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The logo for the Hamburg International Conference of Logistics (HICL). It features the letters 'HICL' in a bold, black, sans-serif font. The letter 'I' is replaced by a stylized globe icon with latitude and longitude lines.

Success Factors for Online Food Retail Logistics

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Purpose: While e-commerce in general has been growing rapidly for years, food e-commerce is lagging behind in Germany. The common approach of using traditional logistics systems and fulfilment concepts does not lead to long-term success. Considering this problem, success factors are needed as a guideline for developing effective fulfilment concepts for online food supply chains in the future.

Methodology: Based on industry performance indexes as well as an extensive search via the google search engine about 20 case studies on online food fulfilment concepts are identified. The case studies are evaluated using a performance measurement concept. Information from the highest performing companies is used to deduct success factors for good practices in online food fulfilment.

Findings: Three main groups of suppliers were identified: Full-range provider, niche suppliers (selective assortment with a specific focus) and supplier of cooking boxes. The fulfilment concept of online grocery retailers is described using thirteen categories. Three success factors could be derived: Reduction of complexity, focus on online fulfilment, and offering a unique product-service mix.

Originality: This paper contributes to the research areas of e-commerce and of logistics and supply chain management, especially online food supply chains. In this area only little original scientific research exists. Also, the approach of using secondary case studies is relatively new in this area of research and has yielded interesting results.

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1 Introduction

E-commerce continues to grow: Since 1999, turnover in German business-to-consumer (B2C) e-commerce has increased more than fifty-fold from 1.1 billion euros to 53.6 billion euros. At the same time, annual growth rates are still under 10 percent. (Statista 2019a) In most industries, the sale of goods via the Internet now accounts for a significant share. The online share in the “Fashion & Accessories” segment for instance is around 25 percent, just as for “Consumer Electronics”. In the “Home & Living” segment, online sales account for around 10 percent of the total market. (IFH Institut für Handelsforschung GmbH 2017) Only the sale of food via the Internet seems to be falling sharply behind.

Online food retail in Germany continues to stagnate at under one percent of the total food market share (share of slightly over 1 billion euros online versus a total market share of 123.1 billion euros (Statista 2019b)). This is in spite of high growth rates in recent years of over 15 percent (Statista, 2019c) and despite various studies repeatedly forecasting online food retail as imminent. A study by EY from 2014, for instance, predicts an online share of 10 percent for 2020 (Wagner and Wiehenbrauk 2014), while a 2010 study by OC&C Strategy Consultants estimated an online share of 1-2 percent or 2-3 billion euros by 2015 (OC&C Strategy Consultants 2010).

Online food retail is therefore regarded as the “last bastion” of B2C e-commerce. Logistics and supply chain management have already been identified as particularly critical for e-commerce with regard to groceries. In contrast to other industries, the handling of perishable goods (maintenance of the cold chain), the use of reusable packaging (e.g. returnable bottles and

cooling equipment) and a precise delivery (the customer must be at home to receive the goods) are particularly demanding.

The aim of this paper is therefore to derive success factors for good practices in online food logistics and supply chain management. We deliberately use the term good practices instead of best practices to emphasize that, firstly, our research is not a comprehensive benchmark and that, secondly, the online food retail market in Germany is not settled and still undergoing frequent changes like founding of new companies, mergers of existing companies and bankruptcies.

Following this introduction, the theoretical background for the paper is presented. This includes a definition of fulfilment, a description of the online food retail industry as well as a brief history of German food e-commerce. Next we present our research design, which comprises the data collection and analysis of the case studies. Subsequently, we list our research findings, which include a description of the German e-commerce food market, the logistics and supply chain management concepts currently used in this market and the good practices that could be derived from the success factors. The paper finishes with a short conclusion and the limitations of our research.

2 Theoretical background

Logistics and supply chain management are inherent parts of the business model when selling goods via the Internet, since the sold items need to be delivered to the customer. (Mahlke 2001) This process is also referred to as e-logistics or e-fulfilment. It includes the entirety of all processes and functions, which must be performed to deliver the order and the accompanying information to the customer and also to pick it up from the customer again if necessary. This includes payment, storage, transport and delivery, after-sales services, returns management and waste disposal. (Merz 2002)

In order to analyze the online food retail market and its players, it is first necessary to give a definition of online food retail to be able to make a distinction which companies to include and which to exclude as possible case studies. In this paper, we only consider companies that deliver food in a narrower sense of the word, i.e. goods for eating or drinking, which are part of the daily needs of life, to end customers. Companies that distribute ready-to-eat meals are excluded. This means that no catering services or online delivery services such as Deliveroo or Delivery Hero (Foodora) are included, since they deliver prepared meals from restaurants.

Distributing food via a distance selling channel is not a new phenomenon in the German food market. Catalogue mail order companies such as Otto or Neckermann always had food in their catalogues, even though these were usually longer-lasting products such as wine, chocolate and canned sausage. The first attempts to sell supermarket products over the Internet were made in Germany around the turn of the millennium, by Tegut and Otto among others. However, these projects were soon stopped again, as

the time for online food retail seemed to not yet have come. (Seidel et al. 2015)

About ten years later, start-ups and established food retailers began to push into the online food market. Froodies, allyouneedfresh.de, supermarkt.de and food.de were founded. Rewe and Kaisers-Tengelmann (Bringmeister) started their own delivery services. This development can be explained by the increasing establishment of online trade in other industries as well as the spread of online food retail at that time in other European countries such as France and Great Britain (Seidel et al. 2015).

In 2010, the online food retail in Germany had a turnover of 0.15 billion euros, which corresponded to about 0.1 percent of total turnover for food in Germany and 1.2 percent of online sales. (Nielsen 2011) The announcement to plan the entry into the food market of Amazon in 2013 and later with the actual start of the services Amazon Prime Now and Amazon Fresh in 2017 led to an increase in the awareness of online food retail in Germany. However, the forecasts for growth and development of the market to date have mostly not materialized, which is why the market is still regarded as a manageable niche in which mainly pilot projects are being tested and small suppliers are operating. Figure 1 summarizes this development.

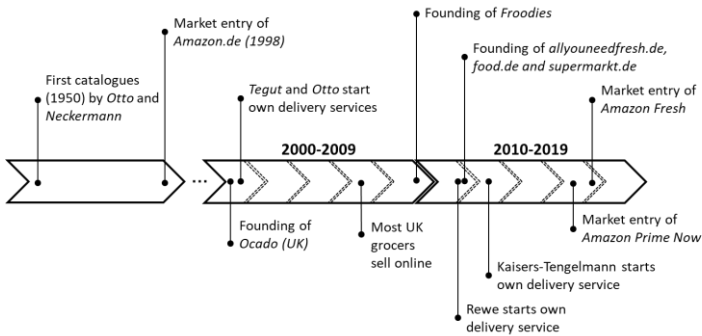


Figure 1: Historical development of online food retail in Germany

At the same time, the food retail market overall is regarded as a stagnating market. (Nitsche, Figiel 2016) Meanwhile, attractive growth potential is emerging in online food retailing, rendering this market seemingly very valuable. In addition, most experts assume that online food retail will become accepted in Germany sooner or later, as it did for other product categories. (Seitz 2013) Our aim is thus to identify success factors which allow companies to profitably operate in the food online retail in the German market and suggest good practices for logistics and supply chain management.

3 Research design

The data collection of this study is based on a secondary multiple case study according to the example of Herden and Bunzel. (Herden and Bunzel 2018) Based on selected case studies, success factors of the business model from a logistics perspective were derived by using qualitative content analysis.

3.1 Data Collection

The first step in this study was to identify the top-selling online food retailers in the German market. The results of a study conducted by the EHI Retail Institute and Statista on the 20 top-selling online shops in the food segment in Germany in 2016 were used for this purpose. (Statista 2018) In addition, a search string was used to search for reports on online food retailers who are no longer on the market in order to be able to compare the different business models. Here, the 10 most frequently named companies were included as case study objects. Thus, 30 case studies were selected for data collection.

As the research question requires a concrete description of the business models used by the companies concerned, it was not possible to rely on scientific databases. Therefore, the approach used by Herden and Bunzel was applied. (Herden and Bunzel 2018) Key words for an online search were selected based on the principles described above. The search was conducted in German, since we are analyzing the German market. Synonyms for logistics (Logistik, Distribution, Lieferdienst, Lieferservice) and the respective company name were used. The google news search engine was

used as the search engine. Personalized search results were deactivated. This search was conducted in December 2018. All articles available at that time were included in the analysis. Cases for which less than five articles were available were excluded from further investigation. Hence, 23 company cases formed the basis for the data analysis. Furthermore, the websites of all remaining companies were examined for analysis-relevant information. According to the snowball sampling method, studies mentioned in the articles found were also included in the data analysis.

3.2 Data Analysis

An adapted form of the EFRFQ model by Aramyan et al. was used for the data analysis. This performance measurement model has been developed specifically for evaluation in the context of food supply chains. (Aramyan et al. 2007) The proposed assessment model provides four categories within which KPIs are evaluated. For the present study, appropriate indicators were deduced based on the above described factors for the online food market.

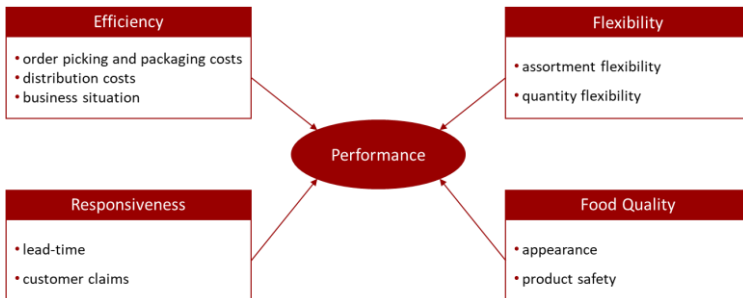


Figure 2: Adapted EFRFQ model to measure the performance of online food retailers.

The four categories are efficiency, flexibility, responsiveness and food quality. A classic Likert scale from -2 to 2 was used for the evaluation. The indices used were given the following descriptions:

-2: several major inefficiencies

-1: minor inefficiencies in all aspects or major inefficiencies in some aspects

0: several minor inefficiencies, or one major weakness in one aspect

1: efficient with few inefficiencies

2: Particularly efficient, competitive advantage over other approaches

In the efficiency category, KPIs order picking and packaging costs, distribution costs and business situation were evaluated. For the KPI order picking and packaging costs, the available information was evaluated with regard to aspects of the order picking system used, weight and volume of handled products, diversity of the product spectrum and necessary temperature zones. For the assessment of the distribution costs, the aspects distribution services (internal or external), delivery area and volumes as well as delivery costs for the customer were evaluated. With regard to the business situation, depending on the information available, the following aspects were

used for the valuation: market value, information on financing rounds and investors, as well as the current business situation and customer base.

Within the flexibility category, both the assortment flexibility and quantity flexibility KPIs were evaluated. With regard to assortment flexibility, the aspects of assortment range and alternative variety for individual products were examined. Concerning quantity flexibility, the aspects of minimum order value or minimum order quantity, maximum order weight and quantity limits were evaluated.

Within the responsiveness category, the lead-time and customer claims KPIs were considered. Concerning lead-time, the following information was taken into account: time interval between order and delivery, possibilities of limiting the delivery windows including the day and the duration of the time window. With regard to customer claims, the aspects of contact channels on the company's homepage and statements on customer claims in the reports examined were included in the evaluation.

Within the food quality category, the appearance and product safety KPIs were evaluated. The appearance aspect was evaluated in terms of how customers perceive the external quality of the food delivered. With regard to product safety, statements were evaluated within the articles that relate to maintaining the cold chain and securing the goods against contamination during transport.

Each KPI and category was assigned a rating factor in order to determine a valuation factor after the evaluation.

The authors carried out the evaluation of the case companies independently of each other. The evaluation schemes were then compared and differences were discussed until the authors achieved a uniform Likert

score. The evaluation factors for the company cases were then determined from this assessment. In order to check the robustness of the resulting evaluation ranking, a sensitivity analysis was conducted. The sensitivity analysis showed that the five best-rated companies do not change in the event of a major change in the weighting factors. These case studies were selected as good practice for deriving success factors. For this purpose, all available information from the data collection was again intensively scanned.

4 Review results

The analysis of the 23 case studies gave a relatively comprehensive picture of the German online food retail market. It is characterized by a variety of vendors, which can be distinguished into three major groups:

(1) The first group summarizes companies offering a full range of products, which includes frozen food (e.g. ice cream), chilled food (e.g. yoghurt), fruits and vegetables, packaged food articles not needing special treatment with regards to temperature or handling (e.g. canned goods), beverages packed in crates (e.g. beer) as well as non-food articles typically found in a supermarket (e.g. toiletries).

(2) Niche providers, which focus on a specific kind of product or product range and thus only offer an excerpt of a typical supermarket assortment, are the second group. The variety of niche providers is great, so that a further division into subcategories like delicatessen vendors, beverage vendors, vendors of health and superfoods etc. could be attempted with more case studies in the future. However, it became obvious during the research that the biggest subdivision in this category are companies offering food and non-food articles with a long shelf life, which are easy to store and distribute.

(3) The third group includes vendors of cooking boxes or meal kits. Modelled on the Swedish company Middagsfrid, vendors of cooking boxes sell food that is pre-packaged according to the ingredients for a specific recipe. Customers can order the box and cook dinner without having to worry about the necessary amounts. In 2010, seven such companies started in Germany of which three are still in the market in 2020: HelloFresh, Marley

Spoon and Kochhaus, although the latter had to file for insolvency, suggesting that this business model is a niche in which only a few players can operate profitably.

The analysis of the case studies further enabled us to gain a deep understanding of the current business model and fulfilment concepts. In order to aggregate the information, we used the morphological box shown in figure 3. We broke the fulfilment concepts down into several categories shown in the first column and summarized our findings into groups representing the case studies. For example, there are three basic types of delivery cost models: (1) a monthly or yearly flat rate, (2) a fixed delivery fee, and (3) a dynamic delivery fee, which can depend on factors such as delivery date and time window or minimum order value. The minimum order value is typically around 40-50€ or 50-100€ for pricier goods like wine. However, there are some vendors charging less than 40€ or more than 100€, resulting in five different characteristics for this category.

The morphological box can be used to compare the fulfilment concepts of the different online food retailers. From this, we were able to conclude, firstly, that for companies offering a full range of products, there does not appear to be a typical fulfilment concept yet, i.e. there is no typical path taken through the morphological box. This supports our motivation for this paper by suggesting that online food retailing especially for a full range of products is still new and the market quite immature, so that no successful concept has yet emerged and the deduction of success factors would be beneficial to implementing a profitable fulfilment concept. Secondly, the fulfilment concept of companies offering food and non-food articles with a long shelf life is quite similar for most companies. The distribution is usually

outsourced to a logistics service provider (LSP) like DHL or Hermes, the orders are processed in a multi-channel distribution center and can be delivered nationwide to a home address or pick-up station. Due to the long shelf life delivery usually takes two to three days and there is a minimum order value of 40-50€ with no extra surcharges.

Type of provider	Start-up		Online retailer		Food retailer	
Cooperation partner	Food retailer	Food wholesaler		Small shops		None
Type of distribution	Outsourcing to LSP (DHL, Hermes, DPD or others)			Own delivery service		
Distribution center	Own existing DC (multi-channel)		Own DC "dark store" (only online food retail)		Bricks-and-mortar store	
Depth of product range	≤ Ø supermarket (10.000 SKU)	2-3x Ø supermarket (20-30.000 SKU)		5-10x Ø supermarket (50-100.000 SKU)		> 100.000 SKU
Delivery area	Nationwide		Many regions, but not nationwide		Some cities and surrounding area (3-10)	
Delivery location	Home (address)		Click-and-collect (store)		Pick-up station or store	
Delivery options	Same-day	Day with <1h window	Day with 1-2h window	Day with half-day window	Day	2-3 days
Delivery cost model	Flatrate		Fixed delivery fee		Dynamic delivery fee	
Min. order value	No min. order value		Min. order value < 40 €		Min. order value 40-50 €	
Free shipping possible?	No	Min. order value < 40 €	Min. order value 40-50 €	Min. order value 50-100 €	Min. order value >100 €	
Surcharges	None		Beverage crates		Frozen goods	
Cold chain	Active cooling (delivery vehicle)		Passive cooling (packaging)		None	

Figure 3: Morphological box of fulfilment concepts

By means of an adapted form of the EFRFQ model we identified the top five online food retailers in our 23 case studies. Three of the top five companies are niche providers. The first company offers mainly organic müsli (granola) and cereal mixtures with a mass customization production concept. The product assortment was diversified to include juices, teas, coffee and milk

alternatives. The company also operates a smaller number of brick-and-mortar stores in bigger cities. The second company is a leading supplier of high-quality wines and champagnes, which also sells other alcoholic beverages online. The third niche company is a large direct distributor of frozen food and ice cream. Founded in the 1960s, it has a long history in the distance selling market providing catalogues to the customers and taking orders by telephone and fax before the onset of the Internet. The fourth company in the top five online food retailers offers cooking boxes in eleven different countries. In Germany, three different boxes are offered for two to four persons with three to five meals a week. The last company in the top five offers the product range of a typical supermarket except for beverages in crates. It is relatively new to the German market. So far, the service is offered - in contrast to other online supermarkets - only in densely populated regions of western Germany, but not in major cities like Berlin, Hamburg or Munich let alone in more rural areas.

With regard to the online food retail market, logistics and supply chain management (often also referred to as order fulfilment or delivery in the literature) is frequently listed as a key success factor to building a competitive advantage. (Keh and Shieh 2001; Feindt et al. 2002; Duffy and Dale 2002; Laosethakul et al. 2006) However, there are rarely any details given on how to design the operations or what to focus on. In the following, we want to focus on three success factor that we were able to identify from the evaluation of the case studies:

- (1) All of the companies in our top 5 reduce the complexity of the sale and delivery of foods via the online channel by a specific measure. Some focus on a specific product range (müsli, wine and frozen goods), which reduces

the effort for handling the orders, since there is no need for different temperature zones. The products are similar with regard to their weight, volume and robustness, which also facilitates the packaging. The company selling cooking boxes reduces complexity by offering a standardized packaging and a limited number of different meals, which can be ordered each week. The online supermarket uses fixed delivery routes and time slots and has been compared to the principle formerly used by milkmen. This is less flexible for the customer, but greatly reduces the complexity in creating delivery routes and calculating cost for delivery.

(2) Four of the five companies in our top 5 use the Internet as their main sales channel. The vendor of wines and other alcoholic beverages is the exception. This leads us to conclude that a focus on online fulfilment and the expectations of online customers is another success factor. This might also explain why traditional supermarkets, which operate the food delivery service as a side business, are not performing as well. This point is further corroborated by the case of the müsli vendor. The company started to open numerous stores in different German cities. However, most of them were eventually closed again after a few years. To operate a multi- or omni-channel business model in the food retail market appears to be even more difficult than a pure-player approach.

(3) All five vendors pursue a competitive advantage through differentiation, offering their customers a unique product-service mix creating a customer value specific to their company offer. The top performing company offers only organic müsli products. Customers are able to customize their individual product out of billions of possibilities. This differentiates the

company from competitors and offers them higher profit margins. Similarly, the distributor of frozen food and ice cream offers a very wide assortment with special products which cannot be found at supermarkets. They are also able to charge higher prices for this differentiated offer.

5 Implications

In the following, we draw implications for practitioners and for academics given the results of our research and the methodology employed.

5.1 Implications for practice

Competition in the online food retail market is fierce. Many start-ups and other players had to give up their business after a few years. Of the remaining companies many do not generate any profit. Thus, success factors to operate profitably in the market are needed. Our research yielded three success factors for online food retailers operating in the German market, which can be used to evaluate the business model currently used or if planning to enter into the market.

5.2 Implications for academics

Our findings contribute to the research areas of e-commerce and of logistics and supply chain management. The approach of using secondary case studies has yielded interesting results and is easily applicable. The adapted EFRFQ model by Aramyan et al. can be used in the future to analyze other cases of online food retailers. A further adoption to measure the performance for other online vendors could be an option for future research projects. The morphological box derived from the case studies systematizes the different fulfilment concepts. It can be used as a framework to analyze branches of online retail in forthcoming research endeavors.

6 Conclusion

In this paper, we investigate the German online food retail market by examining 23 secondary case studies. The market is characterized by three different types of retailers with regard to their product portfolio:

- (1) vendors offering a full supermarket assortment,
- (2) niche providers offering a selective range of product with a specific focus (e.g. product type or luxury segment) and
- (3) companies selling cooking boxes.

Logistics and supply chain management are one of the most important factors of an online business model. The fulfilment concept of online food retailers can be described by thirteen categories, e.g. namely the type of distribution, the delivery area or the delivery cost model. Three success factors could be deduced from the top five case studies: (1) reduction of complexity, (2) focus on online fulfilment and (3) using differentiation to offer a unique product-service mix.

7 Limitations

The research results presented were collected using a secondary case study analysis based on media reports on the selected case companies that were publicly available at the time of the survey. For this reason, it was not possible to collect as much information as required for all case study companies, so that some had to be excluded from the analysis. For further investigation, additional sources of information should be used to validate the results obtained.

The evaluation using the presented evaluation model was carried out by two scientists with experience in logistics research. For further research, it would be reasonable to have the similar procedure carried out by practitioners, since their practical experience could allow a further perspective to influence the evaluation.

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