarty, 2014, p. 153; Agatz et al., 2008b). There exists a gap in literature regarding innovation in the last mile problem of e-grocers. Literature

studies with respect to online groceries can be divided into two distinct periods. There has been an abundance of research interest in the early 2000's and renewed interest 2010 onwards. There has also been increased attention on carbon emissions of different fulfilment methods (Loon, 2014), (Belavia, 2014).

## 2.2 Customer Behavior and Last Mile

A number studies have looked at the effect of consumer behaviour in e-commerce. For example, Reibstein (2002) finds that customers in online sales are very heterogeneous and that the price of the products plays an important role in the purchase process even though it is no guarantee for customer loyalty, concluding that on-time delivery is important. Hsiao (2009) evaluates a study comparing buyer preference choices between online and offline stores concluding that the monetary value of the delivery time is highly valued by the customer. Corresponding with Hsiao (2009), Zhang (2008) identifies the delivery time as one important element in the transaction process. It can therefore be concluded that delivery times play an important role in e-Commerce logistics effecting customer behaviour and preferences (Esper et al., 2003). Furthermore, Swaminathan and Tayur (2003) argue that customer expectations in e-Commerce in terms of delivery time and timeliness have increased in e-commerce. Xing and Grant (2006) emphasize high consumer expectations in terms of reliable and fast deliveries at convenient times. Boyer et al. (2003) show that late deliveries result in customer dissatisfaction.



Boyer and Hult (2005) examine case studies in the grocery industry to survey customer behavioural intentions. They conclude that e-Business quality (i.e. ease of use), product quality (i.e. assortment and quality) and service quality (i.e. credibility and communication) have a significant impact on customers buying intentions. In addition, they indicate that convenience in receiving a delivery is more important than the actual price. Brusch and Stübner (2014) examine customer expectations in terms of delivery times for German online shoppers. They find that there are differences in expectations within different clusters of consumers, e.g. frequent online shoppers are interested in fast deliveries. Schnedlitz et al. (2013) states that online-shoppers prefer home delivery to alternative delivery solutions such as a collection delivery point. Blauwens (2010), state that logistics provider should offer specific time windows for delivery (Agatz et al., 2008a). Boyer et al., (2004) show that offering narrow delivery time windows is a great opportunity to induce customers. Specific time slots for delivery can help improve the customer service and efficiency of the delivery (Agatz et al., 2011). In conclusion, corresponding customer behaviour in e-Commerce has a big relevance in terms of logistical processes and services. Smáros et al. (2000) argue that customers' needs need to be considered first before implementing new services. High consumer expectations and preferences are main drivers for efficiency of the delivery. Yrjölä (2001) formulates the cost structure of different steps of the supply chain and develops a model for traditional grocery stores that want to enable electronic grocery shopping. The findings from this paper are closely related to Punakivi and Saranen (2001). A number of researchers (Gevaers et al., 2014; Fichter, 2003) support the idea of developing a cost simulation tool as there exists a lack of available

real cost data. Gevaers et al. (2014) developed a tool that simulates based on a time and distance function. The last mile delivery costs per unit delivered are calculated taking into account several characteristics related to the last mile delivery (for example potential delivery time windows, pooling effects and customer density) into account.

### **3 Conceptual Framework**

The following chapter will deal with the development of a qualitative model, which incorporates potential effects of innovation on costs.

#### **3.1 Factor Analysis**

In order to establish the last mile cost factors, different cost factors and drivers need to be identified. The last mile factors are subdivided into delivery related, innovation and external factors.

##### **3.1.1 Delivery related factors**

Multiple deliveries and FTHR (First Time Hit rate) have an influence on the last mile costs (e.g. Vanelslander et al., 2013; Gevaers, 2014). The term FTHR implies the percentage that a product can be successfully delivered to a customer at first try. If a product cannot be delivered to a customer at first try, the FTHR decreases because the product has to be taken back by the delivery provider. In case of a failed delivery, repeated deliveries are necessary which result in higher costs (e.g., Song et al., 2012; McLeod et al., 2006).

To avoid multiple deliveries and increase the FTHR, alternative solutions are being evaluated and currently being tested in practice. Additionally, alternative delivery concepts like unattended home deliveries, collection delivery points and store based pick up can increase the FTHR and help to avoid failed deliveries (Morganti et al., 2014b). The dropping factor describes the average number of parcels that are being delivered per stop (Gevaers, 2014; Schnedlitz et al., 2013). In order to lower delivery costs, a higher dropping factor implies better cost efficiency as more packages can be dropped at one stop resulting in time savings (Schnedlitz et al., 2013). The dropping factor has a direct effect on the delivery efficiency in terms of costs. The higher the dropping factor, the lower the costs of the last mile delivery. Collection delivery points wherein more than one customer is served at once can influence the dropping factor in the last mile delivery, but requires high constant demand. The density of customers has a direct influence on the last mile delivery costs and is directly associated with the miles that have to be travelled (Boyer et al., 2009).

### **3.1.2 Innovation Factors**

The vehicle factor contains the vehicle operating costs, which are directly related to the distance travelled (Pulido et al., 2014; Vanellander et al., 2013). Vehicle operating costs are time and distance-related costs. Vehicle operating costs are related to the distance travelled and include several factors such as drivers' wages, fuel consumption and maintenance. The driver wage covers the costs involved in navigation of the vehicle, serving of the customer and maintenance or safety checks on the vehicle (Koether, 2014, p. 86; Vanellander et al., 2013). Innovation can influence the different

operating costs with regard to the vehicle use. Different types of vehicles can have a different impact on the last mile delivery costs and offer scope for innovation. For example, delivery by drones can result in savings in time and Labor costs.

### **3.1.3 External Factors**

A delivery needs to be planned taking into account external factors. For example, delivery to city locations might be subjected to travel legislations like restricted time slots for entering different regions (Quak and de Koster, 2009). Infrastructure restrictions are considered as external factors. For example the limited number of delivery vehicles allowed entering densely populated urban areas in peak evening hours. Customer density and infrastructural restrictions can affect the dropping, stopping factor and the vehicle operating costs (e.g. Boyer et al., 2009).

## **3.2 Framework for Solving the Last Mile**

The framework has to be interpreted as outlined in the following. From a supply chain perspective, the model looks at key performance indicators to manage supply and demand. Four set of KPI's are identified and there are number of levers that have a direct and indirect effect on these KPI's.

Table 2 KPI's for the last mile

KPI	Factors	Reference
Product Assortment	Inventory optimization	Agatz (2008)
	Demand forecasting	Agatz (2008)
Delivery Profile	Number of Time windows	Punakivi (2001)
	Length of Time windows	Punakivi (2001)
	Frequency of Time window	Boyer (2009)
	Delivery Factors	Gevaers (2014)
Degree of Innovation	Process + Service Innovation	Gevaers (2014)
Value Based Pricing	Pricing of Time windows	Agatz (2008)
	Minimum order quantity	

Table 2 describes the KPI and the corresponding lever important in solving the last mile problem. The KPI's are decisions belonging to different planning levels of a supply chain. Innovation and value based pricing are two factors, which can be a good basis for service differentiation. Innovation (e.g. service and process), not only implies a change in some predominant components of order picking and order delivery, but also influences time or distance-related variables.

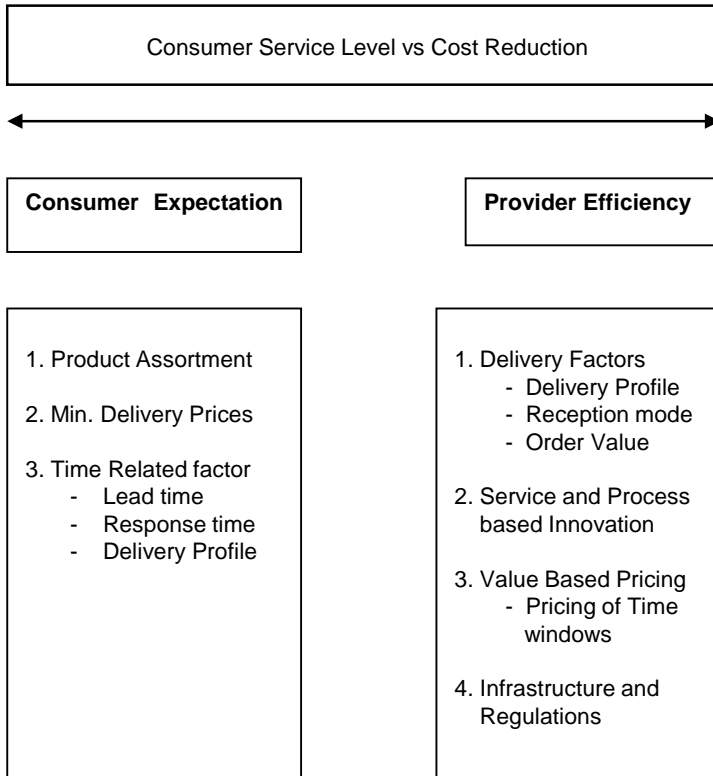


Figure 1 Factors for solving the Last Mile Problem

The first KPI, product assortment determines the assortment size i.e. number of products to be sold and the corresponding inventory policy for each of these products sold. High availability of the right product assortment gives an e-grocery player the necessary scale to compete with several

multi-channel retailers. The strategy here can be niche based either product assortment or a whole range for product assortment. Managing capacity and inventory are important levers for ensuring right size of product assortment. The time and speed of delivery are important factors as they have a direct effect on the last mile and corresponding customer satisfaction. With gradual increase in volume of the online grocery market, there will be less scope for changes in assortment size or time of delivery.

As mentioned before, the provider has to fulfill consumer expectation ensuring high efficiency in terms of cost, the key performance indicators and factors are grouped into two categories namely customer expectations and provider efficiency in figure 1. One of the main challenges of the last mile is inefficient delivery routing due to unreliable deliveries that need to be made to remote areas. In order to implement innovation, laws and legislations need to be taken into account. The proposed framework combines different factors identified in the state of the art and can be used a guideline for e-grocery business in handling the logistical challenges.

Practical insights from the industry are always helpful in validating the work. The following sections will first discuss the existing business models and strategies in Germany. Insights from two German e-grocery retailers will be discussed.

## 4 Business Practices in Use

The market is characterized by price sensitive customer evident by the high presence of discount stores that consists of approximately 44% of the total retail chains (AT Kearney, 2012 p.2). Multi-channel retailers REWE, Edeka along with Lidl-Aldi dominate 70% of the market share in Germany (planet retail.net, 2015). German e-grocers use a variety of business models for fulfillment. Aldi, Lidl primarily use physical stores for selling grocery and online channel only as a catalogue where orders cannot be placed. Traditional multi-channel retailers like REWE, which actively use online and offline for selling groceries. Drive in concepts are currently tested by multi-channel retailers like Edeka drive (planetretail.net, 2015). The drive in fulfillment model saves in order delivery costs and uses its physical store as collection point for a number of deliveries. Shopwings.de is a Berlin based start-up, which gives customers options to their product assortments from different supermarkets in their vicinity. The purchase will be compiled in a regional grocery store and delivered by personal shoppers in their private vehicles. If an item in the desired supermarket does not exist, the personal shopper purchases a replacement item. Delivery is possible within two hours after the order. The variable delivery fee is dependent on the size of the basket. With conditions of anonymity or non-quantitative data in some cases, managers from two different German e-groceries agreed to share their insights in a semi-structured interview. A logistics routing manager was interviewed first as a sample interview. We intended to interview C-Level senior managers who have ample decision-making powers and work experience. Furthermore, two conversations were held with the respected



expert, first being an unbiased general perspective on the e-grocery fulfillment and last mile problem. The factors identified and the developed model was send well in advance to ensure the expert has ample time to reflect on the interview.

The interviewed managers were selected because of the different business model and fulfillment methods used. Triangulation was obtained with two different practical perspectives and a revisit interview on the same model.

## **4.1 Insights from Shopwings.de**

The fact that all the existing players are currently experimenting with their fulfillment methods makes case study based or empirical data simulation study difficult. The following section discusses practical insights regarding the factors affecting online grocery obtained in the form of a semi structured telephonic interview.

### **4.1.1 Important Factors for E-Grocery**

The representatives from Shopwings.de foresee the current German market as underdeveloped as compared to markets like the United States. They identified the lack of best strategy for online grocery in Germany. According to the interviewee, multi-channel retailing or a global network model is the way forward. Furthermore, they emphasize on need for collaboration between online and offline channels for maximizing the pooling effect and avoid cannibalization of sales. Accordingly, speed and same day delivery are the most important performance factors for success in e-grocery. The interviewee emphasize on speed because of high competition and perishability factor of groceries. They state that Amazon has set same day delivery

as the ultimate benchmark for success in e-commerce. Low volume and low value orders with limited lifetimes and the fact that the majority of orders are to be delivered in presence of the customer i.e. attended home delivery differentiates home delivery of groceries from Amazon. Furthermore, they acknowledge the importance of inventory management for prevention of stock outs, but state that customers are generally willing to accept replacements.

#### **4.1.2 Innovation and Future of E-Grocery**

Regarding usage of drones and innovation in online grocery, the interviewee stated that it could be seen as a possible means of online distribution in the future. Regarding order pricing and time windows, the interviewee were ambivalent. Vehicle routing is done automatically by the use of software. The interviewee state that innovation is an important factor but more in terms of distribution. For example, inclusion of B2B grocery services and introduction of clusters of third party delivery services to serve the rural population. The interviewee state that the German grocery retailer can take a cue from the French model of collection delivery points for order fulfilment. Collection delivery points in gas stations are also a norm for UK based grocery retailers considering the limited amount of available space for physical stores. Furthermore, online grocers can benefit by dedicated collaboration with supermarkets or cash and carry chains.

#### **4.2 Insights from a Multi-channel Player**

It was interesting to observe that the same set of questions yielded different opinions from a logistics manager of a leading multi-channel player.

The interviewee was positive about the future of pure online grocery players but did not see them as a threat to multi-channel retailers.

#### **4.2.1 Important Factors for E-Grocery**

The interviewee stated that the current German grocery market is highly cost dependent and costs are the primary drivers for the different fulfilment strategies. The interviewee was in agreement with the factors discussed in the model. The interviewee was particularly in agreement with product assortment factor that is an indication of product availability. The seasonality of products coupled with uncertainties in delivery of the product by supplier affect the order picking processes. The interviewee stated that customers are unforgiving for either mistakes in order delivery that are related to unavailability of inventory or error in order picking. Regarding comparison with crowd sourcing based delivery, the interviewee emphasized on the trust factor. Customer trust and delivery personnel behaviour are two important factors.

#### **4.2.2 Innovation and Future of E-Grocery**

The lack of alignment and internal conflicts between the different departments regarding acknowledgement of costs related to low valued inventory products play a role. The interviewee gives an analogy of spare products industries, characterized by high number of products that are of low value.

Regarding usage of drones, the interviewee was positive in general but was not sure of the weight bearing capacity of drones. The interviewee opined that innovation is important but right now, the grocers need to optimize

the current situation and get their basics right before thinking of automated warehouses. The interviewee states that delivery of groceries in offices or collection was imaginable in cities like Berlin.

According to the interviewee, another possibility could be introduction of community trucks for the weekdays with complete refrigeration systems at convenient pick points as an alternative to home deliveries.

The literature review, the developed framework and the practitioners' acknowledge the importance of the last mile problem. The practitioners focus more on getting the operational issues right for ensuring the delivery of the product. Furthermore, the practitioners focus on intra-organizational coordination and human factors of the delivery personnel. The literature study showed that various deliveries related factors like FTHR, vehicle-operating factor, dropping factor significantly affect the costs of the last mile delivery. As seen in literature, innovation is not clearly linked as a solution to the last mile problem. The practitioners view innovations like drone delivery as a possibility for the future. Currently standard routing software is used for vehicle routing and planning of delivery in practice. There has been less focus in practice and literature on the usage of pricing mechanisms for exploiting customer heterogeneity in online groceries.

Furthermore, in practice pricing is not explicitly seen as a key tool for managing demand and capacity. Dynamic or differentiated order based delivery fees based on length of time window and the time of ordering can result in higher revenues. Two main shortcomings of the work can be from a theoretical and practical perspective. A specific analytical model for the last mile and KPI based studies (Grégory, 2014) could have been discussed in detail to form the basis for the theoretical model. Furthermore, the results

do not address interdependencies among the different KPIs. A detailed survey of the existing grocery business models in Germany and comparison with other western European grocery markets for operational leanings can give more practical insights and relevance to the model.

## 5 Summary and Conclusion

This work is closely related to Agatz (2008) Gevaers (2014) in terms of the central theme of online groceries and model development. Specific Factor based analysis for the last mile and validation for a German player differentiates this work from the after mentioned papers. Relevant problems underlying the last mile delivery were identified by the use of press releases, literature and different studies. It was shown that innovation (independent of its type) could have effects on different factors that drive the costs for the last mile delivery. Innovation can be profitable in terms of costs but it cannot be concluded how much it has an effect on customer service level.

Future studies can prioritize the factors according to their affect and current relevance in solving the last mile problem. Efforts should be directed towards incorporating service level aspects like lead-time and response time explicitly. Value based pricing can be the basis for development of a revenue management model for stochastic demand distribution and unknown customer classes. The effect of returns and environmental regulations (Weltevreden, 2008) on the last mile problem specific to online groceries is also a possible area for future research.

E-commerce players (multi and pure players) can use the model as a guideline to evaluate which cost factors could affect the last mile problem. In addition, an important managerial implication is that there exists no right strategy for solving the last mile fulfillment problem. Nevertheless, this model shows the relation between different costs factors but not their extent of effects. With the help of quantitative data such as sales volume, investment costs and implementation costs a business case study can be developed.

## References

- Agatz, N., Campbell, A., Fleischmann, M. and Savelsbergh, M. (2008a), "Challenges and Opportunities in Attended Home Delivery",
- Agatz, N., Campbell, A., Fleischmann, M. and Savelsbergh, M. (2011), "Time Slot Management in Attended Home Delivery", *Transportation Science*, Vol. 45 No. 3, pp. 435–449.
- Agatz, N., Fleischmann, M. and van Nunen, J. (2008b), "E-fulfillment and multi-channel distribution – A review", *European Journal of Operational Research*, Vol. 187 No. 2, pp. 339–356.
- AT Kearney (2012), "Von B2C zu B2B durch alternative Zustelloptionen. Aktuelle Herausforderungen für Paketdienstleister im B2C-Segment", Available at: [http://www.at-kearney.de/documents/856314/1214708/BIP\\_Von\\_B2C\\_zu\\_B2B\\_durch\\_alternative\\_Zustelloptionen.pdf/892541a9-63aa-434d-b2b3-2f146094409f](http://www.at-kearney.de/documents/856314/1214708/BIP_Von_B2C_zu_B2B_durch_alternative_Zustelloptionen.pdf/892541a9-63aa-434d-b2b3-2f146094409f), [Accessed: 10 June 2015].
- Bask, A., Lipponen, M. and Tinnilä, M. (2012), "E-Commerce Logistics: A Literature Research Review and Topics for Future Research", *International Journal of E-Services and Mobile Applications*, Vol. 4 No. 3, pp. 1–22.
- Blauwens, G., Baere, P. de and Van de Voorde, Eddy (2010), *Transport Economics*, 4th ed., De Boeck, Antwerpen.
- Board of Innovation (2015), "CARDROPS. E-commerce delivery in your car. Convenient", Available at: <http://www.cardrops.com/>, [Accessed 2 June 2015].
- Boyer, K.K., Tomas Hult, G. and Frohlich, M. (2003), "An exploratory analysis of extended grocery supply chain operations and home delivery", *Integrated Manufacturing Systems*, Vol. 14 No. 8, pp. 652–663.
- Brown, J.R. and Guiffrida, A.L. (2014), "Carbon emissions comparison of last mile delivery versus customer pickup", *International Journal of Logistics Research and Applications*, Vol. 17 No. 6, pp. 503–521.
- Brusch, M. and Stübner, E. (2014), "Developments and Classifications of Online Shopping Behavior in Germany", *International Journal of Cyber Society and Education*, Vol. 7 No. 2, pp. 147–156.
- Boyer, K.K., Frohlich, M.T. and Hult, G.T. (2004), *Extending the supply chain: How cutting-edge companies bridge the critical last mile into customers' homes*, 1st ed., American Management Association, New York.

- Boyer, K.K. and Hult, T. (2005), "Extending the supply chain: Integrating operations and marketing in the online grocery industry", *Journal of Operations Management*, Vol. 23 No. 6, pp. 642–661.
- Boyer, K.K., Prud'homme, A.M. and Chung, W. (2009), "The last mile challenge. Evaluating the effects of customer density and delivery window patterns", *Journal of business logistics*, Vol. 30 No. 1, pp. 185–201.
- Bubner, N., Bubner, Nikolaus, Helbig, Dr. Ralf and Jeske, M. (2014), "Logistics Trend Radar. Delivering insight today. Creating Value tomorrow!", Available at: [http://www.dhl.com/content/dam/downloads/g0/about\\_us/logistics\\_insights/DHL\\_Logistics-TrendRadar\\_2014.pdf](http://www.dhl.com/content/dam/downloads/g0/about_us/logistics_insights/DHL_Logistics-TrendRadar_2014.pdf), [Accessed 2 June 2015].
- Chakravarty, A.K. (2014), *Supply Chain Transformation: Evolving with Emerging Business Paradigms*, Springer texts in business and economics, Springer Berlin Heidelberg.
- Colla, E. and Lapoule, P. (2012), "E-commerce: exploring the critical success factors", *International Journal of Retail & Distribution Management*, Vol. 40 No. 11, pp. 842–864.
- Dell'Amico, M. and Hadjidimitriou, S. (2012), "Innovative Logistics Model and Containers Solution for Efficient Last Mile Delivery", *Procedia - Social and Behavioral Sciences*, Vol. 48, pp. 1505–1514.
- Deutsche Post DHL (2014b), "Forschungsprojekt DHL Paketkopter - vom Festland auf die Insel Juist", Available at: <http://www.dhl.de/paketkopter>, [Accessed 5 June 2015].
- Deutsche Post DHL (2014c), "Global E-Tailing 2025. Eine Studie von Deutsche Post DHL", Available at: [http://www.dpdhl.com/content/dam/dpdhl/global\\_etailing\\_2025/pdf/dpdhl-studie-global-e-tailing-2025.pdf](http://www.dpdhl.com/content/dam/dpdhl/global_etailing_2025/pdf/dpdhl-studie-global-e-tailing-2025.pdf), [Accessed 15 June 2015].
- Deutsche Post AG (2014), "Deutsche Post DHL übernimmt StreetScooter GmbH", Available at: [http://www.dpdhl.com/de/presse/pressemitteilungen/2014/deutsche\\_post\\_dhl\\_uebernimmt\\_streetscooter\\_gmbh.html](http://www.dpdhl.com/de/presse/pressemitteilungen/2014/deutsche_post_dhl_uebernimmt_streetscooter_gmbh.html), [Accessed 15 June 2015].
- eMarketer (2014b), "E-Commerce-Umsatz in Deutschland in den Jahren 2011 bis 2018", Available at: <http://de.statista.com/statistik/daten/studie/199790/umfrage/entwicklung-des-b2c-e-commerce-umsatzes-in-deutschland/>, [Accessed 25 May 2015].
- Esper, T., Jensen, T. and Turnipseed, F. (2003), "The last mile: an examination of effects of online retail delivery strategies on consumers", *Journal of Business Logistics*, Vol. 24 No. 2, pp. 177–203.



- European Commission (2013b) E-commerce and delivery. A study of the state of play of EU parcel markets with particular emphasis on e-commerce, Okholm and (Copenhagen Economics), July 2013, p.297
- European Commission (2013c) Internal Market Report. Available at: [http://ec.europa.eu/public\\_opinion/archives/ebs/ebs\\_398\\_en.pdf](http://ec.europa.eu/public_opinion/archives/ebs/ebs_398_en.pdf), [Accessed 11 June 2015]
- Eurostat (2013) Available at: [http://epp.eurostat.ec.europa.eu/statistics\\_explained/index.php/Information\\_society\\_statistics\\_at\\_regional\\_level](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Information_society_statistics_at_regional_level), [Accessed 27 May 2015].
- Fernie, J. and Sparks, L. (2009), "Retail logistics: changes and challenges", in Fernie, J. and Sparks, L. (Eds.), *Logistics & retail management: Emerging issues and new challenges in the retail supply chain*, 3rd ed., Kogan Page Ltd., London, Philadelphia, pp. 3–37.
- Food.de Online (2015): Frischegarantie, Available at: <https://food.de/kuehlkette-frische-garantie>, [Accessed 10 June 2015].
- Freshfoods.de Online (2015): Lieferung, Available at: <https://www.fresh-foods.de/lieferung/>, [Accessed 10 June 2015].
- Fichter, K. (2003), "E-Commerce: Sorting Out the Environmental Consequences", *Journal of Industrial Ecology*, Vol. 6 No. 2, pp. 25–41.
- Gevaers, R., Van de Voorde, E., & Vanelander, T. (2011). Characteristics and typology of last-mile logistics from an innovation perspective in an urban context. City distribution and urban freight transport: multiples perspectives, 56-71.
- Gevaers, R., Van de Voorde, Eddy and Vanelander, T. (2014), "Cost Modelling and Simulation of Last-mile Characteristics in an Innovative B2C Supply Chain Environment with Implications on Urban Areas and Cities", *Procedia - Social and Behavioral Sciences*, Vol. 125, pp. 398–411.
- Geoffrion, A.M. and Krishnan, R. (2001), "Prospects for Operations Research in the E-Business Era", *Interfaces*, Vol. 31 No. 2, pp. 6–36.
- Grégory Bressolles and Gerald Lang (2014), "Proposing Key Performance Indicators for performance measuring of e-fulfillment systems in multi-channel retailing Conference: Proceedings of the ANZMAC, At Brisbane (Australia)
- Hau, L. and Whang, S. (2001), "Winning the last mile of e-commerce", *MIT Sloan Management Review*, Vol. 42 No. 4, pp. 54–62.
- Hsiao, M.-H. (2009), "Shopping mode choice: Physical store shopping versus e-shopping", *Transportation Research Part E: Logistics and Transportation Review*, Vol. 45 No. 1, pp. 86–95.

- IGD (2013): „Development for click and collect (drive) for groceries“, Available at: [http://www.olivierdauvers.fr/wp-content/uploads/2013/06/Click-and-collect-for-groceries\\_presentation.pdf](http://www.olivierdauvers.fr/wp-content/uploads/2013/06/Click-and-collect-for-groceries_presentation.pdf), [Accessed 20 June 2015].
- IGD (2014): „Share of grocery retail sales in the United Kingdom UK) in 2014 and 2019, Available at: <http://www.statista.com/statistics/326418/forecast-grocery-retail-market-value-by-channel-in-the-united-kingdom-uk/>, [Accessed: 20 June 2015].
- Johnson, E. and Whang, S. (2002), “E-Business and Supply Chain Management: an Overview and Framework”, *Production and Operations Management*, Vol. 11 No. 4, pp. 413–423.
- Kämäräinen, V., Saranen, J. and Holmström, J. (2001), “The reception box impact on home delivery efficiency in the e-grocery business”, *International Journal of Physical Distribution & Logistics Management*, Vol. 31 No. 6, pp. 414–426.
- Koether, R. (2014), *Distributionslogistik: Effiziente Absicherung der Lieferfähigkeit*, 2nd ed., Betriebswirtschaftlicher Verlag Gabler, Wiesbaden.
- Van Loon, P., Deketele, L., Dewaele, J., McKinnon, A., & Rutherford, C. (2014). A comparative analysis of carbon emissions from online retailing of fast moving consumer goods. *Journal of Cleaner Production*.
- Liu, J., Li, C.-L. and Chan, C.-Y. (2003), “Mixed truck delivery systems with both hub-and-spoke and direct shipment”, *Transportation Research Part E: Logistics and Transportation Review*, Vol. 39 No. 4, pp. 325–339.
- Lunce, S.E., Lunce, L.M., Kawai, Y. and Maniam, B. (2006), “Success and failure of pure-play organizations: Webvan versus Peapod, a comparative analysis”, *Industrial Management & Data Systems*, Vol. 106 No. 9, pp. 1344–1358.
- McLeod, F., Cherrett, T. and Song, L. (2006). Transport impacts of local collection/delivery points. *International Journal of Logistics*, 9(3), 307-317.
- Morganti, E., Seidel, S., Blanquart, C., Dablanc, L. and Lenz, B. (2014b), “The Impact of E-commerce on Final Deliveries: Alternative Parcel Delivery Services in France and Germany”, *Transportation Research Procedia*, Vol. 4, pp. 178–190.
- Planetretail.net European Grocery Retailing by Kelly Tackett. Available at: <http://www.planetretail.net/presentations/ApexBrasilPresentation.pdf>, [Accessed: 22 June 2015].
- Pulido, R., Muñoz, J.C. and Gazmuri, P. (2014), “A continuous approximation model for locating warehouses and designing physical and timely distribution strategies for home delivery”, *EURO Journal on Transportation and Logistics*.

- Punakivi, M., Yrjölä, H. and Holmström, J. (2001), "Solving the last mile issue: reception box or delivery box?" *International Journal of Physical Distribution & Logistics Management*, Vol. 31 No. 6, pp. 427–439.
- Punakivi, M. and Tanskanen, K. (2002), "Increasing the cost efficiency of e-fulfilment using shared reception boxes", *International Journal of Retail & Distribution Management*, Vol. 30 No. 10, pp. 498–507.
- Punakivi, M. and Saranen, J. (2001), "Identifying the success factors in e-grocery home delivery", *International Journal of Retail & Distribution Management*, Vol. 29 No. 4, pp. 156–163.
- Pyke, D., Johnson, E. and Desmond, P. (2001), "E-Fulfillment: It's Harder Than It Looks", *Supply Chain Management Review*, Vol. 5 No. 1, pp. 26–32.
- Quak, H. and de Koster, R. (2009), "Delivering Goods in Urban Areas: How to Deal with Urban Policy Restrictions and the Environment", *Transportation Science*, Vol. 43 No. 2, pp. 211–227.
- Reibstein, D.J. (2002), "What Attracts Customers to Online Stores and What Keeps Them Coming Back", *Academy of Marketing Science*, Vol. 30 No. 4, pp. 465–473.
- Ring, L. J. und Tigert, D. J. (2001): „Viewpoint: the decline and fall of Internet grocery retailers", in: *International Journal of Retail & Distribution Management*, Aufl. 29, Nr. 6, S. 264 – 271.
- Schnedlitz, P., Lienbacher, E., Wadegg-Lidl, B. and Waldegg-Lindl, M. (2013), "Last Mile: Die letzten - und teuersten - Meter zum Kunden im B2C E-Commerce", in Crockford, G., Ritschel, F. and Schmieder, U.-M. (Eds.), *Handel in Theorie und Praxis*, Springer Fachmedien Wiesbaden, Wiesbaden, pp. 249–273.
- Småros, J., Holmström, J. and Kämäräinen, V. (2000), "New Service Opportunities in the E-grocery Business", *The International Journal of Logistics Management*, Vol. 11 No. 1, pp. 61–74.
- Sneader, K., Crawford, B., and Ebrahim, S. (2000). Operation food: Fighting to win in the new economy. Available at: [http://www.fmi.org/e\\_business/pre-nations/OperationFood/sld001.htm](http://www.fmi.org/e_business/pre-nations/OperationFood/sld001.htm), [Accessed: 22 June 2015].
- Song, L., Cherrett, T., Guan, W. and Zhang, W. (2012), "Alternative Solution for Addressing Failed Home Deliveries", *Transportation Research Record: Journal of the Transportation Research Board*, Vol. 2269 No. 1, pp. 83–91.
- Song, L., Cherrett, T.J., McLeod, F.N. and Guan, W. (2009), "Addressing the last mile problem - the transport impacts of collection/delivery points", *Transportation Research Record*, No. 2097, pp. 9–18.
- Swaminathan, J.M. and Tayur, S.R. (2003), "Models for Supply Chains in E-Business", *Management Science*, Vol. 49 No. 10, pp. 1387–1406.

- Vanelislander, T., Deketele, L. and van Hove, D. (2013), "Commonly used e-commerce supply chains for fast moving consumer goods: comparison and suggestions for improvement", *International Journal of Logistics Research and Applications*, Vol. 16 No. 3, pp. 243–256.
- Weltevreden, J.W. (2008), "B2c e-commerce logistics: the rise of collection-and-delivery points in The Netherlands", *International Journal of Retail & Distribution Management*, Vol. 36 No. 8, pp. 638–660.
- Wollenburg, J., Hübner, A. and Kuhn, H. (2014), "Conceptual Framework for Order Fulfillment and Delivery in Online Grocery Retailing. Working Paper".
- Xing, Y., & Grant, D. B. (2006). Developing a framework for measuring physical distribution service quality of multi-channel and "pure player" internet retailers. *International Journal of Retail & Distribution Management*, 34(4/5), 278-289.
- Yrjölä, H. (2001), "Physical distribution considerations for electronic grocery shopping", *International Journal of Physical Distribution & Logistics Management*, Vol. 31 No. 10, pp. 746–761.
- Zhang, J., & Cohen, R. (2008). Evaluating the trustworthiness of advice about seller agents in e-marketplaces: A personalized approach. *Electronic Commerce Research and Applications*, 7(3), 330-340.