Last mile delivery concepts in E-Commerce An empirical approach

[Simon Holdorf, Prof. Dr. Hans-Dietrich Haasis]

***Abstract*— This paper discusses the question whether online retailers can diversify from their competitors by reaching out to new delivery concepts for last mile logistics. We choose an empirical study to ask 250 potential online consumers about their opinion and preferences of online trading and last mile delivery to show the importance of new delivery strategies in order to deal with the rising challenges of high growth rates in E-Commerce business for retailers and logistic service providers.**

Keywords— last mile, delivery concepts, E-Commerce business

I. INTRODUCTION

A. Motivation

E-Commerce has taken on greater importance over the last years in Germany according to the Bundesverband E-Commerce and Versandhandel Germany and increased its sales in 2013 by 41.7% to 39.1 bn. Euro over the previous year. This means that the share in total retail trade expands to a new record of 11.2%. A continuation of a high-level growth is expected for the current year by 24.8% to 48.8 bn. Euro. [1]

Besides price and service quality, delivery loyalty or rather delivery rate plays an important role for the customer as well as low delivery costs. A differentiation between two tenders quoting the same price is frequently realized via the method of delivery and delivery costs. For that reason, online shops try to improve existing delivery options in cooperation with logistics service providers and seek to develop and establish new delivery solutions to differentiate from their competitors. Nowadays the delivery of parcels usually takes between 24 to 48 hours. The next big target is the full territorial coverage and affordable delivery at the same day. [2] In this case it is called Same-Day-Delivery. Furthermore, it is in the interest of customers and logistics service providers to make the last mile more efficient and save costs by avoiding multiple deliveries using new delivery options.

By aligning the own unique selling propositions (USP), it is possible for the firms to position themselves in the market and towards other competitors. In times of permanent availability of information, it is also possible for customers to implement a comprehensive comparison between all available market participants within less time and to decide in favor of the offer with the best conditions. But in addition it is logistics that provide a differentiating unique selling proposition that influences the decision of the customer in the end. New logistic concepts and additional services are meant to help supplying customers quicker and more efficient in the future. In order to meet this objective, different scenarios are possible. These range from the national implementation of Same-Day-Delivery to short time frames in which the customer can receive his parcel and to highly automated pick-up stations and parcel shops.

B. Research question

The objective of this working paper is the empirical research of the acceptance and preference of different delivery concepts as a bridging instrument for the last mile in the Business-to-Consumer (B2C) sector as well as their consequences for the ordering behavior of persons in Germany. This is intended to check to which extent logistics can serve as a differentiation factor in ecommerce. That aspect covers the conception of a suitable catalogue of questions, the implementation of this research via an online questionnaire as well as the subsequent evaluation of the collected data in professional context.

II. STATE OF RESEARCH

In Germany E-Commerce is a young business area of the retailing sector. With the growth of the internet from the mid-nineties, this form of shopping became available for an increasing number of customers.

To explain the connections between E-Business-, E-Logistics and Supply Chain Management, the book “E-Logistik und E-Business“ by Helmut Wannenwetsch in 2002 was used predominantly.[3] In this book the author shows the complex connections between E-Logistic and E-Business based on practical examples and a clear structure. Of special interest are descriptions of possible solutions to the last mile logistics. Many of those established requirements and examples still correspond to the current state of research and are taken up in the book „Vernetztes Supply Chain Management“. [4] The book „e-Logistik“ by Frank Straube, wherein the changes of logistics through information systems and the internet are described, is also ideal as a compliment. [5] Relevant E-Business strategies as well as practical solution methods for achieving a holistic logistics strategy in trading companies are treated.

For the development of the “last mile problem”, the book „Bausteine des Logistikmanagements“ by Jochem Piontek (2013) was used besides Wannenwetsch (2002/2005). [6]

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Mainly Supply Chain Management, E-Logistics, Logistics Controlling, Green Logistics and Logistics instruments are treated. Weber et al. provided further information on the requirements of future logistics systems and concepts to by-pass the last mile through their market report „E-Commerce in der Logistik: Quantensprung oder business as usual?“ published in 2002.[7]

The subject area of this working paper has been processed by several authors both in a theoretical and a practical point of view in recent years. Lindemann (2002) dealt with the consequences, requests and problems of new logistics systems and delivery concepts to solve the problem of the last mile in her dissertation entitled „E-Commerce and E-Logistics systems in B2C sector”. [8] The dissertation by Andreas Cardeneo (2005) concerned the „modeling and optimization of routing problems with alternative delivery locations and delivery times in the B2C sector”. [9] As part of this work Cardeneo developed the Personal Logistics Assistant. The essence of the concept is to make the delivery point for a parcel to a negotiable and with it to a competitive dimension. Furthermore Niehus (2005) dealt in his dissertation with „The analysis of the evaluation of different delivery options in B2C E-Commerce“ with the focus on the Austrian market. [10] The aim of this work was to analyze the preference of end customers for different delivery concepts of distance trade and to gather the acceptance of box systems compared to conventional delivery systems in Austria as a result. It was unavoidable to reduce the scope of the questionnaire due to the written survey in shopping malls. The formation of opinion made in this study is limited at some points and does not correspond to the current state considering the changes in E-Commerce over the last decade.

This is precisely the point, where this working paper comes into play. Although the problems and challenges with regard to the last mile were examined in series of works, there is no detailed analysis of customer requirements in this area. A similar study, which analyses the logistics service as a differentiating factor of B2C orders in E-Commerce in Germany, is not yet available at the time of completing this work.

III. The problem of the “Last Mile” in B2C logistics

Within distribution logistics the „last mile“ can be described as the delivery of goods from local distribution centers to the front door of customers. The delivery of a parcel takes place by means of personal delivery by the relevant carrier to the recipient. The carriers are known as courier, express and parcel services (CEP-services). [11]

Today the biggest problem in addition to legal and economic regulations is that the recipient is often not at home at the day of delivery. Resulting multiple deliveries and the atomization of consignments of goods are the main reasons for the disproportional increase in costs of the „last mile“ compared to upstream transport sections. The share of costs for fulfillment of fine distribution is already between five and ten percent of total sales. Vahrenkamp furthermore assumes that 70 % alone of the resulting transportation costs connect to the „last mile”. [12] The responsible cost drivers consist of frequent stop rates, high efforts for identification and search activities, rising efforts for collection operations, multiple delivery attempts and finally the rising number of returned parcels.

Because of the close connection of B2C online trade with logistics it is particularly important to develop new and innovative delivery concepts to minimize the costs of the „last mile“ in order to realize a better customer value. Due to the fact that the delivery loyalty and the quality of the offered services determine the acceptance of the customers, the CEP services are forced to provide new delivery methods and value added services to work against negative cost developments. The objective is to cooperate with the customer over the long term and to involve him in the delivery process. By communicating with the customer continuously, the distribution planning can be improved and the customer requests can be taken into greater account.

In addition to a real-time order processing, fast and reliable logistics are of essential meaning for the customer. In most cases, the only contact between customers and online-shops takes place through the parcel service, so that the parcel service and his delivery options become a critical success factor for E-Commerce orders. All known parcel services have already provided solutions for the problem of the „last mile“ in the B2C sector. These range from simple e-mail notifications including the planned delivery date to a more accurate indication of the time window for the delivery to automated parcel lockers, local parcel stations and parcel boxes for private customers.

On one hand the trends presented above are responsible for the growing success of the CEP services, but on the other hand, they are doubts regarding to the current conventional delivery concepts of the parcel services. Because of delivery times between 9am and 5pm, there will be an additional expenditure of time for the customer, if he/she is absent. For that reason the customer has to pick up his parcel at the nearest store of the CEP service, which means that the expected time savings through an online order are often invalid. The reduction of the local stores of the CEP services reinforces this effect once again. [13]

The methods of resolution can be differentiated in drop-off and collection systems. For drop-off-systems, the delivery is made at the front door of the customer, whereas collection systems means that the good is delivered to a fixed delivery point where the customer can collect his parcel. Examples for drop-off-systems are the front door delivery, front door boxes and the commitment logistics. Collection systems are either local pick-up stations or automated storage systems. Finally

figure 1 summarizes all relevant systems together along with their specific advantages and disadvantages.

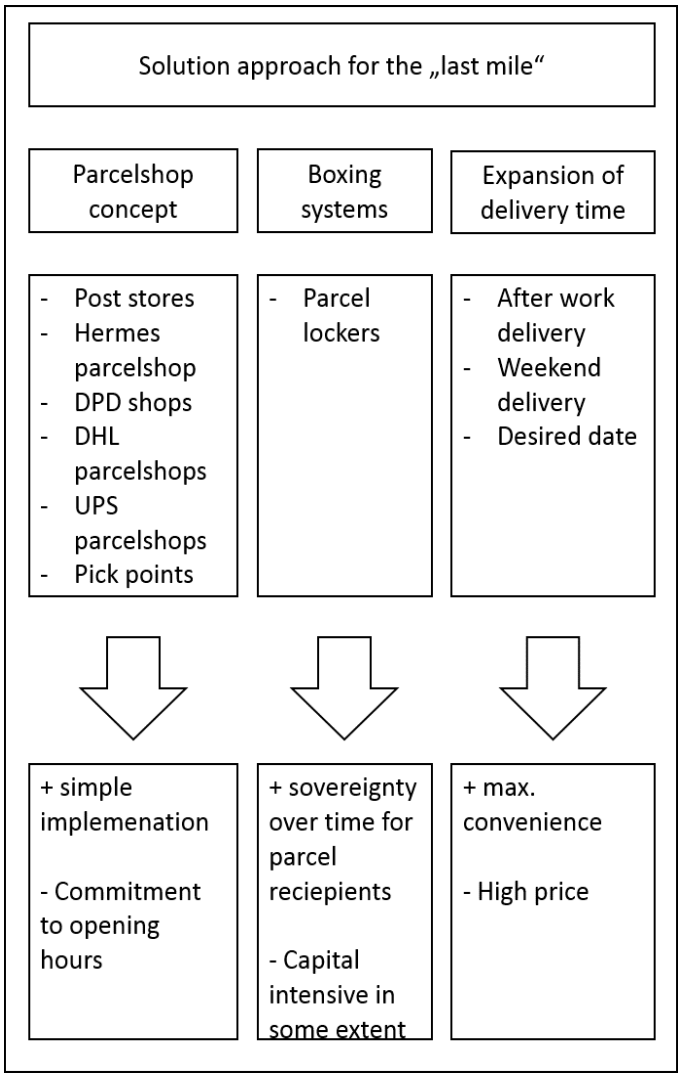

Figure 1: solution approach for the "last mile" [4]

IV. Empirical Evidence

The objective of this working paper bases on a review of the question to what extent the use of different delivery options can generate competitive advantages or Unique Selling Propositions over competitors. For this purpose, preferences and acceptance of end users are evaluated in relation to different supply concepts for orders from online retailers. The objective is to identify the willingness of test customers to pay for the respective delivery concepts in addition to personal preferences. The findings of the study will give evidence that it makes sense for an online retailer to offer his customers certain logistics concepts to distinguish from the competitors. A random sample and a standardized questionnaire were selected for data collection.

The questionnaire divides into four sections, whereby the first section serves to determine the basic information about the study participants. Section two then determines the basic ordering behavior of the test persons looking back on the last 12 months. The main part of that study consists in the third section: the evaluation of different logistics concepts to overcome the "last mile". The focus is on topics like delivery time, delivery place, selection of carriers, use of tracking and tracing and important potential for improvement for the participants. The last section is about general questions in the topic of „ordering on the internet". The objective is to determine the factors that influence the ordering behavior of consumers when choosing an online shop.

The questionnaire contains both multiple choice (with and without radio buttons) and a few free text fields. See the following sample question from the questionnaire (multiple choice, radio buttons and only one answer possible) to get a better understanding of the procedure:

"Imagine you want to order goods online. To what extent will your decision be influenced by a fixed allocation of a logistics service provider?"

- **No impact** (It does not matter which service provider delivers my parcel)
- **Medium impact** (I will not order under some circumstances because I do not want my order fulfilled by a specific carrier)
- **Strong impact** (I highly ensure my favorite carrier is selected)

The study was carried out via a web-based questionnaire on the website www.umfrageonline.com. This platform was chosen because of the huge scope of data quality and evaluation and the free access for students. After a pre-test, which checked the comprehensibility, logic and formulation of the questionnaire, the handing out to all participants followed via e-mail and social networks like Facebook and Twitter. The study period was 24 days (29.11.2013-23.12.2013), in which a sample size of 250 participants was reached. We chose the period to have a full month (six workdays, no Sunday) for the evaluation. 180 persons filled out the questionnaire completely so that they were considered for the evaluation whereby a rate of return of 72% was reached.

V. Results of the Empirical Research

All in all it can be stated that a functioning and simple solution for the „last mile" problem is crucial for future success of online shops in E-Commerce. Because 60% of the participants in that study live in one- or two-person households, it is becoming more and more difficult for the carrier to meet the receiver in person. At the same time, the number of orders per customer is significantly increasing. According to the study results it can be seen that on average at least one order per customer per month is made. According to that, nearly 50% of customers order goods over the internet more than ten time a

year and 27.2% of customers order more than twenty times per year.

The delivery time is an increasingly important factor for internet-based orders. It decides whether the user is satisfied with the retailer or not. What also counts, in addition to the price, are low delivery costs and a quick distribution, which are some of the most important decision criterions for internet purchases. It is important for customers to get their orders as soon as possible. Otherwise, it is of importance to know the order's delivery date. This data will allow the customer to see if he/she is at home at that time to receive the parcel.

Furthermore the carrier is in most of the cases the only contact person between online shop and customer. Over 50% of the test persons have an eye on the carrier when ordering over the internet. In addition they stated that they are influenced by the choice of the parcel service and their reputation. It may also ensure that a customer stop the order process if the parcel is either delivered solely by one carrier the customer made a bad experience with or if the favored parcel service cannot be selected. An Online-Shop should at least offer two different parcel services for the delivery from which the customer can choose. Because DHL reached the highest level of customer satisfaction and offers the delivery to parcel lockers, a delivery option with DHL is of significance importance.
It is also imaginable that alternative services are offered for an extra charge.

The best solution in solving the „last mile" problem within the B2C-logistics appears to be decoupling the presence of the receiver from the parcel delivery. 95% of the participants prefer a delivery to their private addresses whereas other alternative delivery options like the delivery to a parcel locker or to a local parcel shop are considered as neutral and they are often only used for the second delivery try. However, the objective of logistics service providers is to deliver parcels with the first attempt. [14] [15] Only these efforts can ensure that the rising costs, which are the results of multiple deliveries, can be reduced. For that reason, online shops should actively support the direct delivery to local stores or collection stations in cooperation with the carriers through cheaper or no delivery costs. In the long run the savings deriving from the discontinuation of the multiple deliveries would be greater than the subsidization of the delivery costs. In addition the parcel services have to supply small numbers of locations only, so that on the one hand time savings and on the other hand cost savings are possible. Nearly 70% of the persons surveyed would be willing to pick up their parcels at collecting stations in case they still have to pay no or just low delivery costs. The service logistics providers have to solve the problem of the high level demand for a way to pick up all parcels from different parcel services at uniform collection stations for getting a higher acceptance of collecting stations.

Regarding to the delivery option, the customers favor the standard delivery by a clear margin, which has been classified by 98.3% either with „really important" or „important". At the same time, this delivery option should generally be offered for free. For the customer express delivery is of minor importance compared with standard delivery. This is especially reflected by the fact that the willingness to pay for the express delivery is 5.54 Euro on average, while the price for an express delivery of many shops is often more than ten Euro. Because of the limited supply of Same-Day-Delivery in Germany, which is also concentrated in only a few regions and due to the high price of 15 Euro on average this delivery option receives the lowest appeal by the end customers. Same-Day-Delivery is "not very important" or "unimportant" for 71.4% of the test persons. Just eight percent of the participants have used delivery on the same day at least once. The remaining 92% of the test persons never used this service or this service has never been offered to them before.

Information about the time of delivery is of most importance for almost 80% of the participants during the ordering process when choosing an online shop. More than 50% also would like to have the opportunity to choose the day and the time window for the delivery. Outstanding in this field are Same-Delivery-Firms like tiramizoo in Germany and Shutl in the UK and USA. [16] [17] Customers have the opportunity to choose the day and the time for delivery during the ordering process in these examples. Alternatively, the option „delivery as soon as possible" can be specified. Online shops should therefore specify an expected date of delivery instead of delivery date in days. If customers are satisfied with the delivery of a retailer they will order again more likely.

The tracking system via internet is being used by almost 90% of the users to determine when the parcel is expected to be delivered. The potential for optimization can be found especially in the timeliness of the data. Many customers want the displayed information updated faster by not only showing the parcel is on its way after it has already been delivered. Furthermore parcel announcements are often very vague and cautious in forecasting the scheduled delivery date. In most cases the parcels are delivered a day before the scheduled delivery. The objective of the logistics service provider has to be the adherence to agreed delivery times. This is the only way that the preliminary announcements can produce a benefit for customers' day planning. A reduction of the delivery window to two hours and the configuration of vehicles with GPS antennas including live tracking offer great potential for optimizing the tracking service.

It is therefore essential that the parcel services no longer deliver anonymous parcels but have the contact details such as phone number and e-mail address of the recipients. With the help of these communication options, notifications in short time and agreements in case of problems would be possible. In addition the customer should have the possibility to communicate with the carrier in a simple way for modifications.

Furthermore it has been proved that younger persons up to the age of 34 years are willing to pay more money than older people (35 years and older) for additional services like the selection of delivery time or the delivery on Sundays. Consequently it has been proven that there is an existing market for Value Added Services especially for short-termed orders.

For customers a decisive selection criterion of the online shop is the opportunity to return ordered articles free, especially in the fashion sector. The most frequently cited reason for return was either a wrong ordered size or articles that do not fit. Secondly, the participants stated that they would return articles if the quality is insufficient or if the description of the article is significantly deviated from the description by the retailer. For that reason, online shops should pay more attention to internal quality control of their products to avoid delivering any wrong articles. It would be the best if retailers avoid offerings with low quality unless they are unique in this segment. A detailed description and meaningful pictures in natural situations also help to better present the product to consumers before purchase. This prevents a mismatch between product and expectations of the customer to avoid the return of the parcel.

There a two strategies for online shops regarding to the new EU consumer directives. It is either possible to offer the customer free returns or to allocate returning costs to the customer. For the latter case, the empirical study shows that more than 60% of the participants would change their ordering behavior if they have to bear the costs. In combination with free returns, online stores should introduce a bonus system that rewards the buyer (e.g. discount on the next order) if he/she does not send back any articles. Otherwise, it might be of interest for small online shops to get the payment for the returning costs from the customers. Consequently, it would be possible to lower their prices and to get cost advantages over other competitors. Especially for products starting from the value of 20 Euro and more, 2/3 of the customers take the opportunity to compare prices with price search engines. Guenstiger.de and idealo.de belong to the most popular providers. With the objective of price leadership firms should focus to place themselves in the upper tiers on the largest comparison portals to catch attention. That is why both strategies have pros and cons and in the end, the customer will decide which model will prevail in the future.

SUMMARY AND OUTLOOK

A. Summary of the results

The objective of this working paper was the empirical research of acceptance and preference of different delivery concepts to overcome the „last mile“ in the B2C sector and their impact on the ordering behavior of persons in Germany. We examined to which extent logistics can serve as a differentiating factor in E-Commerce business.

The survey results have shown that competitive advantages can be achieved by offering different logistics services and Value Added Services. Viewed critically, Same-Day-Delivery in its modern form is an elitist luxury product used by people with less time and a lot of money. However, the majority has more time but less money. Nevertheless Same-Day-Delivery has the right to exist in special applications or for selected user groups like when ordering food or spare parts which are needed the fast as possible. Considered more thoroughly, the innovation does not consist in the delivery, but in the online processes of the retailers, because food deliveries on the same day were possible decades ago. In general, express deliveries are useful as an additional offer but they should not be the priority of retailers and logistics service providers.

The online trading sector rather focuses on truly important logistics requirements of customers in the high volume mass market. Alternative delivering options in the absence of the customer, free deliveries, improved tracking and tracing and adherence to delivery deadlines are currently the most important customer requirements. In addition, customers require flexible alternative delivery times and delivery locations because the parcels cannot been taken by the buyer personally during the day as a result of the growing number of single and two-person households and the rising employment in the population. The convenience and time savings by shopping online are invalid if the customer needs to pick up his/her parcel at various pick-up stations and parcel shops. At this point, it would be necessary to provide uniform collection points were parcels can be received by all parcel services. Due to the upcoming changes in the right of withdrawal it was determined that returns with costs can strongly influence the ordering behavior.

The results of this working paper show that measurable competitive advantages can be achieved by improving logistics in B2C-E-Commerce and by offering additional services. Even the implementation of short-term measures like the selection of the delivery service or the indication of a delivery date during the ordering process can be sufficient to improve customer satisfaction

B. Outlook

This working paper illustrates that a sustainable differentiation from competitors is possible by using various logistics concepts. In practice, this means that in particular the parcel services have to extend and improve their services to meet high customer expectations. For this reason, the retailers should cooperate with logistics service providers that already offer delivery options without the need of the receiver’s presence or allow the customer to arrange the delivery of the parcels individually.

In the future, it should be further assessed to what extent the use of Revenue Management for the calculation of logistics

services affects the ordering behavior of the customers. Furthermore it should be investigated which measures can increase the acceptance of central collection stations and parcel shops. In addition, more and more online retailers offer delivery flat rates or club memberships to their customers. The objective is to establish relationships with customers in the long-term. A further study will examine when and under what conditions a customer is willing to pay an annual fee for free delivery.

It is also questionable whether the new parcel returning conditions will have an impact on the customer's buying behavior. It is therefore important to check to what extent the online shops have modified or maintained the return management after July 2014. It is also of interest whether the customers will actually change their behavior, if they have to pay the return costs on their own regardless of the value of goods in the future.

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