A MULTI-METHOD STUDY OF CONSUMER BEHAVIOR – TOWARDS A BETTER UNDERSTANDING OF THE CONSUMER'S PERSPECTIVE ON ONLINE GROCERY SHOPPING

Von der Fakultät für Wirtschaftswissenschaften der
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vorgelegt von

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Preface

Summary

Food is the basis of our existence. It is therefore not surprising that the food industry is the largest trading sector worldwide and is still continuously growing. However, the proportion of groceries purchased online is still rather low. Only 2.4% of the revenue in the worldwide grocery industry is currently generated via online sales. This is especially remarkable as e-commerce is well established in many other industries such as fashion, entertainment, and banking. Moreover, new and innovative ways of connecting people to groceries will be needed as societies undergo demographic shifts. Younger people tend to want to make purchases over the internet and have the offline purchase more as an experience than a necessity, while older people need to secure their grocery supply; even if they enjoy shopping for groceries offline, they still may want barrier-free services that deliver groceries to them for those times that they may not be able to transport them by themselves.

Because of its social and economic relevance, the online grocery industry is a highly interesting field of research. Many researchers have worked in this area in recent years. Much of this research was undertaken using online customer and retailer data in specific countries such as the US or UK. Research on Germany-specific developments is, however, rare.

The objective of this dissertation is to expand and enhance existing research on the online grocery industry. I strive to gain a holistic understanding of German consumers' behavioral intentions and subsequently to derive information that can support the development and re-design of online grocery business models. From a methodological perspective, I employ an interdisciplinary mixed-methods approach combining quantitative and qualitative research data. The diverse research methods and settings address various related research questions that are approached with six distinct studies in three articles.

In the first paper, I develop a research framework that comprises the key drives of German consumers' behavioral intention to use online grocery shopping. I use Technology Acceptance Model 3 predictors and combine them with external variables that have been explored in recent online grocery shopping literature. I add factors that I extract from three qualitative customer workshops. I subsequently evaluate the framework with data from 213 online survey participants. For the analysis of the data, I deploy a structural equation modeling approach: more precisely, the partial least square methodology. The framework describes 41% of the behavioral intention to use online grocery shopping for consumers with online grocery shopping experience and 43.4% for consumers without online grocery shopping experience. These values imply additional factors

extending beyond the developed framework. From this result, I derive the need for further investigation of online grocery shopping adoption behavior.

The second paper addresses this need by exploring customer experiences through two ethnographic studies using research diaries. By analyzing the data inductively and deductively, I find that consumers' reluctance to embrace online grocery business models is caused by several factors, most importantly the insufficient usability of the technical applications as well as limited product assortments and delivery coverage throughout Germany. I find that even if users are able to handle the online interfaces, the existing limitations make it difficult for consumers to integrate online grocery shopping into their daily lives. I further point out that current online grocery business models leave no room for spontaneity, for playfulness, for serendipity, for the delight of making happy, unplanned discoveries. The coronavirus crisis appeared during my studies, and I find that this situation has been both a positive and negative amplifier for the adoption of online grocery shopping.

In the third paper, I change perspective and investigate the structures of 40 current operating online grocery business models. I extract 60 online grocery business model patterns concerning regular business activity and 19 crisis-driven patterns that account for the shift in business models caused by the SARS-CoV-2 pandemic. To structure the extracted patterns, I develop a taxonomy of online grocery business model patterns and transfer it into a morphological box scheme. To help others to put this information into practice, I subsequently propose a proceeding in seven steps. Finally, to connect the results of the third paper with the results of the first and second paper, I compare unfulfilled customer needs to the extracted business model patterns and highlight the business model dimensions that are in high demand for adjustments to reach business model success.

In conclusion, my dissertation complements to the literature on online grocery shopping behavior and online grocery business models, while it simultaneously contributes to the understanding of consumer behavioral intentions, technology acceptance, and the lack of business model success in Germany. By looking at the customer ecosystem as well as the individual customer level, I confirm the importance of customer-centered business models. Simultaneously, I highlight the need for further research in this regard. Through analyzing customer behavior during the German lockdown and the corresponding shift of online grocery shopping business models, I furthermore contribute to the research on COVID-19-driven behavioral mechanisms.

Zusammenfassung

Lebensmittel sind eine Grundlage unseres Lebens. Es ist daher wenig überraschend, dass die Lebensmittelindustrie den weltweit größten Handelssektor darstellt, der zudem kontinuierlich wächst. Dennoch ist der Anteil an Lebensmitteln, die über das Internet erworben werden, gegenwärtig sehr gering. Gerade einmal 2,4% der weltweiten Lebensmittelverkäufe werden aktuell über Online-Verkaufskanäle umgesetzt. Dies ist deshalb erstaunlich, da E-Commerce in vielen anderen Industrien wie Mode, Unterhaltung oder dem Bankenwesen bereits vollständig etabliert ist. Darüber hinaus werden durch die demografische Entwicklung westlicher Staaten neue Formen der barrierefreien Lebensmittelversorgung in Zukunft immer größere Bedeutung gewinnen.

Der Online-Lebensmittelhandel ist wegen seiner sozialen und wirtschaftlichen Relevanz ein hoch interessanter Forschungsbereich, dem sich in den vergangenen Jahren viele international forschende Wissenschaftler*innen gewidmet haben. Ein Großteil der Forschungsarbeiten beschäftigt sich mit landesspezifischen Daten von Online-Konsument*innen und Händler*innen, beispielsweise aus den USA oder dem Vereinigten Königreich. Das spezifische Verhalten von deutschen Online-Kund*innen und diesbezüglichen Geschäftsmodellen wird jedoch nur vereinzelt adressiert.

Die Zielsetzung dieser Dissertation ist die Erweiterung des bestehenden Forschungsstands zum Online-Lebensmittelhandel in Deutschland. Hierfür wird ein ganzheitliches Verständnis der Strukturen der Konsument*innenakzeptanz, der Nutzungsintention sowie der individuell beeinflussenden situativen Faktoren angestrebt. Diese Erkenntnisse fließen in Entscheidungshilfen zur Gestaltung von erfolgreichen Geschäftsmodellen ein. Im Rahmen von drei wissenschaftlichen Aufsätzen kommt ein interdisziplinärer Methodenmix zum Einsatz, der quantitative und qualitative Forschungsinstrumente umfasst.

Der erste Aufsatz entwickelt ein Forschungsgerüst, das die Kerntreiber der *Nutzungsabsicht* des Online-Lebensmitteleinkaufs deutscher Kund*innen betrachtet. Dazu werden Prädiktoren des Technologie-Akzeptanz-Modells 3 genutzt und mit externen Variablen kombiniert. Darüber hinaus werden Faktoren ergänzt, die im Rahmen von qualitativen Konsument*innenworkshops erarbeitet wurden. Dieses Forschungsgerüst wird mit Daten aus einer Online-Umfrage mit 213 Teilnehmer*innen evaluiert. Zur Datenanalyse wird die Methode der partiellen Regression der kleinsten Quadrate aus der Strukturgleichungsmodellierung genutzt. Zusammenfassend erklärt das Forschungsgerüst 41% der Variable *Nutzungsabsicht* des Lebensmitteleinkaufs für Kund*innen, die bereits Erfahrungen in diesem Bereich gemacht haben, und 43,4% für

Kund*innen, die noch keine Erfahrungen im Online-Lebensmitteleinkauf gesammelt haben. Die Ergebnisse implizieren die Existenz zusätzlicher, über das entwickelte Forschungsgerüst hinausgehender Faktoren.

Der zweite Aufsatz untersucht deshalb unter Einsatz von Forschungstagebüchern die Kund*innenerfahrungen während des Online-Lebensmitteleinkaufs. Durch induktive sowie deduktive Analyse der Daten wird herausgearbeitet, dass sich die verhaltene Nutzung von Online-Lebensmittel-Geschäften in einer unzureichenden technischen Nutzbarkeit der angebotenen Anwendungen sowie in einer nicht hinreichenden Lieferabdeckung begründet. Durch unvollständige Produktsortimente, unzureichende Lieferverlässlichkeit und -flexibilität wird dann die Integration von Online-Lebensmitteleinkäufen in das tägliche Leben zusätzlich erschwert. Außerdem zeigt sich, dass derzeitige Geschäftsmodelle die Spontanität der Kunden während des Einkaufs nicht ansprechen. Die sich im Laufe der Studie entwickelnde Corona-Krise wird durch die Studienergebnisse als positiver wie auch negativer Einfluss auf die Nutzung von Online-Lebensmittel-Geschäftsmodellen identifiziert.

Der dritte Aufsatz wechselt die Betrachtungsperspektive und untersucht systematisch die Struktur von 40 am Markt operierenden Online-Lebensmittel-Geschäftsmodellen. Aus dieser Analyse werden 60 reguläre und 19 krisengetriebene Online-Lebensmittel-Geschäftsmodellmuster extrahiert. Die 19 krisengetriebenen Muster beschreiben die Reaktionen der Geschäftsmodelle auf die SARS-COV-2-Pandemie. Zur Strukturierung der extrahierten Muster wird eine Taxonomie entwickelt und in das Schema einer morphologischen Box überführt. Für die praktische Dissemination wird ein Vorgehen in sieben Schritten vorgeschlagen. Um die Ergebnisse des dritten Aufsatzes mit denen der beiden anderen Aufsätze zusammenzuführen, werden die extrahierten unerfüllten Kund*innenbedürfnisse mit den Geschäftsmodellmustern in Beziehung gesetzt. Anschließend werden diejenigen Geschäftsmodelldimensionen hervorgehoben, die einen hohen Anpassungsbedarf zur Realisierung eines erfolgreichen Geschäftsmodells aufweisen.

Insgesamt ergänzt diese Dissertation die Literatur über Online-Lebensmittel Einkaufsverhalten und Geschäftsmodelle und trägt zu einem Verständnis von Nutzungsabsicht, Technologieakzeptanz sowie dem mangelnden Erfolg von Online-Lebensmittel-Geschäftsmodellen bei. Nach Untersuchung des Konsument*innenverhaltens zeigt sich die Bedeutung kundenzentrierter Geschäftsmodelle. Durch die Analyse des durch COVID-19 hervorgerufenen veränderten Einkaufsverhaltens und erfolgten Anpassungen der Geschäftsmodelle, trägt diese Dissertation zudem zum Forschungsfeld der durch die COVID-19 Krise getriebenen Verhaltensmechanismen bei.

Thesis Structure and Status of Independent Research Papers

My dissertation is structured in two parts. In the first part, the Synopsis, I present the motivation and the need to conduct research in the field of online grocery business models, and give a short overview of the dissertation's storyline and structure. Next, I discuss recent research on online grocery shopping as well as the purpose of this dissertation and introduce the research questions. I also provide an overview of the three independent research papers and their publishing status.

The second part of this dissertation comprises the three independent research papers. Previous versions of the first and the second paper were supervised by Dr. Frank Hees, Dr. Daniela Janssen, and Dr. Rene Vossen and published under their co-authorship in the proceedings of International Society for Professional Innovation Management (ISPIM) conferences in 2019 and 2020. The versions of these papers included in this dissertation have been written entirely by the doctoral candidate. All three papers include motivation, relevant theories, methods, proceedings, results, and discussion. In the following, I provide an overview of my three research papers including information on each paper's publication status.

Paper 1: Antecedents of Online Grocery Shopping Acceptance in Germany: An Integrated Research Model

Selected previous results have been published as:

- Güsken, S.R.; Janssen, D., Vossen, R.; Hees, F. (2019): *smart emma – Ein Forschungsprojekt zum Aufbau eines regionalen Onlinemarktplatzes für Lebensmitteleinzelhändler*, in Neiberger, C.; Pez, P., Einzelhandel und Stadtverkehr: Neue Entwicklungstendenzen durch Digitalisierung und Stadtgestaltung, Würzburg, Würzburg University Press, 139-156.

A previous version has been published in the proceedings of the ISPIM Connects Ottawa conference, Ottawa, Canada, 7-10 April 2019:

- Güsken, S.R.; Janssen, D.; Hees, F. (2019): *Online Grocery Platforms – Understanding Consumer Acceptance*, in Conference Proceedings of ISPIM Connects Ottawa, Ottawa, Canada on 7-10 April 2019, 1-17.

Moreover, this paper was presented at:

- Annual Meeting of the VGDH-Working Groups *Verkehr* (Traffic) *und Geographische Handelsforschung* (Geographical Trade Research) 2018, Lüneburg, Germany.
- ISPIM Connects Ottawa, Canada 7-10 April 2019.
- Scientific Colloquium of the Chair of Information Management in Mechanical Engineering April 2018 & April 2020, RWTH Aachen University, Germany.

Paper 2: "1000 clicks and it still didn't go as I'd hoped" – Positive and Negative Experiences in E-Grocery Shopping

Previous versions have been published as:

- Güsken, S.R.; Janssen, D.; Vossen, R., Hees, F. (2019): Emerging Online Grocery Business Models – Exploring Consumer Behavioural Patterns, in Conference Proceedings of the XXX ISPIM Innovation Conference, Florence, Italy on 16.-19. June 2019, 1-14.
- Güsken, S.R. (2020): *"E-mails are Annoying"– Con- and Destructive Shopping Experiences for E-Businesses*, in Conference Proceedings of the XXXI ISPIM Innovation Conference, Virtual Event, 7.-10. June 2020, 1-13.

Moreover, the paper was presented at:

- ISPIM Innovation Conference, June 2019, Florence, Italy.
- Scientific Colloquium of the Chair of Information Management in Mechanical Engineering April 2018 & April 2020, RWTH Aachen University, Germany.
- ISPIM Innovation Conference, June 2020, Virtual Event.

Paper 3: Business Model Innovation in the Online Grocery Sector – Extracting and Structuring Business Model Patterns

This paper was presented at:

- Scientific Colloquium of the Chair of Information Management in Mechanical Engineering April 2020, RWTH Aachen University, Germany.

This paper was accepted for presentation at:

- INFORMS Annual Meeting, November 2020, Virtual Event.

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List of Abbreviations

3D	Three-dimensional
ANOVA	Analysis of Variance
AR	Augmented Reality
AVE	Average Variance Extracted
B2B	Business-to-Business
BI	Behavioral Intention
BM	Business Model
BMI	Business Model Innovation
BMP	Business Model Patterns
CA	Customer Acquisition
CANX	Computer Anxiety
CB-SEM	Covariance Based Structural Equation Modelling
COVID-19	Coronavirus Disease 2019
CPLAY	Computer Playfulness
CR	Composite Reliability
CS	Customer Segments
CSE	Computer Self-Efficacy
D	Dimension
DI	Delivery Infrastructure
DS	Differentiation Strategy
ENJ	Enjoyment
eTailQ	E-Shopping Quality
EXP	Experience
FMCG	Fast Moving Consumer Goods
H	Hypothesis
HTMT	Heterotrait-Monotrait
IMG	Image
IT	Information Technology
OFD	Online Food Delivery
OGBMP	Online Grocery Business Model Patterns
OGS	Online Grocery Shopping
PEC	Perceptions of External Control
PEU	Perceived Ease of Use
PF	Product Freshness
PI	Product Involvement
PL	Private Label
PLS	Partial Least Squares

PM	Payment Methods
PQ	Product Quality
PU	Perceived Usefulness
Q	Question
R^2	Coefficient of Determination
R^2 adjusted	Adjusted Coefficient of Determination
REL	Job Relevance
RES	Result Demonstrability
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
SEM	Structural Equation Modelling
SN	Subjective Norm
TAM	Technology Acceptance Model
TF	Technical Functionalities
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
TRU	Trust
VB-SEM	Variance based Structural Equation Modelling
VIF	Variance Inflation Factor

I Synopsis

1 Introduction

In March 2020, the outbreak of SARS-CoV-2 changed the world radically. While the crisis has had negative impacts on many companies, it has had positive effects on others. Companies whose business models enable and promote physical distancing are among the beneficiaries of the crisis. One of these models is online grocery shopping (Rumscheidt, 2020). However, the crisis has required companies to develop new strategies for the shift in customer behavior as quickly as possible and, in particular, to adapt their business model so that it can carry them through the crisis (Seetharaman, 2020). Changes in customer habits and behavior and shifts in corporate strategy are of great interest to researchers, especially when they are driven by crises and happen extremely rapidly. The observation and investigation of such changes help to develop an understanding of the basic mechanisms of customer behavior changes and the corresponding strategy and business model shifts (Knowles et al., 2020). While this understanding does not help to anticipate such crises, it contributes to understanding possible customer behavioral patterns and strategy changes in business models and subsequently enables companies and researchers to apply them to other crises (Coibion et al., 2020).

Not only because of SARS-CoV-2 pandemic but also because of digitalization, the online grocery market is a swiftly-changing, emerging market with high growth potential. The food industry is one of the strongest sectors in Germany in terms of turnover (Bundesministerium für Wirtschaft und Energie, 2020; Verband der Chemischen Industrie e.V., 2019, p. 46; Vogel, 2018). With a turnover of 209.8 billion euros, the grocery retailing sector is the largest sales channel for the food industry in the country (Bundesvereinigung der Deutschen Ernährungsindustrie, 2020, p. 18). These facts make online grocery retailing in Germany a highly attractive market. While sectors such as electronics, fashion, literature, press, entertainment, and banking have been transformed entirely by digitalization, the grocery retailing is only sporadically employing online channels and is still concentrated on stationary offline retail. When one considers the growing popularity of online grocery shopping, especially in the Asia-Pacific region, Latin and North America, but also in Europe (IGD, 2019; Ingram, 2020; PwC, 2019), the question arises whether a similar transformation of consumer behavior is coming to Germany.

International markets for online grocery shopping are rapidly developing. This can be seen especially in the UK, the Europe-wide leader, with a 6.9% online grocery sales share in 2016,[1] and an expected sales value of US $28 billion in 2020 (IGD and Profitero, 2016; Statista, 2019a). South Korea is the current world leader in terms of online grocery penetration, with an online

[1] 6.9% of all grocery revenue in the UK come from online sales.

grocery sales share of 16.6% in 2016 and US $13 billion predicted sales value for 2020, while China is the worldwide leader in sales, with US $178 billion in 2020 (IGD and Profitero, 2016; Statista, 2019a). Given the attractiveness of the economic environment as well as the international market developments, it is very surprising that the revenue from groceries sold online in Germany is only 1.4% of the total (Rumscheidt, 2020, p. 64).

In addition, there is a steadily increasing number of internet users. 90% of the German population over 10 years of age currently accesses the internet (Statistisches Bundesamt, 2019a). 89% of those users use it to search for information, products, and services (Statistisches Bundesamt, 2019b) and 70% also use the internet to make purchases online (Statistisches Bundesamt, 2020). Consumers buy offline and online, and increasingly demand sales channels through their personal computers or mobile devices on top of the traditional stationary retail sales channels. They shop at the time and through the distribution channel that best suits their temporary needs (Porter, 2001; The Nielsen Company, 2015). Despite all these developments, the breakthrough for grocery online shopping in Germany is still pending. However, numerous potential opportunities for innovation emerge in the German online grocery sector when one considers the digital changes in non-food industries and the digital transformation of grocery shopping behavior in international markets as signposts for future developments.

Determining factors for the success of online grocery business models have received a lot of attention in recent research (Martín et al., 2019). Most of these studies are quantitative, using consumer purchasing data or customer surveys. The majority are also country-specific, mainly using data from the US or the UK (Anesbury et al., 2016; Driediger and Bhatiasevi, 2019). The reasons for the lack of success in Germany has only rarely been addressed (Fedoseeva et al., 2017; Pechtl, 2003; Piroth et al., 2020; Seidel et al., 2016).

To successfully manage and shape the digital change of grocery retailing, it is necessary to research and identify the reasons for the delayed digitalization of the industry in Germany, especially in light of the presence of digital infrastructures in other industries. Understanding and observing consumer behavior is an elementary factor in this. It is essential to explore which circumstances, features, and needs inspire consumers to buy groceries online. Likewise, it is necessary to identify how business models in German grocery retailing should be designed to match the features and needs with profitable business models.

The present work contributes to these ongoing developments and counteracts the scarcity of scientific literature specific to the behavior of German online grocery customers. This dissertation comprises six studies represented by three research papers. I start by exploring the consumer ecosystem perspective in Paper 1 and move on to the analysis of the individual customer level in

Paper 2. In Paper 3, I change perspective from customer to retailer and analyze online grocery business models in detail.

In the first paper, I explore the reasons for the missing success of online grocery retailing by investigating theoretical consumer acceptance. Based on the Technology Acceptance Model 3, I develop an integrated research framework that explains the behavioral intention to use online grocery shopping. My second paper serves to gain a more holistic understanding of behavioral intention. I move one step inwards the customer behavior by looking at actual customer experience on an individual level. From my participants' positive and negative experiences, with and without the influence of the coronavirus, I derive a list of met and unmet customer needs that positively or negatively influence the adoption of online grocery shopping behavioral intentions. In my third paper, I take stock of current operating online grocery businesses in Germany and analyze their structure before and during the COVID-19 crisis. I identify which customer needs are addressed by current operating business models and which remain unmet. Through the morphological analysis of German online grocery business models, I derive 79 online grocery business model patterns. To preserve and structure the collected patterns and to provide an easy-to-use tool for business model innovators, I propose an online grocery business model taxonomy and a corresponding practical application scheme.

In conclusion, my thesis complements to the literature on online grocery shopping behavior and online grocery business models, while it simultaneously contributes to the understanding of consumer behavioral intentions, technology acceptance, and the lack of business model success in Germany. By looking at the customer ecosystem as well as the individual customer level, I confirm the importance of customer-centered business models. Simultaneously, I highlight the need for further research in this regard. Through analyzing customer behavior during the German lockdown and the corresponding shift of online grocery shopping business models, I furthermore contribute to the research on COVID-19-driven behavioral mechanisms.

The structure of the first part of this thesis is as follows. I first outline the theoretical background and the investigative objectives of this thesis. From these considerations, I derive my research questions. Subsequently, I provide summaries of the three research papers. I conclude the synopsis of this thesis with the resulting theoretical and managerial implications, the limitations, and the possibilities for future research.

2 Research Background and Object of Investigation

2.1 A Market with High Potential: Investigating Online Grocery Shopping

Given the high potential of digital developments as well as the economic significance of the grocery sector, it is not surprising that research concerning the online grocery sector has increased in recent years (Martín et al., 2019). Figure 1 illustrates the rising trend in the publication of academic literature relevant to online grocery in the past twenty years. Additionally, these publications are broken down by year in Figure 1

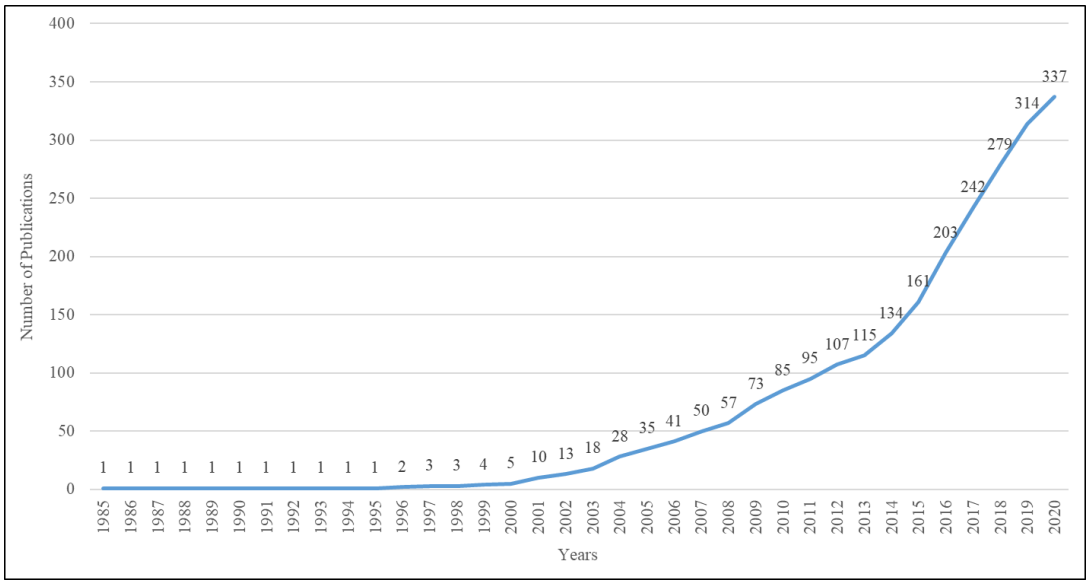

Figure 1: Cumulative Numbers of Scholarly Papers Containing the Search Term "Online Grocery" from 1985 to June 2020. Based on Web of Science Search "Online Grocery" (July 2020).

From 2013 onwards, Figure 2 shows a steep rise in the annual number of publications, reaching an all-time high in 2016. These phenomena seem to closely coincide with the increasing adaptation of technology for e-commerce and online grocery in the consumer market.

There are various possible reasons for the irregular rise in academic publications on online grocery for the period from 2008 to 2010. The global financial crisis of 2008 severely affected global markets, deflating consumption and consumer confidence. Since traditional business models faced extensive limitations in expanding market share, a substantial need for new and agile business strategies arose. Among the companies that responded well was Amazon, which launched the Kindle in late 2007, inspiring more consumers to buy e-books, and growing their companywide net sales by 28% in 2009 (Bradley, 2019). In general, consumers increasingly shifted from traditional brick-and-mortar stores to digital shopping channels (Huyghe et al., 2017).

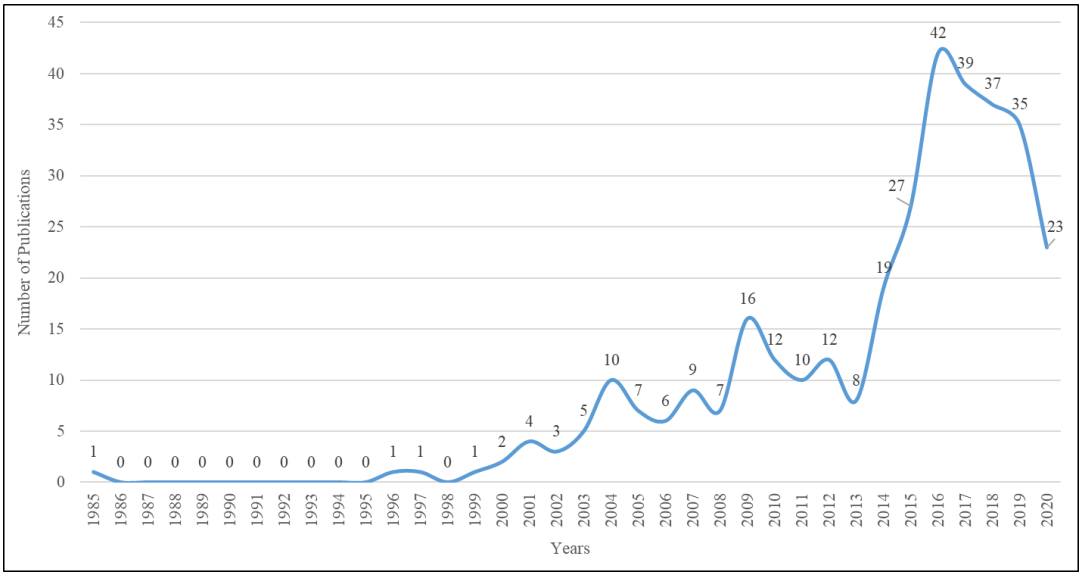

Figure 2: Per-Year Numbers of Scholarly Papers Containing the Search Term "Online Grocery" from 1985 to June 2020. Based on Web of Science Search "Online Grocery" (July 2020).

With their innovative products and customer-oriented services, technology leaders such as Amazon, Apple, and Google have, both directly and indirectly, played powerful roles in e-commerce and e-grocery. For example, the success of the Apple iPhone in 2007 led to a range of consumer application areas; the number of internet users grew to 1.367 billion in 2007 (Statista, 2019b); Amazon.com attracted 615 million visitors in 2008 (Chacksfield, 2008) and launched Amazon Fresh in 2007. The enhancements brought by these companies led to changing consumer behavior and sparked interdisciplinary scientific research on areas such as online sales, online marketing, and online business models.

Research from 2013 and onwards charts the exponential rise of online grocery in academia and the retail industry, positively affecting businesses worldwide. In 2017, Amazon Fresh accounted for an estimated $350 million in total sales worldwide (Acosta, 2018) and a 54% annual increase in grocery sales in Germany (Acosta, 2018). The reason for this enormous growth lies in the increasing consumer acceptance of the integration of technology into the online grocery sector. The consumer acceptance of online grocery services has been a challenging but crucial factor for online grocery business model success. This is due to the fact that individuals' experiences when shopping for groceries online is fundamentally different from other forms of online shopping (Boyer and Hult, 2006; Mortimer et al., 2016). To address and understand this peculiarity, academic professionals have branched out into interdisciplinary domains. Scientists and practitioners have collectively examined compelling factors and introduced technological solutions.

An analysis of the relevant literature reveals discussions on an array of notions and abstractions. These include business concepts such as click-and-collect (Davies et al., 2019; Huyghe et al., 2017; Jara et al., 2018; Wollenburg et al., 2018) and multi-channel grocery shopping (Arce-Urriza and Cebollada, 2018, 2012; Breugelmans and Campo, 2016; Campo and Breugelmans, 2015; Cebollada et al., 2019; Fedoseeva et al., 2017); consumer behavior (Choi et al., 2010; Milkman et al., 2010; Milkman and Beshears, 2009; Ramus and Asger Nielsen, 2005) and consumer expectations (Boyer and Hult, 2006; Burke, 1997; Cho, 2009; Hansen, 2008; Souitaris and Balabanis, 2007); and convenience, as consumers utilize mobile devices because the technology provides convenient access, which leads them to incorporate mobile shopping into their habitual routine (Wang et al., 2015). Additionally, the *convenience* promise of online grocery is widely regarded as one of the core reasons for its symbiotic growth and its main selling point. Consumers utilize mobile devices because the technology provides convenient access, which leads them to incorporate mobile shopping into their habitual routine (Wang et al., 2015).

For a comprehensive overview of the academic literature in the field of online grocery, I reviewed the titles and abstracts of 322 papers on the worldwide online grocery industry published between 1997 and 2020. Based on three criteria – topic, focus, and ranking[2] – I narrowed down the number of publications to 142 relevant papers. All remaining papers were read and summarized by two researchers. Building on this, I assigned the publications to the three meta categories of *Market*, *Retailer*, and *Consumer*, the eight corresponding research streams of *Controlling*, *Analysis*, *Branding*, *Business Models*, *Logistics*, *Interface*, *Purchase* and *Experience*, and the fifteen sub-categories of *By Country*, *Potential*, *Corporate Culture*, *Multichannel Price Setting*, *Types of Business Models*, *Delivery Model*, *Supply Chain*, *Storage Optimization*, *Environmental Impact*, *Intention*, *Frequency*, *Loyalty*, *Pre-Purchase*, *Behavioral Patterns* and *Online vs. Offline*. An overview of the structure of the online grocery literature is shown in Figure 3

[2] (1) Does the paper approach the topic of online grocery retailing from an economic perspective? (2) Is online grocery retailing the main focus or a substantial part of the discussed problem/solution? (3) Is the paper published in a minimum C-rated journal or conference, based on VHB Jourqual rating?)

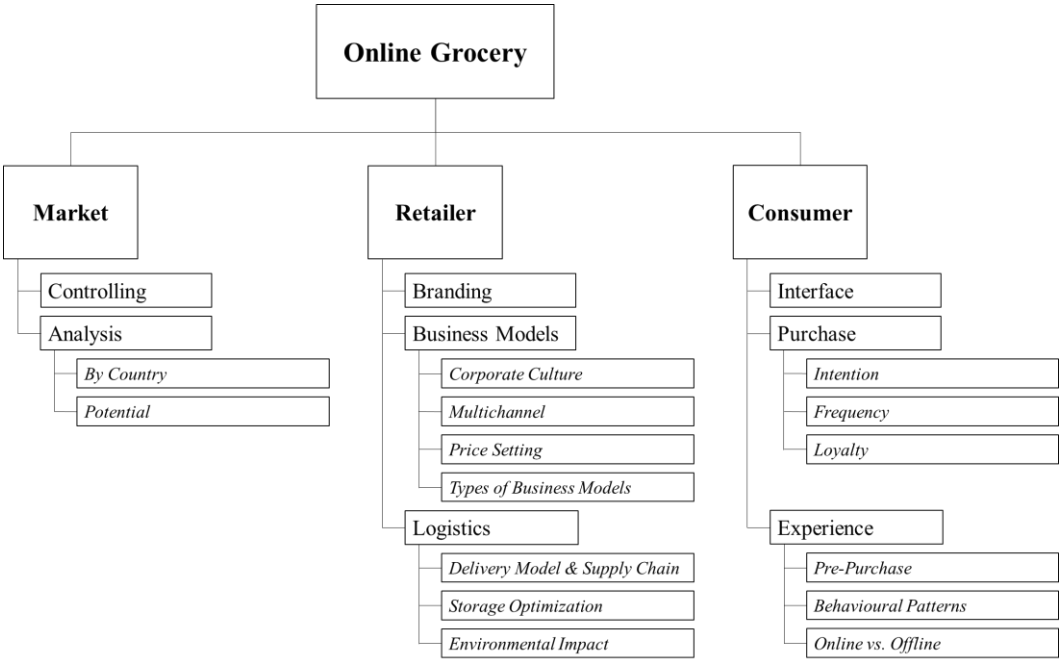

Figure 3. Research Structure on Online Grocery Publications

A deep dive into the defined literature classification reveals that in terms of the number of publications, the research streams of consumer purchase behavior, logistics, business models, and customer experience are the largest (see Figure 4).

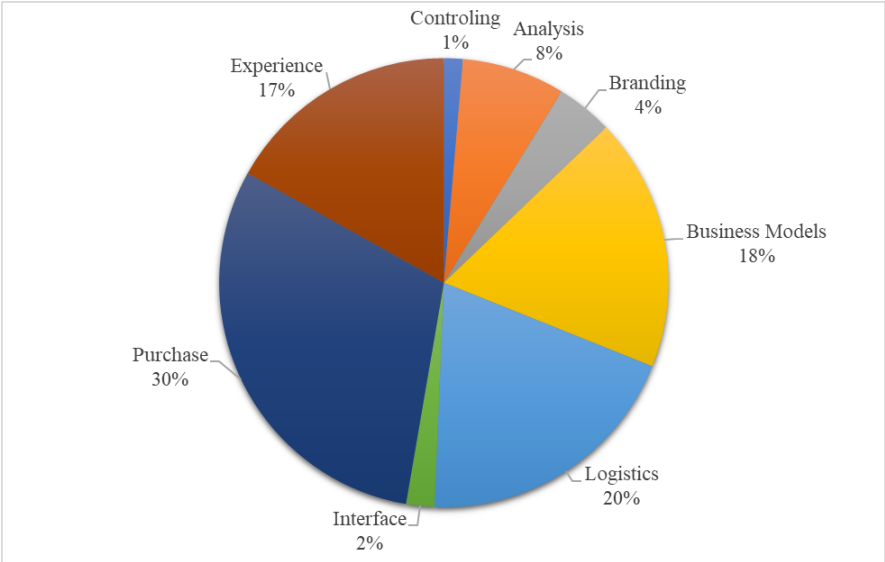

Figure 4: Thematic Spread within the Research Stream "Online Grocery Shopping"

The literature screening process revealed that research on the German grocery sector is rare (Martín et al., 2019). Three publications present research on the adoption of online grocery shopping in Germany (Blitstein et al., 2020; Pechtl, 2003; Piroth et al., 2020). Two studies are concerned with price dispersion between German online and offline markets (Fedoseeva et al.,

2017; Piroth et al., 2020) and the consequences of e-grocery on transport and logistics in Germany and France (Seidel et al., 2016). There are various reasons to assess the German online grocery industry, in particular, and I will explain them below; the central question in this regard is why the success of the German online grocery sector is considerably lower in comparison to other countries such as the UK, France, China, and the USA (see Section 2.2).

In Germany, the grocery market and the behavior of its consumers are different from their parallels in other countries. For instance, the German grocery retail landscape is characterized by a high density of physical stores (Blitstein et al., 2020; Piroth et al., 2020). This might mean that online grocery shopping is less useful, since offline supermarkets can be accessed easily. The advantage of the high density of physical stores is, however, countered by the fact that their product variety is lower than that of their counterparts in other countries such as the USA (Blitstein et al., 2020). Online grocery shopping therefore might facilitate access to a broader variety of products, enhancing its relevance.

A further differentiating factor is the relatively low price of groceries in Germany, which intensifies price sensitivity in online contexts (Fedoseeva et al., 2017; Piroth et al., 2020). Beyond that, groceries are "culture-bound" products, perceived, experienced, purchased, and valued differently across countries (Piroth et al., 2020). Given specifically German structural conditions and behaviors, many of the study results from other cultural contexts cannot be transferred to the German online grocery industry. This fact underscores the need for a country-specific investigation.

With this dissertation, I strive to contribute to the understanding of the overreaching open question regarding the lack of online grocery success in Germany by taking the cultural peculiarities of the German market into account. I examine German consumer behavior in online grocery contexts as well as the structure of German online grocery business models. With this, I contribute to the body of literature on several levels. The main emphasis in my research belongs to the streams of consumer purchase intention (Paper 1), consumer experiences and their impacts on purchase intention (Paper 2), and business models (Paper 3).

2.2 International Comparison

An international comparison of the online grocery sector on an economic level shows that after a slow implementation phase (Melis et al., 2015; Ramus and Asger Nielsen, 2005; Singh, 2019), it has been experiencing tremendous growth since 2011, especially in China, USA, Japan, and the UK (The Nielsen Company, 2015). In terms of market size by revenue, the world's uncontested leading online grocery market in 2018 was China, with a market size of US $50.9 billion and a

3.8% online grocery sales share, followed by Japan, with a market size of US $31.9 billion and a 7.1% online grocery sales share, and the USA with US $23.9 billion and a 1.6% online grocery sales share (IGD, 2018a). The Institute of Grocery Distribution (IGD) reports that in 2017, Walmart stated that consumers were spending nearly twice the amount shopping online that they spent shopping in-store (IGD, 2018b). In a European comparison, the UK, with a market size of $14.6 bn and 6.5% online grocery sales share, and France, with a market size of $ 11.6 bn and a 4.5% online grocery sales share, are leading the European online grocery market (IGD, 2018a). The online grocery market is promising, expected to grow rapidly worldwide, driven by enablers like tech innovations, consumer convenience, and a swiftly-evolving digital world (IGD, 2018b, 2018c, 2018a; The Nielsen Company, 2015). For the year 2023, a worldwide compound annual growth rate (CAGR) of 20.4% is expected for the online grocery market (IGD, 2018a).

In comparison to these numbers, in Germany, the current economic success of online grocery shopping is small. Germany only accounts for an online grocery market size of US $1.3 billion. Only 1.4% of the revenue from groceries sold in Germany comes from the distribution over the internet (Rumscheidt, 2020, p. 64). Various studies argue that the high density and quality of grocery stores in Germany, as well as the price sensitivity of German consumers, helps explain the slow development of grocery e-commerce (Handelsverband Deutschland, 2017; The Nielsen Company, 2018). However, the fast-moving consumer goods (FMCG) sector is said to be “on the verge of strong growth” and the online distribution of groceries is identified as the key growth driver for this sector (Handelsverband Deutschland, 2017). It was predicted in 2017 that Germany’s growth in FMCG would be among the strongest worldwide over the subsequent five years (Handelsverband Deutschland, 2017). Based on an overall compound annual growth rate of 23.2%, in 2018, it was predicted that by the year 2023, Germany would rank among the three countries with the strongest growth worldwide in terms of grocery e-commerce (IGD, 2018a). Due to the fast growth of grocery e-commerce, and with offline and online shopping continuously merging, including in Germany, online stores are becoming indispensable in addition to offline distribution (IGD, 2018b).

Looking at current online grocery business models in Germany such as Rewe Online, Amazon Fresh and Supermarkt24.de, it becomes apparent that not only is their economic success limited (Kapalschinski, 2018; Reimann, 2018; Wirtschaftswoche, 2018) but they also do not meet the complex and heterogenous consumer needs. Shopping online, German consumers miss the immediate availability of the goods, they do not trust the retailer, and they are reluctant to pay for distribution costs (Brauns and Zacharakis, 2017; Stiftung Warentest, 2018; Wirtschaftswoche, 2018). The predictions cited in the previous paragraph on the future development of the German

online grocery sector are based on the development of other countries and industries but do not consider the special needs and structural differences of German consumers that are not yet met. To fulfill consumer needs and to reach the anticipated success of the online grocery sector, the key drivers of German consumers that influence the adoption of online grocery shopping have to be identified.

2.3 Research Questions and Purpose of the Dissertation

Especially in China, the UK, and the USA, new models of grocery retail have been getting established for several years with various online and hybrid shopping offers. For example, in 2018, Walmart China partnered up with JD.com – a one-stop online platform for all domestic and international products – to deliver goods from local supermarkets to 20 million active users (IGD Research, 2017; Kelso, 2018). In the UK, the percentage of people who buy groceries online between 2009 and 2018 and has remained stable for the last two years (Schmid, 2020). In 2014, Amazon USA presented a WiFi-enabled handheld scanner called Dash for its online grocery portfolio. With this, groceries could be scanned or ordered online using an integrated microphone (förderland, 2014). In 2019, this application was stopped and replaced by Alexa, a more technically sophisticated form of home automation, also called Amazon Echo, which had been introduced in 2016 (FOCUS Online, 2019; Gründerszene Magazin, 2019).

In 2017, the online grocery service Amazon Fresh became available in major German cities. Sensing the potential of the market, and the danger from giants like Amazon, large, established German supermarket chains were also investing in online sales. For example, in 2013, Rewe announced its intention to invest 10 million euros in the online grocery business (Heiermann, 2013). Other supermarket chains – such as Edeka, with its 2016 acquisition of online grocery service Bringmeister – have also gradually entered the online grocery business, offering full assortments including fresh and non-perishable groceries as well as kitchen supply items. Many chains, such as Lidl and Netto, are offering only non-perishable groceries and kitchen supply items; this service can serve as an add-on to, but not a replacement for, in-person shopping. And thus, the online purchasing and delivery possibilities are increasing, especially in metropolitan areas (Kolf, 2019).

The developments of the last few years, both internationally and in Germany, underline the potential for German grocery retailing and the need for a scientific understanding of these developments. This is what this dissertation project provides. It reveals what consumer needs are currently in play; what effects these new needs have on retailers, logistics, and the business models of grocery retailing in Germany; and how future business models can be designed to

succeed. I investigate, from a consumer's perspective, which factors are fundamental to the successful digital retail of groceries. Moreover, I empirically investigate the structure of German online grocery businesses and outline their potential for improvement by contrasting their services with customer needs.

In the course of digitalization and technological developments, new opportunities are opening up for companies to design and construct their business models to create value for the company (Amit and Zott, 2015; Chesbrough, 2010; Piller et al., 2016; Teece, 2018). Although business models are a focus of companies and researchers, practical business models are not sufficiently understood by either entrepreneurs or researchers (Foss and Saebi, 2017; Osterwalder et al., 2005; Zott et al., 2011). It is therefore important at this point to explore innovative business models in grocery retailing and actively shape the future of grocery retailing.

To achieve the outlined objectives and support the scientific understanding of the highlighted developments, this dissertation addresses three research questions throughout the three research papers.

Research Question 1: *What requirements and needs are shaping the consumer's behavioral intention to use or refuse online grocery shopping in Germany?*

Research Question 2: *How are customer experiences influencing the usage intention of online grocery shopping in Germany and what elements of an online grocery website or application are driving these experiences?*

Research Question 3: *How can successful online grocery business models be built that satisfy open customer needs?*

Paper 1 addresses the first research question with the proposition of an online grocery acceptance model and its quantitative verification. Paper 2 strives to answer the second research question by empirically observing customer behavior and the influences of experience on behavioral intentions. Paper 3 aims at answering the third research question; though a single dissertation does not have the capacity to answer this question holistically, it constitutes a valid first step. After I have examined the factors shaping and influencing the behavioral intention to use online grocery shopping in Papers 1 and 2, Paper 3 addresses the third research question of how online grocery business models can be designed more successfully by outlining the structures of current online grocery businesses and recurring problem-solution patterns.

Overall, the three papers contribute to the understanding of customer behavior, behavioral intentions, and the acceptance of the online grocery sector. They stress the importance of

customer-centricity for long-term business model success and they add to the body of knowledge and literature in innovation management, marketing, and social sciences.

The cumulative contribution of this dissertation lies not only in the understanding of the outlined fields but also in the combination of interdisciplinary researching methodologies and the consideration of the research object across different research disciplines.

3 Summary of Research Papers

In this section, I summarize each of my three papers, presenting their objectives, methodologies, and findings. Overall, my dissertation follows a convergent parallel mixed-method research design, combining qualitative and quantitative researching approaches. The first paper follows an exploratory sequential research design in which online grocery behavioral intention is analyzed exploratively by combining qualitative research with quantitative evaluation. The second and third papers are designed as qualitative explanatory research designs as they contribute to the understanding of customer acceptance.

In the following, I provide a tabular overview of the research paper themes, gaps, research questions, objectives, contributed theories, analytical perspectives, research settings, methods, and publishing status (see Table 1).

Table 1: Overview of the Research Papers

Research Paper No.	1	2	3
Title	*Antecedents of Online Grocery Shopping Acceptance in Germany: An Integrated Research Model*	*"1000 clicks and it still didn't go as I'd hoped" – Positive and Negative Experiences in E-Grocery Shopping*	*Business Model Innovation in the Online Grocery Sector – Extracting and Structuring Business Model Patterns*
Theme	Describing the requirements and needs shaping consumer acceptance and behavioral intention towards the usage of online grocery shopping by developing an integrated research framework	The individual customer perspective of online grocery shopping experience and corresponding usage intention, product and service perceptions, with regards to threats and opportunities to the individual adoption decisions	Analysis of the online grocery retailer market with regards to the understanding of the structure of operating business models and their improvement potential by deriving business model patterns and an overall taxonomy
Research Gap	Missing comprehensive research framework for online grocery shopping consumer acceptance	Limited understanding concerning online grocery shopping consumer experiences and behavior in Germany, and lack of qualitative research	Lack of clarity concerning the structure of online grocery business models and the reasons for the lack of business model success
Research Questions	What requirements and needs are shaping the consumer's behavioral intention to use or refuse online grocery shopping in Germany?	How are customer experiences influencing the usage intention of online grocery shopping in Germany and what elements of an online grocery website or application are driving these experiences?	How can successful online grocery business models be built that satisfy open customer needs?
Objective	Generating an integrated research framework to explain behavioral intention to use online grocery shopping	Extending theory on how the behavioral intention of online grocery shopping is built by understanding individual online grocery experiences and associated behavior	Deriving business model patterns with a corresponding taxonomy to contribute to the structural understanding of the market and the reason for missing success while enabling business model innovation
Unit of Analysis	Consumer ecosystem	Individual customer	Retail market environment and business model
Design	Quantitative and qualitative	Qualitative, ethnographical design	Qualitative
Data	213 online questionnaires of (potential) online grocery customers in Germany plus data from three qualitative workshops with 48 participants in total	34 research diaries of German online grocery customers	Websites, social media, newspapers, online shops, blogs and customer ratings of 40 online grocery business models operating in Germany
Methods	• Consumer requirements workshops using Bewextra-methodology • Qualitative content analysis • Statistical analysis: Structural equation modeling, partial least square	• Research diaries • Qualitative content analysis	• Netnographic research • Qualitative content analysis • Taxonomy development
Status	Pre-version published (Proceedings)	Pre-version published (Proceedings)	Working paper

Paper 1: Antecedents of Online Grocery Shopping Acceptance in Germany: An Integrated Research Model

Online grocery shopping in Germany is, in contrast to other countries and despite its huge economic potential, still in its infancy, as consumers have so far been unwilling to embrace it. This rejection means a lack of economic success for providers of such business models. Country-specific research on online grocery shopping has been widely conducted in the USA and the UK, but research on Germany is rare. Moreover, no comprehensive research model has yet described the determinants of online grocery behavioral intention and its resulting acceptance.

To contribute to the understanding of online grocery shopping behavioral intentions while simultaneously extending the current body of knowledge, I develop an extensive online grocery acceptance model. Its development is based on an in-depth literature review and three qualitative consumer workshops to identify valid acceptance factors in regard to online grocery shopping environments. The final framework combines predictors from the Technology Acceptance Model 3 with the factors extracted from the literature and workshops. The proposed model comprises sixteen key influences on the behavioral intention to use online grocery shopping. The key influences are moderated by experience and 33 assigned hypotheses. For the framework evaluation, I develop and carry out an online survey with 213 participants.

To analyze this quantitative data, I use structural equation modeling (SEM): in particular, the Partial Least Square (PLS) approach. The proposed model is of high statistical quality, as all quality criteria concerning the internal consistency of the in-scale items and the discriminant validity of the proposed model are fully met. 31 of the stated hypothesizes are confirmed. The relationship between product quality and perceived usefulness proves insignificant, as does the moderating effect of product quality on the relationship between job relevance and perceived usefulness. Overall, the proposed model explains 41.3% of the behavioral intention to use online grocery shopping for consumers with online grocery shopping experience and 43.4% of the behavioral intention for consumers without online grocery shopping experience. New theoretical relationships – such as the influence of enjoyment and online shopping quality as well as the influence of experience – are postulated as key moderators.

This research has various implications for theory and practice. By stressing the explanatory power of behavioral intention, this study deduces the need for more extensive qualitative research to comprehensively understand the structures of behavioral intentions.

Paper 2: “1000 clicks and it still didn't go as I'd hoped” – Positive and Negative Experiences in E-Grocery Shopping

Recent research has sought to predict the determinants of online grocery acceptance and to understand the structure of the usage intention. Most researchers in this area have employed quantitative approaches, including technology acceptance models, while qualitative research in this regard is scarce. While quantitative technology acceptance models are very strong in explaining behavioral intention concerning information systems, they are prone to overlooking important aspects of human behavior. Under the assumption that the reasons for the missing success of online grocery business models in Germany lie in insufficiently fulfilled and unmet customer needs, the objective of this research is to contribute to the understanding of how behavioral intentions are built. I explore the reasons that help or hinder consumers’ adoption of online grocery shopping and uncover information on how to re-evaluate and design the value creation processes of current and future business models.

I conduct two ethnographic studies employing research diaries with 34 participants in total. As research diaries allow daily data collection, they enable more profound insights into customer interaction behavior than quantitative surveys do. The data is analyzed from two perspectives using a deductive content analysis approach, following Kuckartz (2018), and an inductive cross-case analysis approach, following Eisenhardt (1989).

In total, this work reveals 52 customer needs, of which 21 have not previously been addressed in the scientific literature. The two studies find that insufficient delivery coverage throughout Germany and a lack of delivery flexibility are the main factors that hinder the adoption of online grocery shopping. Beyond that, I derive two online grocery shopping types: the spontaneous/inspirational shopper and the planning shopper. Given the fact that spontaneous and inspirational shopping environments are currently absent from online grocery business models, I observe that the spontaneous shopping type is unlikely to develop a behavioral intention to use online grocery shopping under the present conditions.

From the various findings, I derive a recommendation matrix for online grocery shopping practitioners by combining implications from positive and negative customer experiences and related opportunities and threats for online grocery business models. Furthermore, I observe aspects of crisis-driven grocery shopping behavior, as one part of the ethnographic study took place during the COVID-19 outbreak in Germany. I conclude this work by highlighting multiple contributions to theory and indicating further research objectives.

Paper 3: Business Model Innovation in the Online Grocery Sector – Extracting and Structuring Business Model Patterns

Insights from the first and the second paper indicate that there is a gap between consumers' needs and the services provided by currently operating online grocery businesses. In the previous papers, I discussed the need to refine and innovate business models. To explore how online grocery businesses can capture and deliver value to the consumer, I shift perspectives and analyze the business models of online grocery companies in the German market. The overall objective of this research is to investigate how online grocery business models succeed in satisfying the needs of their customers and to provide a basis for business model innovation.

To achieve this, I utilize the concept of business model patterns and systematically examine the business model structure of 40 companies operating in the market. I follow a five-step, fully transparent and traceable methodological approach. I derive 60 regular online grocery business model patterns. I observe that the online grocery industry is experiencing strong growth in customer numbers driven by the COVID-19 outbreak in Germany. I also investigate the effects of this situation on the respective business models. Through this, I identify 19 additional coronacrisis-driven business model patterns. The representation of all patterns is inspired by the Alexandrian method of pattern description and comprises a short problem statement, the observed background, and the solution. I also contextualize the problem by adding examples of online grocery business models.

I additionally propose a taxonomy of online grocery business model patterns. This serves to manifest and preserve the collected knowledge and information of the online grocery business model patterns in a comprehensible form for other researchers. It also serves to enable short- and long-term business model innovation success for practitioners. The proposed taxonomy comprises twelve dimensions and 42 characteristics. For an easier understanding and overview of the taxonomy, I transfer the taxonomy into a morphological box scheme. Subsequently, I propose a detailed application description for the utilization of the taxonomy by practitioners and thus provide starting points for the re-design of business models in the online grocery industry. Finally, I present the contributions of this research to praxis and theory and highlight limitations as well as the options for further research therein.

4 Overall Conclusion and Implications

The three research papers of this dissertation jointly contribute to the understanding of German consumers' acceptance of online grocery shopping. I review the literature on online grocery research and provide a profound understanding of the landscape of online grocery acceptance research and the individual fields addressed within. I explore the influencing factors of its adoption as well as the structures of online grocery business models operating in the market. With this, I provide new insights to consumer research focused on online experiences as well as business model innovation and business model patterns. To capture online grocery acceptance holistically and to contribute meaningfully from a theoretical and practical perspective, I employ diverse and interdisciplinary methodological approaches (e.g. structural equation modeling, Bewextra methodology, qualitative content analysis) and collect data from a variety of sources (e.g. online surveys, research diaries, and consumer workshops). I analyze online grocery acceptance from a consumer perspective and add insights from the retail market environment and business models operating in this market.

Each research paper offers individual contributions to the understanding of online grocery customer acceptance. These are described in detail in the individual articles. In the aggregate, they provide a comprehensive overview of online grocery customer acceptance. It can be established that there is not only one factor determining the adoption and rejection of online grocery shopping, but an interplay of influences including usability, delivery, product freshness, shopping quality, trust, and sustainability. It is, nonetheless, possible to conclude that online grocery acceptance can only be increased if the service is available.

In 2020, this fundamental premise is insufficiently fulfilled by German online grocery businesses. Most German business models currently almost exclusively address consumers living in metropolitan areas, while consumers in rural areas and suburbs are rarely supplied; other European countries including France and the UK have met this challenge of last-mile delivery through the widespread and successful introduction of click-and-collect options. Furthermore, I observe that current business models in Germany do not satisfy the requirements of many consumer types, but cater to a particular group of consumers who have high digital skills, live in metropolitan areas, plan their shopping, and have little time. Many consumers over 50 have difficulty buying goods online even if they live within the delivery range, while consumers seeking serendipity and spontaneity during the purchasing process are uninspired by online grocery shopping offerings. Even the needs of the digitally-skilled city-dwelling shopping-planners are insufficiently met by current services: problems include usability issues, insufficient

product selections, inflexible delivery options, and the unreliable freshness of the delivered products.

Taken together, the results of all three papers advance three of the leading themes in online grocery shopping research: online grocery shopping adoption, business model innovativeness, and country-specific differences (Driediger and Bhatiasevi, 2019; Martín et al., 2019). In the following, I discuss outstanding contributions to these themes as well as the contribution to the body of literature that is COVID-19-driven research. I illustrate how the three papers collectively contribute with their theoretical and managerial implications as well as their limitations and their corresponding options for future research.

4.1 Theoretical Implications

In my dissertation, I reveal that online grocery shopping literature covers three main fields of research: *Retailer*, *Consumer*, and *Market*. Within these three fields, most research is associated with the *Consumer* field. Much of the research in this field is engaged with exploring the influences on consumer behavior and the determinants of behavioral intention to use online grocery shopping. My analysis shows that many influences on behavioral intention to use online grocery shopping are examined in isolation, while comprehensive frameworks to holistically describe online grocery acceptance are missing. In the course of my analysis, it also became apparent that online grocery acceptance is a complex research objective. It combines various researching disciplines, including social sciences (Bell and Song, 2007), psychology (Harris et al., 2017), geography (Mensing and Neiberger, 2019), informatics (Moriuchi and Takahashi, 2018; Vrechopoulos et al., 2004), and, of course, economics.

Furthermore, even the economics portion of it is cross-disciplinary, embracing different areas such as organizational research (Asdemir et al., 2009; Richards et al., 2016), consumer behavior (Anesbury et al., 2016), marketing (Campo and Breugelmans, 2015; Shi and Zhang, 2014), distribution management (Koutsomitis and Lochmahr, 2019; Suel and Polak, 2017; Valle et al., 2017) and business models (Belavina et al., 2016; Melis et al., 2016). Hence, to reach a holistic understanding of online grocery acceptance, it is necessary to combine several research disciplines as well as the investigation from different perspectives. Following this need and to contribute to the understanding of online grocery acceptance, I combine interdisciplinary research methodologies from organizational, social, and psychological researching disciplines.

The three research papers collectively contribute to the understanding of the culturally-specific behavior of German consumers. Previous literature revealed that online shopping customer behavior varies greatly across countries (Ashraf et al., 2014; Clemons et al., 2016;

Smith et al., 2013). This underscores the need for country-specific examinations. The difference in the success of online grocery shopping among countries indicates that in Germany, the perception of online grocery business models is different from what it is in other countries such as the UK, the USA, and Japan, although in other ways those countries may be culturally close to Germany. I contribute to research on consumer behavior as I specifically investigate the German market.

While in the USA and China, product brands or supermarket brands are adequate to ensure a feeling of trust in online grocery shopping (Blitstein et al., 2020; Shi and Zhang, 2014; Van Ewijk et al., 2020), in Germany, personal knowledge of and familiarity with the retailer are the keys to building trustworthiness. Other factors that help explain the differential success of online grocery are demographic and socioeconomic. In Japan, for some time, the population has been aging and, at the same time, there have been increasing numbers both of individuals living alone and of double-income households (Moriuchi and Takahashi, 2018, 2016). These changes are increasingly taking place in Germany as well. Therefore, these cultural developments demand a continuous comparison in future research that may include further signposts for the development of online grocery shopping in Germany.

I observe in my studies from Papers 1 and 2 that product freshness is perceived by the customer in distinction to product quality. Meanwhile, in recent literature, I notice that the product quality is often confused with the product freshness or that product freshness is summarized under the term product quality (Boyer and Hult, 2006; Kumar and Anjaly, 2017; Sigurdsson et al., 2020; Singh, 2019). Furthermore, product quality is said to be one of the strongest determining factors for online grocery shopping acceptance. Contrary to this, I find that product freshness is substantially more decisive for the formation of a behavioral intention to use online grocery shopping than product quality. I find that product quality has only a minor influence on the evaluation of the shopping experience, whereas product freshness is highly important. In further research, I suggest more nuanced distinction between these two variables, given that blurring leads to biased results in the assessment of online grocery consumer acceptance.

The influence of enjoyment on online grocery shopping intention has been examined in previous literature mostly by analyzing the relationship between the influence of enjoyment on perceived ease of use or perceived usefulness (Driediger and Bhatiasevi, 2019; Ha and Stoel, 2009; Venkatesh and Bala, 2008). A direct effect of enjoyment on the attitude towards online shopping in general has also been examined (Bedi et al., 2017; Horváth and Adıgüzel, 2018). However, the direct effect of enjoyment on behavioral intention in the online grocery context has been shown in literature only once (Childers et al., 2001). Consistent with the findings of Childers et al. (2001),

I confirm the strong direct effect of enjoyment on the behavioral intention to use online grocery shopping with the results of my first and second paper. Further online grocery shopping research should not only include enjoyment as a key factor but also engage in a more detailed investigation of it.

With the quantitative finding of the first paper, I enrich the understanding of the influence of enjoyment on behavioral intention by showing that the strength of this influence differs between the persons who have experience and those who do not. Moreover, in Paper 2, I observe that customers who enjoy the process of online grocery shopping are more likely to build a positive behavioral intention concerning future usage of online grocery shopping. In the future, more focused research concerning the determinants of enjoyment and how to integrate it in online grocery shopping business models needs to be undertaken. This will contribute to the understanding of how behavioral intentions are built and support the design of successful online grocery business models.

In my first paper, I statistically confirmed that the subjective norm has a positive direct influence on behavioral intention (Piroth et al., 2020). By considering this factor in a specific online shopping field, I contribute to the current body of knowledge that has so far mostly focused on the influence of the subjective norm on general online shopping acceptance (Hasbullah et al., 2016; Ho and Chen, 2014; Lim et al., 2016; Mosavi and Ghaedi, 2012; Ramadania and Braridwan, 2019). Contrary to this finding, in the qualitative analysis of the second study in Paper 2, I can only identify a moderate influence of the subjective norm on the behavioral intention to use online grocery shopping. As the number of participants in the qualitative study is small, this finding should be considered with extreme care, especially since the statistical results show otherwise. However, the opposing results contribute to the theory, as they emphasize the need for further research on subjective norm in online grocery shopping. For future research, I suggest quantitatively and qualitatively testing the influence of subjective norm on behavioral intention to use online grocery shopping with larger sample sizes. Knowledge of the nature and the strength of influences within social environments enables companies to conduct targeted customer acquisition and contributes to reaching the ultimate goal of customer loyalty (Argo and Dahl, 2020; Purani et al., 2019).

I furthermore add to consumer behavior and online consumer experience research by supporting the theory of hedonic and utilitarian motivations (Babin et al., 1994; Childers et al., 2001; Kumar and Anjaly, 2017). Regarding the two online grocery shopping types derived in the second paper, I extend prior research by exploring that the planning type is more likely to build a usage intention of online grocery shopping than is the spontaneous shopping type. I hypothesize that the reason

is that current online grocery shopping environments only allow for the opportunity to plan purchases but do not allow for inspiration or spontaneous shopping behavior. In my third paper, I confirm this assumption. By shifting perspective and analyzing the business model structures of currently operating online grocery businesses in the German market, I conclude that the technical possibilities offered are not inviting the customer to "stroll around" or make spontaneous purchases as they would in offline contexts.

Not only does this finding contribute to current literature on business models, it also reveals that current business models are unable to attract a large group of customers. Although there are technological opportunities and business model patterns that encourage inspiration and spontaneity, the question arises why these have not been integrated. As this is a matter of innovation capabilities, the third paper makes also contributions to theory on business model innovation. Previous research has shown that website quality directly influences the likelihood that a consumer will develop an urge to impulsively purchase the products presented online (Wells et al., 2011). Hence, to integrate spontaneous/inspirational shoppers, it is necessary to explore the factors that determine their perceptions of quality and find out what technological developments can encourage them to shop for groceries online.

Finally, my dissertation contributes to the still young and scarce body of knowledge concerning the influences of the COVID-19 crisis on consumer behavior and business model shifts. Most of the COVID-19-driven research is engaged with examining survival strategies of businesses facing a sharp decline in customers (Kuckertz et al., 2020), while research on strategies to cope with crisis-driven fast growth is largely missing. In my second and third papers, I discuss the COVID-19 crisis as a situational factor benefitting the success of online grocery business models. In this way, I build on the research by Hand et al. (2001), who said that success of online grocery shopping adoption would depend on situational factors. I contribute further by finding that online grocery business models are among the winners of the crisis and therewith support ongoing scientific assumptions about changes in economic environments (Knowles et al., 2020). From a business model perspective, I add to the understanding of business model transition paths (Ritter and Pedersen, 2020; Seetharaman, 2020) by showcasing short-term and crisis-driven business model pattern amendments as well as the increasing success, in terms of customer growth, of the online grocery industry.

4.2 Practical Implications

Like most other management studies, this dissertation is not only designed to contribute and enrich theory, but also to outline managerial implications for practitioners. Moving to the growth

of the German online grocery market and consequently pursuing the successful design of online grocery business models, I derive five main managerial implications.

First, in Paper 1, I outline the strongest influencing factors on the behavioral intention to shop groceries online. The most significant result for managers is that enjoyment and subjective norm are two of the strongest direct influences on the behavioral intention to use online grocery shopping. About the enjoyment of the shopping process, I stress the need to make shopping environments fun and exciting to mitigate boredom and confusion. I find that enjoyment during the shopping process is even more important to consumers with online grocery shopping experience. Providing enjoyment, therefore, seems to be an excellent way of maintaining customer loyalty. Referring to the direct influence of subjective norm on behavioral intention, I indicate that this influence especially applies to consumers without online grocery shopping experience. In terms of the adoption of new behavioral habits and business models, I find that consumers strongly rely on outside evaluations from the social environment. This finding is particularly valuable for marketing purposes as it shows how to approach new customers. Furthermore, it confirms the importance of word of mouth (Ismagilova et al., 2019) in the online grocery context.

Second, as gaining a broader understanding of the underlying customer requirements is a crucial aspect of managing online grocery shopping adoption and consequently the success of the business model, in Paper 2, I derive a list of 52 qualitatively elaborated customer needs. To transform the customer requirements into concrete managerial implications, I provide a managerial recommendation matrix. The matrix has opportunities and threats to online grocery business models on the vertical axis and positive and negative observed customer experiences on the horizontal axis. The four quadrants of the matrix indicate concrete aspects that hinder and promote the adoption of online grocery shopping.

Third, in addition to the recommendation matrix in Paper 2, I identify two kinds of shoppers: the planning shopper and the spontaneous shopper. I provide concrete advice on how to address both types. I stress the need to develop business model elements that address the spontaneous shopper. I observe that this shopping type feels excluded by online grocery shopping and, resulting from this, tends not to form a behavioral intention towards online grocery shopping. Building on this, I stress in Paper 3 that more thought must be given to alternative ways of online shopping. I conclude that consumers shop for groceries in a different way than they do for other products. Shopping for groceries from a list of products, as on Amazon Fresh and Rewe Online, is not only inconvenient for many consumers, it is also uninspiring. In some cases, the staleness of the presentation even leads to loss of trust in the product freshness. Since current online shopping

environments and their representation are not sufficient for the online grocery market, more customer-centric technology has to be included in online grocery shopping, bringing more enjoyment and enabling the integration of the spontaneous shopper.

Fourth, for easy navigation through and within the derived business model patterns, I provide a business model taxonomy and a corresponding process for its practical application. In this way, I make it possible to learn from various online grocery business model patterns and allow managerial decision-makers to identify the starting point of business model innovation. The business model pattern descriptions serve as a basis to support the short- and long-term success of systematic business model innovations.

Finally, my dissertation gives a holistic picture of the online grocery market from two perspectives, that of the customer and that of the business model. By looking at the customer ecosystem as well as the individual, the dissertation provides information on the reasons for the missing success of online grocery businesses in Germany. Furthermore, it enables a deeper understanding of consumers as it provides consumers' experiences during the online grocery adoption phase. It reveals starting points for customer-centric business innovation and, by looking at the retailer environment, provides an overview of the current structure of online grocery shopping business models. This not only helps to prevent failures in the redesign of business models, but also supports the economic success of online grocery businesses.

4.3 Limitations

Despite its numerous contributions to research and practice, my dissertation is not free from limitations. I use these limitations to outline opportunities for further research in three areas.

First, my proposed online grocery acceptance research model in Paper 1 is based on the Technology Acceptance Model 3. This is in line with previous research on online grocery shopping acceptance that is mostly based on technology acceptance model measures (Childers et al., 2001; Driediger and Bhatiasevi, 2019; Gefen et al., 2003; Ha and Stoel, 2009; Kim, 2012; Wolfinbarger and Gilly, 2003). Unlike my proposed framework, which is more comprehensive, previous frameworks often focus on only one aspect of acceptance. Even though technology acceptance models are useful for explaining and predicting behavioral intention, they tend to overlook or underestimate essential aspects of human interaction and behavior (Chen and Cheng, 2009). Consequently, I examine the process of online grocery shopping adoption from a qualitative perspective in Paper 2. The qualitative results discovered factors absent from the literature that contribute to the understanding of how behavioral intentions to shop groceries online are established. Therefore, a combination and integration of the proposed framework from

Paper 1 with the results of Paper 2 into one overall framework could be fruitful to explain the behavioral intention of German customers even more comprehensively. For the evaluation of this overall framework, I suggest a longitudinal approach that provides data over a long period in which diverse situational factors may contribute to the adoption process. This approach would not only enables the evaluation and better understanding of online grocery shopping adoption and behavioral intention establishing processes, it would also contribute to research on the influences of situational factors (Hand et al., 2009), one of which – the SARS-CoV-2 pandemic – I observed only in its initial stages in Paper 2.

Second, my dissertation focuses on online grocery shopping business models and their adoption by consumers in Germany. I chose this particular spotlight on country and market especially because the German online grocery market is developing unlike other digital markets in Germany and internationally. Therefore, additional analyses performed in other countries (where online grocery shopping is already well established) applying research techniques and instruments similar to those in Papers 1, 2, and 3 may yield insights into the causes of the differences in business model success. Their outcomes may also identify new development paths for online grocery business models and markets that not only enrich the providers and customers of such models but are also of societal relevance. Especially against the background of the aging of the population in Western countries, comprehensive coverage by grocery delivery services will be necessary in the future.

Third, the findings of Paper 2 and 3 reveal insights into the behavior of customers and business models that is driven by the coronavirus crisis. However, they are more a coincidental by-product than an intended research finding. The two studies are not specifically designed for the research of the impact of the COVID-19 crisis and therefore show some methodological weaknesses regarding this research objective. Furthermore, the research questions and the studies were not designed to analyze coronavirus-related phenomena of business model changes and innovations. Nevertheless, it is possible to derive individual results that were explicitly caused by the corona pandemic and thus make a valuable research contribution. Additionally, the available data from the studies of the second and third papers can be analyzed in a more nuanced way concerning the effects of the crisis in further research. Further investigations are needed of coronavirus-driven consumer behavior and its short- and long-term effects, as well as the resulting necessary shift of online grocery business models.

5 Outlook and Agenda for Future Research: Latest Developments in Retailing, Influencing Trends and Social Change

Although I evaluate the online grocery retail as a high-potential market in terms of economic success and convenience to the customer, I am, despite my intensive research, or rather because of it, torn regarding the long- and short-term developments of this market. I summarize some of my thoughts about future market developments and possibilities for research in the following. To provide a meaningful overview, I summarize future influencing developments in Table 2 (without claiming completeness). I chose to briefly discuss four relevant factors, which, in my opinion, will be the most significant in the near future.

COVID-19, Changes in Consumer Behavior, and the Shift of Business Models

Changes in individual and social behavior take time, especially with deeply entrenched habits like grocery shopping (Worsley et al., 2010). While this is one reason for slowness of the adoption of online grocery shopping, I also outlined that physical distancing regulations caused by the COVID-19 crisis have promoted the acceptance of online grocery shopping. New customer numbers in operating business models rose sharply during the outbreak of the COVID-19 crisis in Germany (Gassmann, 2020) and have been high and stable ever since. It thus seems this situational influence has accelerated the adoption of online grocery shopping. From what we know at present, physical distancing regulations in public places including public transportation and stationary retail will continue for some time. A question is whether this period will be long enough to outbreak deeply-rooted habits and result in long-term success for online grocery providers.

A scientific understanding of how deeply-rooted consumer behavior can be disrupted and strategically changed by business model offerings is not only beneficial for the online grocery industry but also for the body of knowledge of innovation management and the theory of diffusion of innovations in general (Rogers, 2003). Recent literature states that shifts in consumption during the COVID-19 crisis have already been observed (Coibion et al., 2020). For example, the fashion market has seen a shift from consumption to anti-consumption (Ozdamar Ertekin et al., 2020) and cooking at home has become more common (tagesschau.de, 2020). However, the impact of online grocery shopping customer approval on the economic success of online grocery business models as well as the strategical shift in their online behavior still remains to be analyzed.

Table 2: Overview Developments in Retailing, Influencing Trends and, Social Change

Developments	*Short Description*
Covid-19 • Digital Business Models • Physical Distancing • Shifting Consumer Behavior	*SARS-CoV-2 is a virus that causes the COVID-19 disease which primarily affects the respiratory tract and can lead to death. Since the end of 2019, the virus has spread rapidly and led to a worldwide pandemic. In Germany, this has resulted in extensive contact restrictions, lock-down measures, distance rules, and an obligation to cover mouth and nose in public places. Further effects include changes in consumer behavior or the switch to online shopping as well as economic risks for companies due to the decline in overall economic performance.*
Neo-Ecology (The Greta-Effect) • Circular Economy • Mobility & Last Mile Logistics • Sustainable Consumption • Sustainable Luxury • Urban Farming • Zero Waste	*Neo-Ecology is consumers' strengthened environmental awareness of globalization, climate change, and the scarcity of raw materials, and their resulting embrace of sustainable consumption, zero waste, circular economy, etc. Growth is generated from a new mix of economy, ecology, and social commitment.*
New Work • Flexible Work Organization • Virtual Working • Work-Life Blending	*The term "New Work" describes the change towards new, more flexible, future-oriented forms of work, e.g. blending work and leisure time or work from home.*
Omnichannel • Augmented Reality • Chatvertising • Dynamic Prices • Voice Commerce	*Omnichannel is a cross-channel business model approach in which the boundaries between online and offline merge and the consumer purchases through the channel that best suits the requirements in the moment of product purchase. The blending of sales channels can be reached through the combination of different tools like "Chatvertising" (marketing via private message), dynamic prices (variable adjustment of prices depending on the time of day) or augmented reality (technology that enables the display of digital elements in real environments).*
Retail as Experience • The Store as a Stage • Retail as Community Center • Physical Space as Digital Escape	*The stationary store is perceived as a place of experience rather than a place of sale. This enables the participation of the retailer in the customer community while simultaneously capturing the demand of the customers.*
Ultimate Personalization • Big Data and Artificial Intelligence (AI) • Digital Twins • Individualism	*The consumer wants to be addressed as an individual. This is not only a matter of personalized advertising tailored to the individual customer, but also of products specifically customized for the individual. Big Data and AI are enabling hyper-personal advertising through the analysis of customer online data. An even further development concerning customization is the concept of digital twins. This is a digital, real-time replica of a physical asset. This representation can be a machine, a store, or even a person.*

New Work and COVID-19

Fueled by the coronavirus crisis, more and more people are working online from home, blending the boundaries between their personal and professional lives as they blend the boundaries between the time they spend on personal and professional activities (Herrmann and Frey Cordes, 2020; Piller, 2020; Umbs, 2020). I described the flexibility of delivery reception as a decisive factor in the adoption process of online grocery shopping. As delivery flexibility becomes less important

because of extended time at home, questions arise of whether consumers will do everything from home, or whether a trip to the supermarket will be a pleasant distraction. Of course, these are not simple yes or no questions, and as my contributions to literature in Paper 2 indicate, the preferences will vary between shopping types. In recent research, it has been observed that members of Generation Z, people born after 1995, are less willing to work with total work-life blending than are the previous Generation Y (Scholz and Grotefend, 2019), resulting in two contrasting trends, one in favor of and one against work-life blending. Through the various questions they contain, these developments prove to be interesting objects for further research by investigating the influence of COVID-19 on the shift of working behavior. Furthermore, online business models need strategies and structures to respond to the two contrasting trends I have described.

Neo-Ecology, Last Mile Logistics and Sustainable Consumption

I identify the need to scientifically examine the influence of increasing online grocery shopping on the logistics industry, which, and not only since the corona crisis started, barely meets the increasing demand (FOCUS Online, 2020; orange by Handelsblatt, 2019). The analysis of the business models in my third paper shows that the most popular business models employ their own delivery infrastructure, but of course, there is also the question of how this can be reconciled with the increasing traffic in city centers. Concepts on how to design innovative business models that link existing and multimodal infrastructures together (e.g. sharing-economy, electromobility, inner-city cargo depots) display interesting research approaches in this regard.

The results of my second study indicate that online grocery shopping leads to more planned purchases and fewer impulse purchases. Based on this, I raise the question of whether online grocery shopping will promote the trend of conscious shopping and nutrition (Ambwani et al., 2020; Huyghe et al., 2017; McCartney, 2016). However, the results of my third paper indicate that business models supporting conscious and healthy shopping are rather rare and represent niches within the niche. Some findings of my second paper also indicate that a few shoppers are influenced by special online offerings of the online grocery shopping retailer and tend to buy products that they don’t need. Although this is not surprising, nor different from offline purchase behavior, what influence does this have in the long term on advertising, special offers, and marketing in general within the scope of online grocery business models?

As my third paper already outlines a few business models of purely regional grocery approaches, the question arises of how the development of the trend of local and regional grocery shopping will continue (Schütz et al., 2019). Will there be more regional food producers and farmers directly selling their products to customers through the internet, and to what extent will this

contribute to the developments of sustainable business models in the circular economy (Lüdeke-Freund, 2010; Lüdeke-Freund et al., 2019, 2018)?

Another aspect relates to the delivery coverage of online grocery business models. The results of my second and third papers indicate that current business models are not offering comprehensive delivery coverage. Much of the missing online grocery acceptance is explained by this fact. However, where could nationwide coverage take the business landscape, and what would be its overall social impact? Would the pervasive coverage of grocery home deliveries have a major impact on people's loneliness and solitude, because the physical activity required to go to the supermarket is eliminated? Or will this enable time for other things, like sports, family, or further education? Recent research has shown that loneliness across various age groups has risen substantially, especially for women and young people, as early as at the beginning of the coronavirus crisis in April 2020 (Entringer et al., 2020). A forecast using coverage and online grocery adoption scenario techniques will not only outline possible developments for the business model landscape but also worrying socioeconomic effects.

Ultimate Personalization and Digital Twins

Lastly, I take a look at future developments in digital retail: the approach of ultimate personalization. By analyzing customer data from the internet, Big Data and AI nowadays not only facilitate the hyper-personalized addressing of customers – known as mass customization – they also enable the efficient proposition and delivery of products targeted with a high degree of accuracy to the customer's needs (Piller and Gülpen, 2020). An approach within this field is that of *digital twins*. Digital twins are precise, virtual, real-time copies of products, services, machines, and systems (Klostermeier et al., 2018; Tao et al., 2019). In the course of the evolution of Industry 4.0 and the research on intelligent production, digital twins have received a lot of attention in engineering (Tao et al., 2019), but are also becoming increasingly relevant for the retail sector.

For the application of digital twins in the online grocery sector, I present two possible future development options, potentially supported by virtual reality applications: (1) the real-time digital representation of the stationary retail store and (2) the real-time digital representation of the customer as an avatar. The replication of the stationary retail store can offer the customer a digital real-time supermarket. The customer could, for example, digitally walk through the store and be inspired by products. As I outlined in my second paper, inspirational online shopping environments can amplify the behavioral intention to use online grocery shopping. A second future vision imagines the digital twin of the customer. Based on the collection of behavioral data and preferences as well as the integration of this data into artificial intelligence, the digital twin

knows what kind of products the customer wants and needs and what price ranges are preferred. This avatar could take over the task of purchasing groceries without any effort by the customer.

Besides the challenges of technological development, especially concerning which data to collect and how to proceed (Tao et al., 2019), the question of consumer acceptance arises. What factors favor the adoption of digital twins and in what way do they contribute to economic success? Digital twins are not only an interesting researching object from the perspective of customer experience. In presenting a real-time replication of the store, including the number of items in stock, and detailed product information such as expiry dates and sales numbers, they can help businesses to trace products in real-time and thus support logistics.

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II Research Papers

Paper 1: Antecedents of Online Grocery Shopping Acceptance in Germany: An Integrated Research Model

Abstract

Across the world online grocery shopping has been growing for the past decade, with China, South Korea and Great Britain leading in terms of the industry's popularity. In Germany, on the contrary, online grocery shopping is only adopted in individual cases. The objective of this study is to develop a research framework that explains the key drivers of the intention to use online grocery shopping of German consumers. The proposed framework incorporates Technology Acceptance Model 3 predictors and several external variables such as Product Involvement, Trust and E-Shopping Quality. Its composition is based on literature analysis and three qualitative workshops. For the framework evaluation, the data collected from 213 participants is analysed using structural equation modeling. The study strongly supports the proposed framework with job relevance, e-shopping quality, perceptions of external control and enjoyment being the strongest predictors of behavioral intention to use online grocery shopping.

Keywords: Online Grocery Shopping; Behavioral Intention; Online Grocery Acceptance; Technology Acceptance Model; Structural Equation Modeling (SEM), Partial Least Square

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6.1 Introduction

The grocery industry is one of the largest trading sectors worldwide. 66.5% of all revenue of the 250 largest trading companies in the world comes from fast-moving consumer goods (FMCG), within which the grocery industry is the major player. Among the top ten highest-turnover retail companies worldwide, six are in the grocery sector (Deloitte Touche Tohmatsu Limited, 2020).[3]

Alongside its transformation of industries such as electronics, fashion, and entertainment, digitization is taking the grocery sector into a changing, developing, and growing market (Heinemann, 2020; Parker et al., 2016; Van Alstyne et al., 2016). The international demand for online grocery shopping is rapidly developing (Melis et al., 2016; The Nielsen Company, 2015), especially in the UK, the leading country in Europe in terms of online grocery penetration, in other words, the percentage of grocery revenue that comes from online shopping. The UK is first in Europe not only in online grocery penetration, with 6.9% of grocery revenue coming from online shopping in 2016, but also in sales value, with US $28 billion predicted for 2020 (IGD and Profitero, 2016; Statista, 2019). South Korea is the current world leader in terms of online grocery penetration, with a penetration of 16.6% in 2016 and US $13 billion sales value in 2020. China is the worldwide leader in terms of sales value with US $178 billion in the online grocery industry in 2020 (IGD and Profitero, 2016; Statista, 2019). Especially in an international comparison, Germany lags far behind, with an online grocery sales share of only 1.1% in 2018 (Handelsverband Deutschland, 2018) and an estimated US $6 billion sales value in 2020 (IGD and Profitero, 2016).

Despite the existing digital infrastructure for online shopping and the remarkable increase in international online trade over the last decade, the German grocery industry has barely integrated and exploited online grocery commerce. There have been attempts to introduce such models in Germany, such as Rewe Online, Bringmeister.de, myTime.de, Lebensmittel.de, hierbeidir.de, and allyouneedfresh.de, but they have either failed or not reached their anticipated success. Although 64.6% of the German population shops online, only €47 per online shopper per year is spend on online groceries. In comparison, the online sales volume of non-food products in Germany is €14 billion, with each German online shopper spending €1227 yearly on non-food products (Handelsverband Deutschland, 2018). The low online grocery market penetration in contrast to the overall market size – in 2019 the German grocery retail industry had a turnover of €125.3

[3]Walmart, US $514.4 billion revenue in 2018; Costco, US $141.5 billion in 2018; Schwarz Group US$ 121.5 in 2018; The Kroger Co. US $117.5 billion in 2018; Aldi US $106.1 billion in 2018; Tesco US$ 82.8 billion in 2018 (Deloitte Touche Tohmatsu Limited, 2020).

billion (GfK, 2020) – indicates that online and offline behavior differs substantially, especially in the food sector, although the same products are offered (Martín et al., 2019; Wolfinbarger and Gilly, 2003; Yeo et al., 2017)

Considering the economic environment, the question arises why online grocery business models in Germany have not yet been able to achieve comparable breakthrough success as those in international markets and the German non-food sector. Current literature on the online grocery industry is divided into three main streams focusing on the market, the retailer and the consumer. Most of these studies possess a quantitative nature, either using secondary customer data from US, Asian, or European grocery stores, or conducting customer surveys. The majority of this research is country-specific, mainly focusing on consumer data from the US or the UK, while research with data from German customers is rare (Fedoseeva et al., 2017; Pechtl, 2003; Seidel et al., 2016).

Against the background of the shortage of German consumer behavior research, this study seeks to find out why online grocery business models in Germany are not performing up to their potential by exploring the determinants of the behavioral intention to shop online for groceries. The identification of the factors influencing the consumers intention to buy groceries online is useful for academics and practitioners, in that it helps to better understand consumer behavior in an emerging online grocery shopping environment. Building upon this, understanding consumers helps to design successful, consumer-centered business models that stimulate the sustainable adoption and acceptance of online grocery shopping in Germany (Kumar and Anjaly, 2017; Lemon and Verhoef, 2016).

To contribute to the understanding of online grocery acceptance and extract its influencing factors, this research pursues the research question: *What requirements and needs are shaping the consumer's behavioral intention to use or refuse online grocery shopping in Germany?* For this purpose, a research framework describing the antecedents of the consumer's intention to use online grocery shopping, is developed and empirically tested.

Overall, this research makes three main contributions. First, it takes stock of the literature on online grocery shopping consumer behavior worldwide, evaluates it, and elaborates its contributions to the research on online grocery shopping acceptance. Online grocery shopping is a novel and fast-developing form of retail, especially in the context of its economic significance. While this fact gives legitimacy to the growing academic and corporate interest in this area, it also underscores the need for additional research on this industry that aims at a better understanding of the success and failure of models in the German market. In so doing, I deliver a basis to substantiate academic and corporate discussions on online grocery shopping acceptance factors.

Second, the empirical results make it possible to support firm decision-making on the future creation of positive customer experiences and, resulting from this, the design of online grocery business models that go beyond current existing models in that industry. Other researchers can use the extracted acceptance factors as a starting point for their own research on the mechanisms and factors that influence the success and failure of online grocery business models. Third and finally, I am among the first to examine German consumer behavior concerning online grocery shopping in detail.

The paper proceeds as follows. In Section 6.2, I outline a literature review on online grocery shopping acceptance as well as on integrated research models to predict behavioral intentions. Further, in Section 6.3, I discuss how I extracted online grocery acceptance factors specific to German consumers. I conducted three qualitative workshops, two of which used the Bewextra method and the third of which was a consumer requirements workshop. Building upon the literature analysis as well as the qualitatively generated findings in Section 6.4, I developed a conceptual research framework with its corresponding hypotheses and described the antecedents for the behavioral intention to use online grocery shopping in Germany. I tested the proposed conceptual framework in a quantitative online survey. Its corresponding procedure and participant setting, as well as the methodology using structural equation modeling – more precisely, the partial least square (PLS) modeling approach – is the subject of Section 6.5. In Section 6.6, I present the results of the study. This includes illustrating the quality of the research model and exposing constructs that explain the behavioral intention to use online grocery shopping. I discuss the findings by identifying theoretical and managerial implications in Section 6.7. This paper closes with an outline of the limitations of this research and future research directions.

6.2 Literature Review

6.2.1 Consumer Behavior and Behavioral Intentions to Use Online Grocery Shopping

I started this research with a worldwide literature analysis, screening 316 scientific articles written in the English language, published between 1997 and 2018,[4] on the worldwide online grocery industry, incorporating research on consumer behavior. Based on three criteria (topic, focus, ranking) I filtered the literature using titles and abstracts, leaving 136 papers. Subsequently, I read and summarized those papers and identified three overall research directions: *Retailer* (48), *Consumer* (73), and *Market* (15). As the focus of this research is to contribute to the understanding

[4]The articles reviewed were listed in two databases, Web of Science and Science Direct.

of consumer behavior in online grocery environments, I investigate the *Consumer* research stream in more detail in the following.

A subset of the *Consumer* research stream (28 articles) deals with consumer behavior and behavioral intentions to purchase groceries online. Most of this literature focuses on very specific aspects of consumer behavior in online grocery shopping such as time savings (Cervellon et al., 2015) or price differences between online and offline groceries (Chu et al., 2008) and finds that these factors have great influences on the purchase intention or the behavioral intention to use online grocery shopping. The influences can be clustered based on their common characteristics in four categories: *Offering*, *Usefulness*, *Effort*, and *Consumer Focus* (see Figure 5).[5]

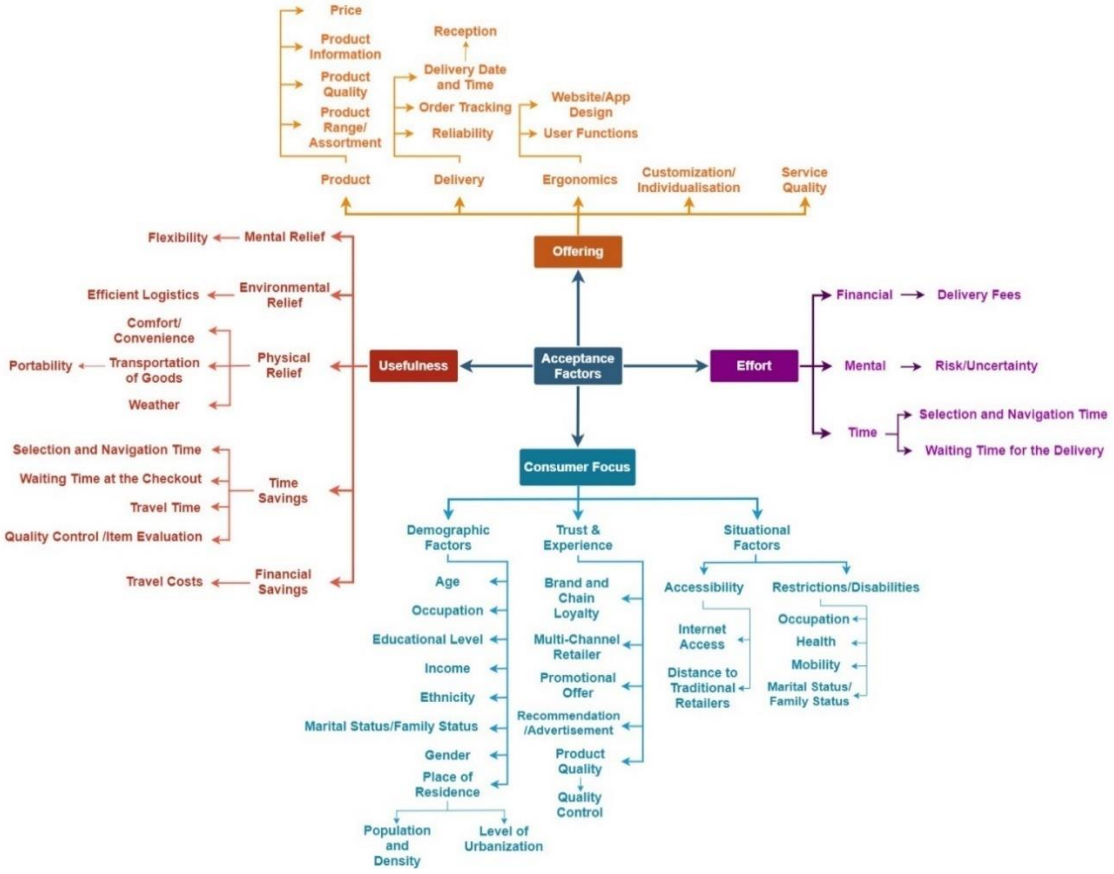

Figure 5: Overview of the Online Grocery Retail Acceptance Factors in Literature

Through the in-depth literature analysis of the publications within these categories, it becomes apparent that the most frequently studied factors are *Product Quality* (Boyer and Hult, 2005; Souitaris and Balabanis, 2007) and *Product Assortment* (Borle et al., 2005; Diehl and Poynor, 2010; Iyengar and Lepper, 2000; Richards et al., 2016). Demographic factors of consumers also receive their share of attention, including *Occupation* (Arce-Urriza et al., 2017), *Education*,

[5]A list of the literature used to derive the acceptance factors is given in the Appendix A.

Family Status (Arce-Urriza et al., 2017; Danaher et al., 2003; Hand et al., 2009), *Gender* (Van Droogenbroeck and Van Hove, 2020), *Income* (Richards et al., 2016), and *Health*, *Mobility*, and *Disability* (Arce-Urriza et al., 2017; Hand et al., 2009).

Influences on the decision to grocery shop online have been studied, especially *Time Saving* and *Relevance* (a term that means, in this context, the suitability of online systems to help one do one's shopping) (Anesbury et al., 2016; Arce-Urriza et al., 2017; Avery et al., 2012; Boyer and Hult, 2005; Breugelmans and Campo, 2016; Gupta and Kim, 2007; Richards et al., 2016). Moderate scientific attention has so far been devoted to *Offerings* by the retailer or provider (Boyer and Hult, 2005; Moriuchi and Takahashi, 2018; Richards et al., 2016; Souitaris and Balabanis, 2007; Wolfinbarger and Gilly, 2003). Factors related to *Delivery* (Chintagunta et al., 2012; Moriuchi and Takahashi, 2018; Souitaris and Balabanis, 2007) and, *Time and Cost Efforts* (Arce-Urriza et al., 2017; Chintagunta et al., 2012) have been rarely examined in literature so far. Research concerning *Sustainability* (Boyer and Hult, 2005; Chintagunta et al., 2012; Seow et al., 2003) is almost insignificant.

Given the motivation of this study to gain a comprehensive understanding of online grocery shopping acceptance, these individual factors will serve as the basis for the development of the proposed online grocery acceptance framework (see Section 6.4).

6.2.2 Research Models on Online Grocery Shopping Behavioral Intention

Alongside those examining single influences, some frameworks combine multiple influences on the behavioral intention to use online grocery shopping proposed in the literature. Most of these are based on the technology acceptance model (TAM) (Davis, 1989; Davis et al., 1989), either adapting the initial TAM (see Section 6.2.3) to an online grocery setting (Hui and Wan, 2009; Kee and Wan, 2004) or adding aspects of consumer behavior to the TAM such as *Risk*, *Visibility*, and *Social Influence* (Kurnia and Chien, 2003), *Store Image*, *Purchase Intention* and *Store-Switching Costs* (Ruiz-Real et al., 2017), *Enjoyment* and *Visibility* (Driediger and Bhatiasevi, 2019), as well as *Payment Methods* and *Trust* (Abu-Shamaa et al., 2016). A summary of the research models using the TAM as an initial basis and their influencing factors on behavioral intention to use online grocery shopping including their results is presented in Table 3.

Summarizing the frameworks based on the TAM, it becomes apparent that the factors examined are mainly the demographic characteristics of the consumer, such as age, income, and gender, or factors hindering the adoption process, such as perceived risk and trust. Factors determining the quality of the purchase, such as product freshness and e-shopping quality, are not included.

Table 3: Research Frameworks based on TAM Predictors Explaining Behavioral Intention to use Online Grocery Shopping

Paper	*Authors*	*Influences on Behavioral Intention*	*Results*
"Payment Methods and Purchase Intention from Online Stores: An Empirical Study in Jordan"	Abu-Shamaa et al. (2016)	• Predictors of TAM 1 (Perceived Ease of Use and Perceived Usefulness) • Payment Methods • Trust	All proposed TAM predictors were found to be relevant (examined with customer data from Jordan) *Additional supported relationships:* • Trust as a moderator for the relationship between perceived ease of use and behavioral intention (BI) • Trust as a moderator for the relationship between Payment Methods (PM) on BI *Unsupported relationships:* • Influence of the moderator trust on the relationship from perceived usefulness on behavioral intention
"Who are the online grocers?"	Hui and Wan (2009)	• Predictors of TAM 1 (Perceived Ease of Use and Perceived Usefulness) • Gender • Age • Education • Monthly Income	TAM can explain the intended usage of online grocery with an accuracy of 87.4% (examined with customer data from Singapore). *Intention to use is dependent on:* • Age o Customers between 21 and 40 years old are most likely to shop for groceries online • Education o Working Professionals are more willing to use online grocery service due to time-savings and convenience reasons • Income Levels o Consumers whose monthly income is below US $2000 have little inclination to shop for groceries online
"Intended Usage of Online Supermarkets: The Singapore Case"	Kee and Wan (2004)	• Predictors of TAM 1 (Perceived Ease of Use and Perceived Usefulness) • Gender • Age • Education • Monthly Income	TAM can explain the intention to shop online for groceries with an accuracy of 87.4% (examined with customer data from Singapore). *Intention to use is dependent on:* • Age o Customers between 21 and 40 years old are most likely to shop for groceries online • Education • Income Levels o Consumers whose monthly income is below US $1500 have little inclination to shop for groceries online

Table 3: Research Framework based on TAM Predictors Explaining Behavioral Intention to Use Online Grocery Shopping (continued)

Paper	*Authors*	*Influences on Behavioral Intention*	*Results*
"The Acceptance of Online Grocery Shopping"	Kurnia and Chien (2003)	• Predictors of TAM 1 (Perceived Ease of Use and Perceived Usefulness) • Perceived Risk • Visibility • Social Influence	All proposed TAM predictors were found to be relevant (examined with customer data from Australia) *BI is dependent on:* • Visibility of online grocery shopping *BI is not dependent on:* • Social Influences • Perceived Risk
"Online grocery shopping in Thailand: Consumer acceptance and usage behavior"	Driediger and Bhatiasevi (2019)	• Predictors of TAM 1 • Subjective Norm • Visibility • Perceived Risk • Enjoyment	All proposed TAM predictors were found to be relevant (examined with customer data from Thailand) *Additional supported relationships:* • Enjoyment positively related to perceived usefulness (PU) and perceived ease of use (PEU) • Subjective norm has a positive influence on PU *Not supported relationships:* • Visibility is positively related to PU of online grocery shopping • Perceived risk has a negative influence on PU of online grocery shopping

Besides using the TAM as a framework basis, some researchers have developed further frameworks to explain online grocery shopping acceptance, independently from or based on other IT acceptance models (Boyer and Hult, 2006; Hand et al., 2009; Ruiz-Real et al., 2017; Yeo et al., 2017). Most of them focus on individual variables to explain single parts of acceptance, adoption, or behavioral intention. A summary of their proposed influences and presented results is given in Table 4.

Yeo et al. (2017) developed a research model based in the Contingency Framework (Anderson and Srinivasan, 2003) combined with an extension of the model of IT Continuance (Bhattacherjee et al., 2008). The Contingency Framework describes the impact of *E-Satisfaction* on *E-Loyalty*, moderated by individual-level factors of consumers like *Inertia*, *Purchase Size*, and *Convenience Motivation*, as well as business level factors such as *Trust* and *Perceived Value* offered by the firm (Anderson and Srinivasan, 2003).

The original model of IT Continuance describes, how the factors of *Perceived Usefulness*, *Disconfirmation*, and *Satisfaction* affect the intention to continue IT use. The extended model of IT Continuance enlarges the given context of the original model with the variables *Post-Purchase Usefulness*, *IT Self-Efficacy*, *Continuance Behavior*, and *Facilitating Conditions* (Bhattacherjee

et al., 2008). The combined approach of Yeo et al. results in a framework intended to explain behavioral intention towards online food delivery services as being moderated by attitude towards online food delivery services, convenience, and post-purchase usefulness. The framework states that that perceptions of convenience and post-purchase usefulness are affected by hedonic motivation, prior online purchase experience, time-saving orientation, and price saving orientation. Post-purchase usefulness and convenience are used as substitutions for perceived usefulness and perceived ease of use, which are core factors of the TAM (Yeo et al., 2017).

Table 4: Research Frameworks Explaining Behavioral Intention to Use Online Grocery Shopping

Paper	*Authors*	*Influences on Behavioral Intention*	*Results*
"Customer behavioral intentions for online purchases: An examination of fulfillment method and customer experience level"	Boyer and Hult (2006)	• Service quality • Product quality • Product freshness • Time savings • Customer experience level • Order-picking method	• Behavioral intention to use online grocery shopping is strongly influenced by the picking-method (store-based picking and distribution center-based picking), product quality, product freshness, and time savings. • Factors are rated higher with increasing experience. • The relative importance of the influences differs between the picking-methods. The product freshness is outlined to be more important to distribution-center picking-based customers, while time savings are more important to store-based picking customers.
"Online grocery shopping: the influence of situational factors"	Hand et al. (2009)	• The influence of individual and situational factors	Two-stage approach: qualitative (audio tape observation) study with 32 respondents and quantitative research (offline survey) with 1128 questionnaires *Findings of the qualitative study* • Adoption of online grocery shopping is highly influenced by the situation or circumstance around that person and can change dynamically, e.g. becoming parents or being restricted in mobility caused by an injury. *Findings of the quantitative study:* • Support the importance of situational factors, resulting in the conclusion that online grocery shopping is an infrequent process highly dependent on circumstances rather than a cognitive decision process. • The initial adoption of online grocery shopping is dependent on the background of situational changes

Table 4: Research Frameworks Explaining Behavioral Intention to Use Online Grocery Shopping (continued)

Paper	*Authors*	*Influences on Behavioral Intention*	*Results*
"The role of consumers' attitudes in estimating consumer response to assortment composition. Evidence from Spain"	Ruiz-Real et al. (2017)	• Product category involvement • Attitude towards private labels • Value consciousness (low prices and quality restrictions) • Variety assortment perception • Store image • Store-switching Intentions	Consumers react differently to different product assortment compositions according to size (single brand, small or large assortment) or structure (private labels only or mixed assortments) (examined with customer data from Spain). • Private label (PL) purchase intention influences store choice • PL purchase intention influenced by a positive attitude towards PL and good store image • Switching costs decrease when a wide variety in the assortment is perceived, high value is perceived and the store has a positive image
"Consumer experiences, attitude and behavioral intention toward online food delivery (OFD) services"	Yeo et al. (2017)	• Hedonic motivation • Prior online purchase experience • Time saving orientation • Price Saving Orientation • Convenience motivation • Post-purchase usefulness	• Examined with customer data from Malaysia • With ascending perception of post-purchase usefulness and convenience motivation, the attitude of the participants concerning online grocery delivery improves. • The same applies to an advancing hedonic motivation leading to a more positive attitude towards online grocery delivery • This also leads to a stronger intention to use online grocery delivery • Prior online shopping experience was not found to be significant in promoting the perception of post-usefulness • Price service orientation showed an indirect relationship

Another integrated research framework is that of Hand et al. (2009). They base their identification of activators for the adoption of online grocery shopping on the literature on the adoption of innovations in general as well as impulses from internet shopping. They also add the Social Cognitive Theory to elaborate situational factors (Hand et al., 2009). The Social Cognitive Theory comes from psychology and addresses knowledge acquisition. Originating with Bandura in 1977, this theory states that individuals observing a behavior enacted by another person and its consequences can learn and remember the sequences of this behavior and apply it in similar situations (Bandura, 1977).

While Yeo et al. (2017) leave out social and situational factors as well as other variables like trust, product quality, technology handling skills, technology sensation, subjective norm, and product involvement, Hand et al. (2009) focus almost exclusively on situational factors in their research

and leave out technical parameters influencing the perceived ease of use or the perceived usefulness, which, according to the Technology Acceptance Model, are key factors in building an intention to use online grocery shopping.

In conclusion, Boyer and Hult (2006), Ruiz-Real et a. (2017), Yeo et al. (2017), and Hand et. al. (2009) all use frameworks that focus on particular aspects of the behavioral intention to use online grocery shopping. Their underlying assumptions are designed to partially explain behavioral intention and are directed to deliver results based on the questions they ask about factors such as picking method, assortment composition, convenience, personal situation, or post-purchase usefulness. In reviewing the literature, it also became apparent that although many individual factors of consumer behavior and their potential impact on the behavioral intention to use online grocery shopping have been scientifically investigated (see Section 6.2.1), no research model unites the investigated factors and seeks to explain acceptance with a holistic approach. Given the motivation of this study to provide a comprehensive framework on German consumers' acceptance of online grocery shopping, the scientific popularity and maturity of the TAM, and the latitude to extend the TAM by additional factors, I decided to use the TAM 3 as a basis for the development of the online grocery acceptance framework.

6.2.3 Technology Acceptance Models

The TAM was based on the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1980, 1975) and the Theory of Planned Behavior (TPB) (Ajzen, 1991). In research, the TRA has been widely used to predict behavioral intentions and the resulting actual behavior (Alzahrani et al., 2019; Chang, 1998; Hansen et al., 2004; Shimp and Kavas, 1984). In TRA, the behavioral intention is described as "a function of salient information or beliefs about the likelihood that performing a particular behavior will lead to a specific outcome" (Madden et al., 1992, p.3). Fishbein and Ajzen note that the behavioral intention is influenced by the antecedent of the individual attitude towards performing the behavior as well as the subjective norm about performing the behavior (Fishbein and Ajzen, 1975) (see Figure 6).

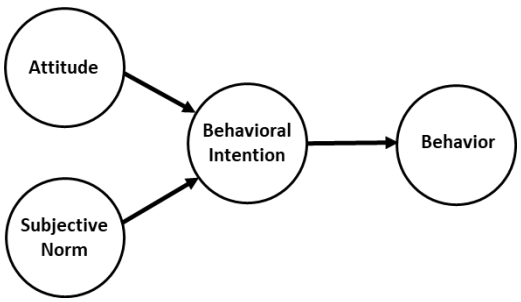

Figure 6: Path Model for the Theory of Reasoned Action. Source: Madden et al., 1992, p. 4

Incorporating the constructs of perceived behavioral control, the TRA was extended to the Theory of Planned Behavior (TPB) (Ajzen, 1991, 1985). In this, the variable *Perceived Behavioral Control* was added, having a direct effect on the behavior itself and an indirect effect on the behavior by having a direct effect on behavioral intention (Madden et al., 1992) (see Figure 7).

Incorporating the TRA, the TAM was developed to predict the acceptance of new technological systems in the workplace (Davis, 1989; Davis et al., 1989). The fundamental conditions of the initial TAM state, that the intention of an individual to use a new technological system is based on two perceptions: *Perceived Ease of Use* and *Perceived Usefulness*. Both variables have been found to positively influence the intention to use a new technological system. In a further step, the intention to use a new system leads to the actual usage behavior respectively the acceptance of the system (Davis, 1989; Davis et al., 1989).

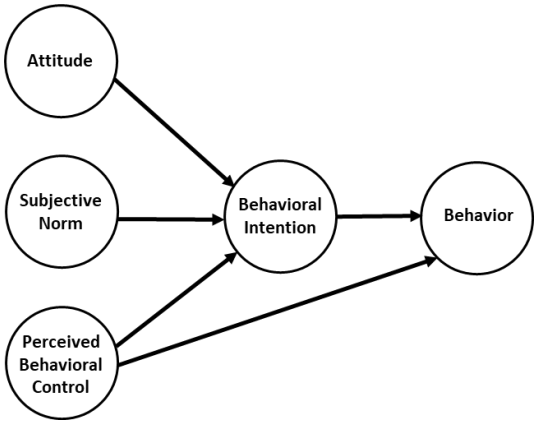

Figure 7: Path Model for the Theory of Planned Behavior. Source: Madden et al., 1992, p.4

Over the years, the TAM has been applied in many areas, especially in connection with e-commerce. Most of the research on e-commerce acceptance focuses on independent variables such as *Trust*, *Enjoyment*, *E-Shopping Quality*, *Product Involvement*, and *Product Quality*, which are added to the initial TAM (Boyer and Hult, 2006; Childers et al., 2001; Gefen et al., 2003; Ha and Stoel, 2009; Koufaris, 2002; Kurnia and Chien, 2003; Wolfinbarger and Gilly, 2003).

Since the development of the initial TAM, two extensions, TAM 2 and TAM 3 have been proposed. The TAM 2 was introduced in the year 2000 by Venkatesh and Davis. These researchers extended the initial TAM with two broad determinants influencing perceived usefulness, as well as two moderators. The determinants were social influence processes (*Subjective Norm*, *Voluntariness*, and *Image*) and cognitive instrumental processes (*Job Relevance*, *Output Quality*, *Result Demonstrability*, and *Perceived Ease of Use*). The moderators were *Experience* and *Voluntariness*; the second was said to influence the intention to use both directly and, through its influence on the subjective norm, indirectly (Venkatesh et al., 2003;

Venkatesh and Bala, 2008; Venkatesh and Davis, 2000) (see Figure 8). The extended model accounts for 34%-52% of the variance in *Intention to Use* and also notes that the additional determinants significantly influence user acceptance (Venkatesh and Davis, 2000).

In TAM 3, Venkatesh and Bala 2008 enlarge the TAM 2 with the *Model of the Determinants of Perceived Ease of Use* (Venkatesh, 2000). They present an integrated model of IT adoption and use by showing key determinants of *Perceived Usefulness* (TAM 2) as well as key determinants of *Perceived Ease of Use* (TAM 3).

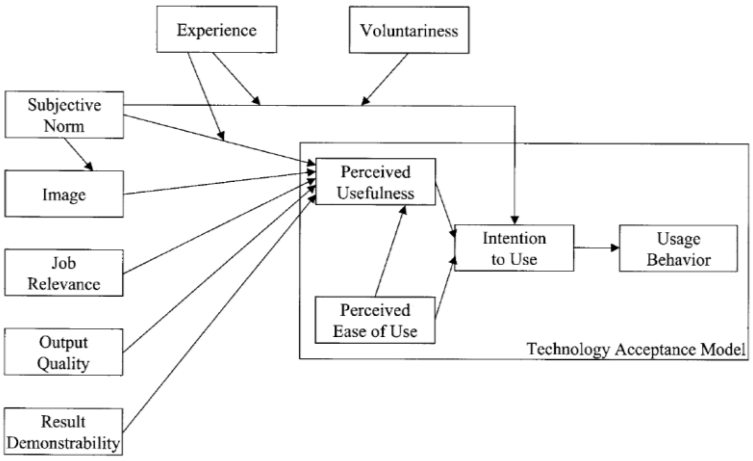

Figure 8: Technology Acceptance Model 2. Source: Venkatesh and Davis, 2000, p.188

These determinants are: *Computer Self-Efficiency*, *Perceptions of External Control*, *Computer Anxiety*, *Computer Playfulness*, *Enjoyment*, and *Objective Usability* (see Figure 9). The authors additionally purpose three new influencing relationships induced by the *Experience* moderator (Venkatesh and Bala, 2008).

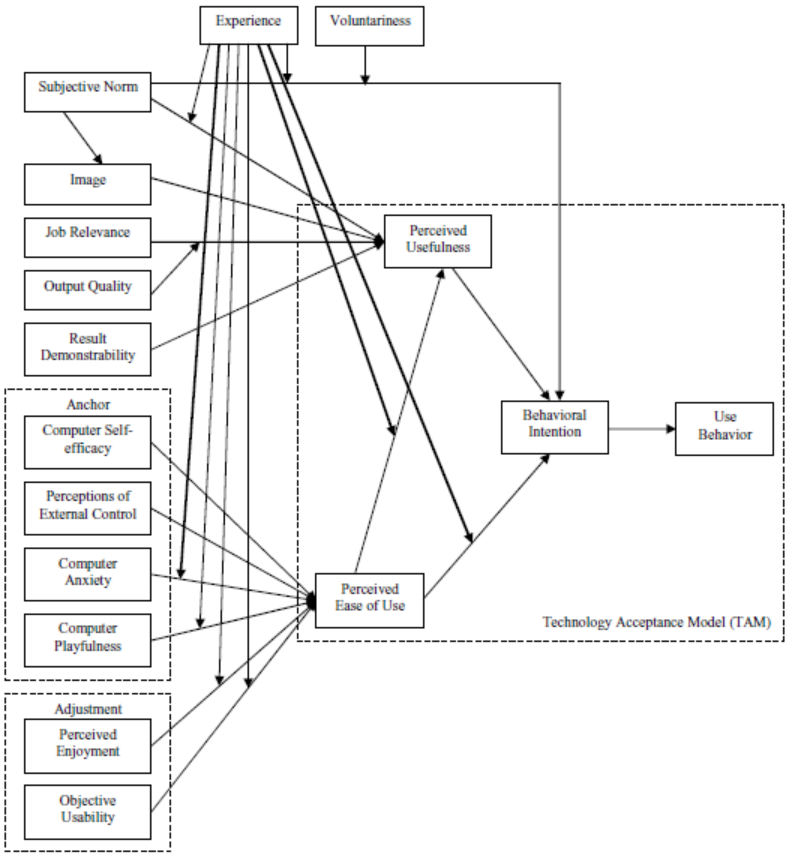

Figure 9: Technology Acceptance Model 3. Source: Venkatesh and Bala, 2008, p.280

6.3 Qualitative Extraction of Acceptance Factors

6.3.1 Consumer Requirements Workshop

The detailed analysis of the literature helps understanding general factors and frameworks which influence the online grocery shopping acceptance. The outlined factors and frameworks have been examined in country-specific contexts like the UK or the US but not specific to the German market. As the economic success of online grocery shopping in Germany differs substantially from other countries, I assume that this is rooted – among other factors – in peculiar German online grocery shopping experiences. To understand the perspective of German consumers, I carried out three workshops. The three consumer workshop results are described in the following. The results of these workshops as well as the results of the literature analysis will subsequently be incorporated in the development of my comprehensive online grocery shopping acceptance framework. This is explained in Section 6.4.

To gain an understanding of online grocery acceptance from the consumer's point of view in addition to the literature, I first conducted a four-step requirements workshop with eleven

participants – four of them female, seven of them male, aged between 16 and 32. The four steps and corresponding key results are shown in Figure 10.

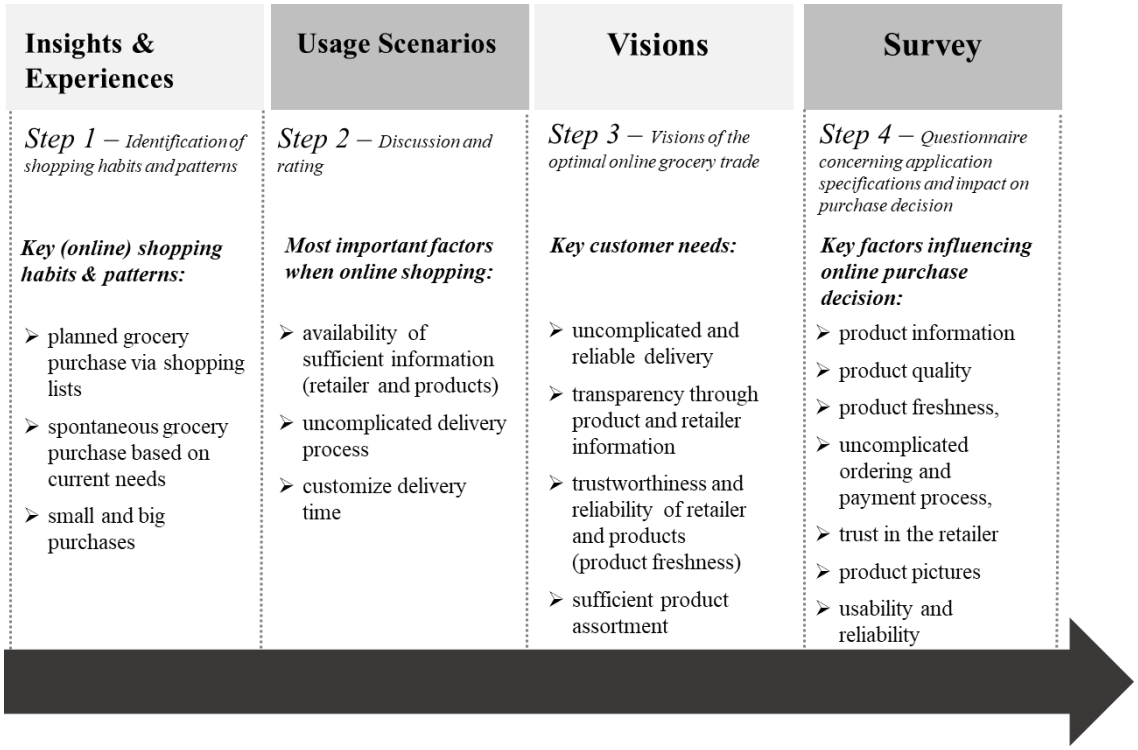

Figure 10: Four-Step Consumer Requirements Workshop and Key Results

In step four of the workshop, the participants completed a prepared survey with 33 questions. The questionnaire included characteristics of the user interface. product information, user-friendliness, shopping experience, payment method, et cetera and how important they were when the participant was choosing whether or not to shop online for groceries. A five-point Likert scale was used, with ratings ranging from *very important* to *not important at all*.[6] The factors rated as very important for the purchasing decision when buying groceries online are shown in Figure 11.

[6]The comprehensive questionnaire is given in the Appendix B.

Figure 11: Factors Rated as Very Important concerning Online Grocery Purchase Decision

To derive acceptance factors from the qualitative data from step one to three of the workshop, I conducted a qualitative content analysis. Subsequently, I compared the workshop results with the results of the questionnaire. Finally, I classified the various acceptance factors into seven main themes, presented in Table 5.

Table 5: Extracted Acceptance Factors via the Consumer Requirements Workshop

Prioritization	Extracted Acceptance Factor
1	Product Quality
2	Product Freshness
3	Availability of Product Information Including Pictures of the Products
4	User-friendliness of the Online Grocery Store and Uncomplicated Handling
5	Trust in the Retailer
6	Uncomplicated Delivery Process
7	Product Assortment

During the qualitative analysis of the consumer requirements workshop, it became evident that some factors influencing the acceptance are difficult to formulate and externalize by the participants. To extract these hidden and sticky factors, I carried out two additional workshops using the Bewextra method (Kaiser and Kragulj, 2016).

6.3.2 Bewextra Method Workshop

The underlying methodological framework of the Bewextra method combines three theoretical pillars from the *theory of needs*, *learning from an envisioned future*, and *generative listening*. While traditional market research usually assumes that consumers can fully express their needs, Goffin et al. (2010) have shown that some requirements and needs are anchored subconsciously and can not be specifically formulated or externalized by the consumer (Goffin et al., 2010; Kaiser and Kragulj, 2016).

The Bewextra method provides a three-step methodology to uncover hidden and unconscious needs and requirements of organizations or economical systems (Kaiser and Kragulj, 2016). This is enabled by breaking the assumption that learning comes only from past experiences and understanding that it can also derive "from a reality that is not yet embodied in manifest experience" (Scharmer, 2000, p. 6). The dialog setting of generative listening, where "knowledge is generated transcending the information carried by spoken or written words" (Kaiser and Kragulj, 2016, p. 84), supports the process of learning from the future. An overview of the three steps of this methodology is presented in Figure 12.

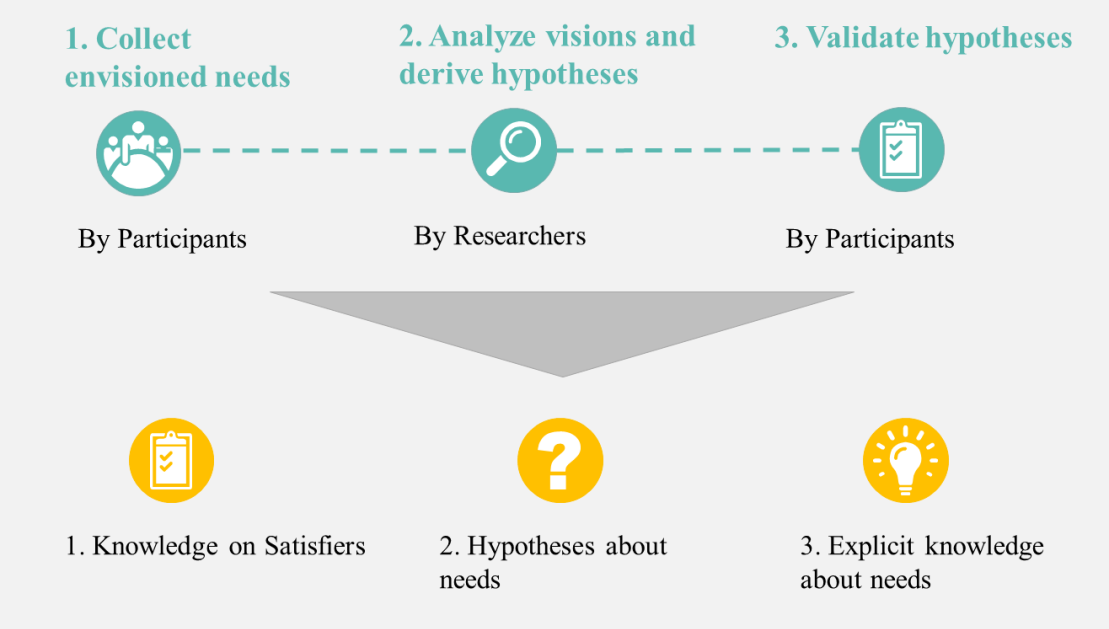

Figure 12: Overview of the Three Steps of the Bewextra Methodology. Based on Kaiser and Kragulj, 2016

The first workshop included seven women and seven men, and in the second, six women and seven men of varying ages and demographic backgrounds. The first workshop steered the participants in the direction of general e-commerce and their corresponding wishes and needs. To contrast the results of this workshop and to highlight the particularities of the online grocery sector, the participants in the second workshop dealt exclusively with the topic of online grocery shopping.

Step 1

To enable the participants to create visionary ideas, requirements, and needs of a possible online grocery retailing future, they were supported by music. The participants documented their visions using a paper-and-pencil approach. In their writings, the participants report what felt better and more pleasant in their future vision compared to the world of today.

Step 2

From the documentation of the participants' visions, I qualitatively derived the needs of the participants. These needs were subsequently formulated as hypotheses on the future of grocery retail. The first workshop yielded 21 hypotheses and the second 30. To summarize the 51 hypotheses, I aggregated them into five subordinate acceptance factors.[7] The acceptance factors and examples of the hypotheses are shown in Table 6.[8]

Table 6: Subordinate Acceptance Factors and Examples of Corresponding Hypotheses

Acceptance Factors	*Examples of Hypotheses*
Purchase Planning	"I would like to have interactive support in planning my food purchases (e.g. via an app on my smartphone), which allows me to directly obtain information about the available foods, such as maturity, freshness, origin, etc.."
Product Range	"I would like to have a large range of food products."
Purchase Experience	"I would like to have a food offering that enables me to order goods online from home and then pick them up in the shops (Click and Collect)."
	"In addition to an automated purchasing system, I would like to have expert personnel to advise me."
Transport	"I would consider/use the possibility of delivering my food purchases (online AND offline) more often if they were sent to me at regular, easily organized intervals with my "standard foods" (also from various retailers)."
Atmosphere	"For my grocery shopping, I wish for a shopping atmosphere that allows me to experience food."

Step 3

The participants evaluated the hypotheses via an online questionnaire on a six-point Likert scale ranging from *I don't agree at all* to *I totally agree*. Nine of the participants in the first workshop and five in the second filled out the questionnaire. To evaluate the surveys, I calculated the mean, standard deviation, and variance of each category. The statistical evaluation for the first workshop is shown in Table 7 and for the second workshop in Table 8.

Table 7: Statistical Evaluation Workshop 1 (General E-Commerce)

Statistics	*Purchase Planning*	*Product Range*	*Purchase Experience*	*Transport*	*Atmospher*
N	9	9	9	9	9
$\bar{x}$	3.88	4.72	4.39	4.61	4.38
s2	0.78	1.12	0.83	0.76	0.80
S	0.61	1.26	0.68	0.58	0.63

[7] I did not assign all hypotheses to the online grocery context, since some requirements are also concerned with the improvement of stationary trade. Of the 51 hypotheses collected, 27 apply to the online food sector.
[8] A list of all hypotheses is given in Appendices C and D.

Table 8: Statistical Evaluation Workshop 2 (Online Grocery)

Statistics	*Purchase Planning*	*Product Range*	*Purchase Experience*	*Transport*	*Atmosphere*
N	*5*	*5*	*5*	*5*	*5*
$\bar{x}$	3.30	5.12	4.0	3.27	4.35
s^2	1.15	0.67	1.21	1.25	1.12
S	1.35	0.44	1.43	1.58	1.27

Looking at the statistics of the first workshop, it becomes apparent that the factors *Product Range* (product quantity, product information, product quality) as well as *Transpor*t (delivery), are evaluated as important needs regarding general e-commerce environments. The participants of the second workshop rated *Product Range*, *Purchase Experience* (actual product purchase experience) and *Atmosphere* (salesroom appearance and corresponding atmosphere) as being highly important. The extracted needs concerning *Transport* and *Purchase Planning* (preparation of the purchase to be made, e.g. shopping list, store choice) are assigned medium importance.

In conclusion, I find seven acceptance factors of online grocery shopping in the requirements workshop and three additional in the Bewextra workshops. All ten factors are included in the development of the comprehensive online grocery acceptance framework. The development of the framework is described in the following.

6.4 Development of the Research Framework

This work aims to develop a comprehensive research framework that describes the acceptance of online grocery shopping. Therefore, the proposed framework combines the influences discovered in the literature (see Section 6.2) and the consumer workshops (see Section 6.3).

In the first step of the framework construction, I translated all TAM 3 constructs into the online grocery context. In a second step, I compared the TAM 3 constructs and their corresponding items with the factors extracted via the literature analysis and the qualitative workshops to determine what factors have not yet been considered by the underlying TAM 3 predictors. It emerged that fifteen online grocery shopping influences are not represented, namely:

- *Trust*
- *Product Quality*
- *Product Freshness*
- *Reliable Delivery*
- *Reliability*
- *Assortment*
- *Product Information*
- *Website Design and Functionalities*
- *Customer Service*
- *Product Involvement*
- *Financial Savings*
- *Relief from Physical Effort while Grocery Shopping*
- *Eco-friendliness*
- *Customization*
- *Delivery Costs*

I added twelve of these to my proposed framework.[9] In this framework, these factors are represented by the items of five constructs validated in the in e-commerce context: *Trust* (Gefen et al., 2003), *Product Involvement* (Koufaris, 2002; McQuarrie and Munson, 1992), *Product Quality* (Boyer and Hult, 2006), *Product Freshness* (Boyer and Hult, 2006), and *E-Shopping Quality* (Wolfinbarger and Gilly, 2003). The proposed framework is shown in Figure 13. Its constructs and determinants as well as their inter-relationships are explained in greater detail in the following section.

[9]The factors of *Financial Savings*, *Delivery Fee*, and *Eco-friendliness* were excluded from the proposed framework to reduce complexity.

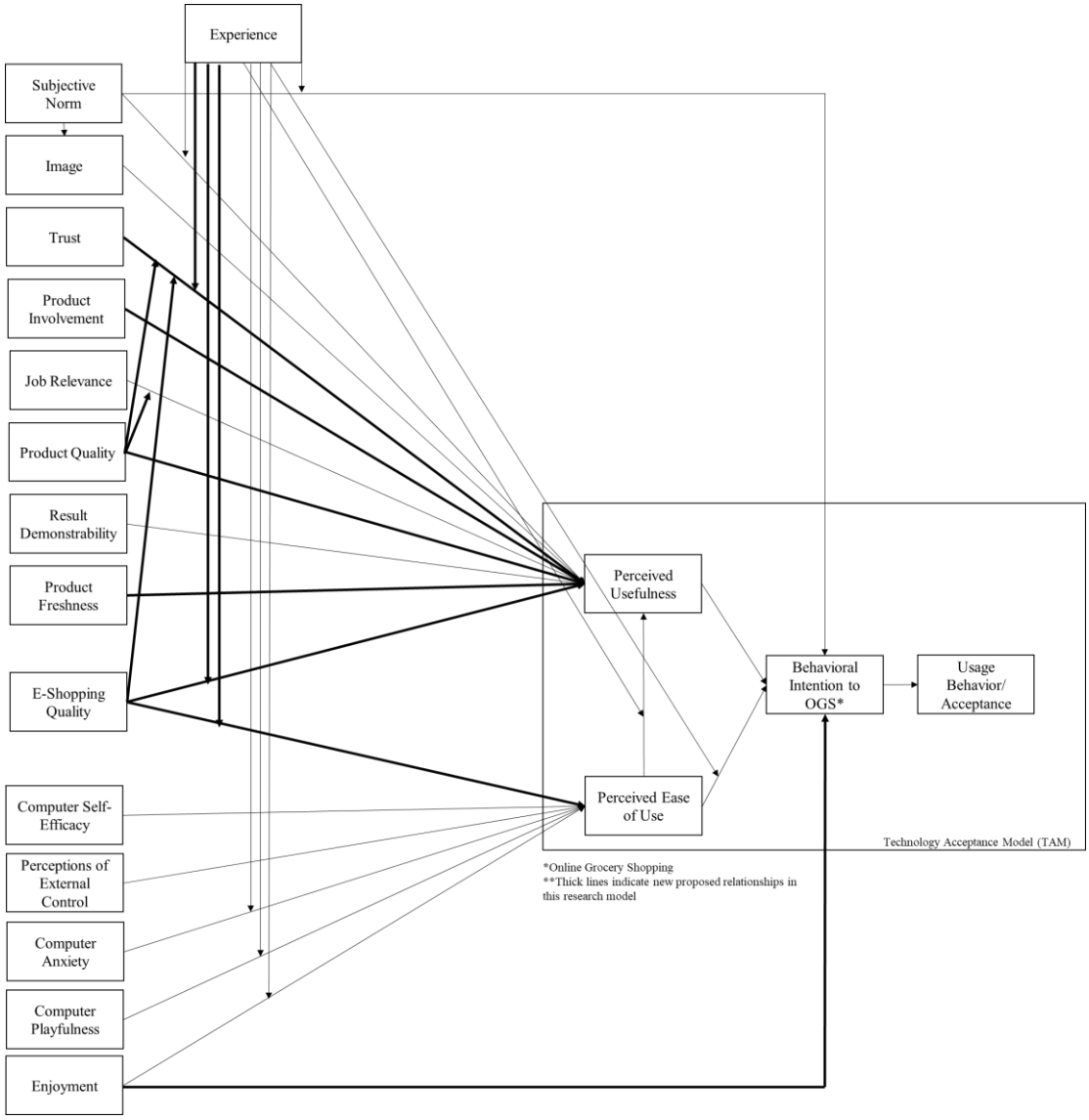

Figure 13: Research Model on Online Grocery Shopping Acceptance. Based on Venkatesh and Bala, 2008, p.280

6.4.1 Relationships from the Technology Acceptance Model

Behavioral Intention (BI) to Online Grocery Shopping

One of the best predictors of behavior, including the actual usage of novel technology, is the so-called behavioral intention (Liébana-Cabanillas et al., 2017; Venkatesh and Davis, 2000; Zhang et al., 2012). It is also the core concept of the technology acceptance model. In the context of online grocery shopping, the behavioral intention is defined as an online purchase intention by the consumer, also referred to as the actual probability that the consumer will use online grocery shopping (Gefen et al., 2003; Liébana-Cabanillas et al., 2017; Venkatesh and Bala, 2008). Since the development of the market of online grocery shopping is still ongoing, the behavioral intention to use online grocery shopping is tested in this study. Behavioral intention is also defined as a direct ancestor to the actual behavior and thus, in the present case, to the acceptance of the new

system (Madden et al., 1992). Behavioral intention to use a new technological system is made up of the two determinants, *perceived usefulness* and *perceived ease of use* (Venkatesh and Davis, 2000).

Perceived Usefulness (PU) and Perceived Ease of Use (PEU) with Experience (EXP) as a Moderator

Two fundamental factors inform one's decision to accept or reject new technology, develop an online purchase intention, and use online grocery shopping (OGS). One aspect of this is the extent of an individual's belief that the usage of the new system will improve or enhance the performance of the actual job or behavior, further referred to as *Perceived Usefulness* (PU) (Davis, 1989). In connection to online grocery shopping, perceived usefulness is the degree to which one believes an online grocery shopping system will improve one's grocery shopping process.

Secondly, the ease or difficulty of using a system also has a strong impact on the actual intention to use it, since the effort of using the system should not transcend the usefulness of the system. This factor is referred to as *Perceived Ease of Use* (PEU) (Davis, 1989). In the literature, perceived ease of use is defined as "the extent to which a person believes that using the system will be free of effort" (Davis, 1989, p.320; Venkatesh and Davis, 2000, p. 187).

Perceived usefulness and perceived ease of use have various determinants. Determinants influencing perceived usefulness are concerned with the result of the usage of the new system or technology,[10] and include *Subjective Norm, Image, Job Relevance, Output Quality,* and *Result Demonstrability*, while determinants of the perceived ease of use are concerned with the process of the new system or technology usage, and include *Computer Self-Efficacy, Perceptions of External Control, Computer Anxiety, Computer Playfulness,* and *Enjoyment* (Venkatesh and Bala, 2008; Venkatesh and Davis, 2000).

Besides the differing determinants, the TAM proposes that perceived ease of use positively influences perceived usefulness, based on the assumption that the easier the usage appears (PEU), the more an individual perceives a technological system to be useful (PU) (Davis, 1989; Davis et al., 1989; Venkatesh et al., 2003). Therefore, I hypothesize:

> *H1: Perceived usefulness of online grocery shopping positively affects the behavioral intention of an individual to use online grocery shopping.*
>
> *H2: Perceived ease of use of online grocery shopping positively affects the behavioral intention of an individual to use online grocery shopping.*

[10]In the following, the terms *system* and *technology* are used interchangeably to identify the same entity.

H3: Perceived ease of use of online grocery shopping positively affects the perceived usefulness of online grocery shopping.

Furthermore, with increasing practical experience with a new technology, the determinants of perceived usefulness and perceived ease of use vary in the strength of their effects. This phenomenon occurs because the user gains more familiarity and information about the level of ease or difficulty with which the system can be used. The user is now able, based on the perceived ease of use of the system, to estimate the probability of fulfilling the task successfully (PU) (Venkatesh and Bala, 2008).

H4: The positive effect of perceived ease of use of online grocery shopping on perceived usefulness will intensify with experience.

However, as experience with the system increases, the effect of perceived ease of use diminishes, since now the individual has the necessary process knowledge about how to use the system. Consequently, with increasing experience, the formation process of the individual's behavioral intention to use the new system is characterized by the fact that less importance is attached to the ease of use. Therefore, with increasing experience, the perceived ease of use has less impact on the behavioral intention (Venkatesh and Bala, 2008).

H5: The positive effect of perceived ease of use of online grocery shopping on behavioral intention will subside with experience.

Determinants of Perceived Usefulness

Subjective Norm (SN) and the Influence of Experience

One determinant of perceived usefulness is subjective norm. Subjective norm is defined as the perception of a person that people in the social environment who can influence that person's opinion expect him or her to use the new system or technology. (Davis et al., 1989; Venkatesh et al., 2003). In the present case, the new system or technology is, of course, online grocery shopping. With subjective norm, I include in my framework the social influences on a focal individual's behavioral intention to shop for groceries online. Subjective norm is assumed to have a positive direct effect on intention, a positive direct effect on perceived usefulness, as well as a positive effect on image (see Figure 9) (Venkatesh and Davis, 2000).

The direct effect of subjective norm on behavioral intention lies in the assumption that we may decide to perform a particular behavior even though we may not be positively disposed toward this behavior. We perform the behavior out of the beliefs that one or more influencing persons from our environment think that we should perform it – assuming, of course, that we are motivated to fulfill those people's expectations (Venkatesh and Davis, 2000). Research on the direct effect

of subjective norm on intention has produced mixed results. While Davis et al. did not find a significant effect from subjective norm on intention, they underlined the need for further research to understand social influences (Davis et al., 1989). In 2000, Venkatesh and Davis did find that subjective norm had a significant on intention, and that one's willingness to use the system acts as a moderator. If the use of a system is perceived to be mandatory, prescribed by a social actor who can reward or punish the behavior, then the individual's intention to use the system is directly influenced (Venkatesh and Davis, 2000). Apart from this, research indicates that subjective norm influences the behavioral intention to use online grocery shopping (Pookulangara et al., 2017; Ramadania and Braridwan, 2019); therefore, I test it with my proposed framework.

Furthermore, the proposed framework suggests a positive direct effect of subjective norm on perceived usefulness, explained by the mechanism of internalization (Kelman, 1958; Venkatesh and Davis, 2000; Warshaw, 1980). This process describes the one's perception that an important actor in the one's environment thinks that one should use the system and that the thinking of the actor also reflects one's own belief structure (Venkatesh and Davis, 2000). In the context of online grocery shopping, this means that if a friend or family member or other person of importance proposes that online grocery shopping is useful, the individual may arrive at the opinion that online grocery shopping is indeed useful.

> *H6: Subjective norm will have a positive direct effect on the behavioral intention to use online grocery shopping.*
>
> *H7: Subjective norm will have a positive direct effect on perceived usefulness of online grocery shopping.*

The direct effect of subjective norm on behavioral intention declines as our experience with the new technology increases. This is because our beliefs about the new technology are "vague and ill-formed" (Hartwick and Barki, 1994, p. 458) before we use it. We rely mainly on statements about the new technology from the social environment (Hartwick and Barki, 1994; Venkatesh and Davis, 2000). After we use the technology several times, we rely more on our own experience to form an opinion. Similarly, increasing experience will mitigate the influence of subjective norm on perceived usefulness, since the perceptions influenced by the social environment are replaced with concrete experiences (Venkatesh and Davis, 2000).

> *H8: The positive direct effect of subjective norm on behavioral intention will subside with experience.*
>
> *H9: The positive direct effect of subjective norm on perceived usefulness will subside with experience.*

Image (IMG)

The image of a technological system is its approval by society. It means the extent to which one believes that the use of a new technology can improve one's status or image in one's social system (Moore and Benbasat, 1991; Venkatesh and Davis, 2000). The proposed framework theorizes that subjective norm will have a positive influence on image, based on the assumption that if influential people within an individual's social group believe that the individual should use online grocery shopping, then using it will in turn improve the individual's standing within the social group. By using online grocery shopping, the individual performs a behavior that is in line with the norms of the social group and this may lead to increased social approval (image). This, in turn, provides a basis for the individual's perception that shopping for groceries is useful. Therefore, the image of online grocery shopping is assumed to have a positive effect on the perceived usefulness of online grocery shopping (Venkatesh and Davis, 2000).

H10: Subjective norm will have a positive effect on the image of online grocery shopping.

H11: Image will have a positive effect on the perceived usefulness of online grocery shopping.

In contrast to the influence of experience on subjective norm, the positive effect of image on perceived usefulness will not attenuate with increasing experience since, "status gains from system usage will continue as long as group norms continue to favor usage of the target system" (Venkatesh and Davis, 2000, p. 190) .

Job Relevance (REL)

Job relevance is a measure of the extent to which a technological entity contributes to the fulfillment of the task. It is described as the perceived suitability of using a new technology to master the task at hand. At an individual level, it is a matter of whether the technology in question is helpful or not in the fulfillment of a job. High job relevance is likely to have a positive effect on the perceived usefulness of the new system (Venkatesh and Bala, 2008; Venkatesh and Davis, 2000). In the context of online grocery shopping, the *job* is the action of shopping for groceries. If online grocery shopping is perceived to be helpful in the fulfillment, this *job* that enables online grocery shopping will seem useful.

H12: Job relevance has a positive effect on perceived usefulness on online grocery shopping.

Result Demonstrability (RES)

Result demonstrability is the comprehensibility and clarity of the result after the use of a new technology. It indicates whether and to what extent the improvement of a situation, which in the present research context is shopping for groceries, can be ascribed to the new technology (Moore and Benbasat, 1991; Venkatesh et al., 2003; Venkatesh and Davis, 2000). The improvement must be easy to recognize or observe. If the performance is improved in a way that the individual does not understand or, recognize it and is not able to communicate it (Moore and Benbasat, 1996), he or she will not perceive the benefits of the new system and will therefore not perceive it as useful (PU). On the contrary, if one observes a connection between the use of a new technology and a better result of this action, one develops a positive perception of the usefulness of the technology in consideration (Venkatesh and Davis, 2000).

> *H13: Result demonstrability of online grocery shopping has a positive effect on perceived usefulness of online grocery shopping.*

Determinants of Perceived Ease of Use

Computer Self-Efficacy (CSE)

Internal and external control play an important role in the formation of behavioral intentions. Internal control is conceptualized with the construct of computer self-efficacy (Venkatesh, 2000). It describes one's feeling or assessment of control over one's own abilities to perform a task using the computer or another digital device (Venkatesh and Bala, 2008).

The perception of self-efficacy affects one's decision to use a new technology and thus is a key factor for its successful implementation. Computer self-efficacy also has a significant influence on one's expectations about the outcome of computer usage as well as the one's emotional reaction to digital devices (Compeau and Higgins, 1995). Individuals with high computer self-efficacy are confident in their abilities to solve tasks using a digital device. The self-efficacy construct provides a basis for the individual's assessment of how easy or difficult it is to use the new system or technology. The higher one's computer self-efficacy, the easier one finds the system to use (PEU) (Compeau and Higgins, 1995; Ramadania and Braridwan, 2019; Venkatesh, 2000).

> *H14: Computer self-efficacy has a positive effect on perceived ease of use of online grocery shopping.*

Perceptions of External Control (PEC)

Perceptions of external control is defined as "the degree to which an individual believes that organizational and technical resources exist to support the use of the system" (Venkatesh and

Bala, 2008, p. 279). In the context of online grocery shopping, the perceived external control is the availability of a digital device and the knowledge of how to use it, internet access and daily-life compatibility. Similar to computer self-efficacy, the perceptions of external control positively influence the perceived ease of use. Based on their experiences in other online shopping areas, individuals have a general expectation about the availability of external control.

> *H15: Perceptions of external control have a positive effect on perceived ease of use of online grocery shopping.*

Computer Anxiety (CANX) and the Influence of Experience

Computer anxiety is concerned with feelings about using computers or digital devices. It describes the extent of one's concerns or even fears, when confronted with the possibility of using a computer or other digital device (Venkatesh, 2000). In contrast to computer self-efficacy – one's ability to interact with computers and – computer playfulness – one's spontaneity in interacting with computers – "computer anxiety is a negative, affective reaction of the individual toward computer use" (Venkatesh, 2000, p.349). Consequences of anxiety include negative effects on cognitive reactions and negative expectations regarding the process outcome. In Venkatesh's model of the determinants of perceived ease of use, computer anxiety is, therefore, a negative influence on the perceived ease of use (Venkatesh, 2000).

> *H16: Computer anxiety has a negative effect on perceived ease of use of online grocery shopping.*

TAM 3 postulates that experience moderates the relationship between computer anxiety and perceived ease of use so that the influence of computer anxiety on perceived ease of use decreases with increasing experience. This postulation is based on the assumption that with increasing experience, system-specific opinions will replace general beliefs about computer usage. With increasing usage, the individual becomes capable enough to develop precise ideas on how much effort is required to solve the task with the new system or technology (Venkatesh and Bala, 2008).

> *H17: The negative effect of computer anxiety on perceived ease of use of online grocery shopping will diminish with experience.*

Computer Playfulness (CPLAY) and the Influence of Experience

Computer playfulness is a response to an intrinsic motivation, the feeling of delight from performing a certain behavior (Venkatesh, 2000) in connection with using a new technology (Venkatesh and Bala, 2008). It is defined as "an individual's tendency to interact spontaneously, inventively and imaginatively with microcomputers" (Webster and Martocchio, 1992, p. 202).

Computer playfulness is a construct that is different for each individual and is independent of the system in question. Playful individuals make use of new computer systems not only because they expect a positive external result from doing so, but also just for the sake of using them. Individuals with a high degree of computer playfulness are inclined to underestimate the difficulty of using the new system, as they tend to focus more on the associated fun and curiosity of finding out how a new system works. They perceive it as less challenging to work with a new computer system than do less playful individuals. Therefore, a positive relationship is implied between computer playfulness and perceived ease of use (Venkatesh, 2000).

> *H18: Computer playfulness has a positive effect on perceived ease of use of online grocery shopping.*

Similar to computer anxiety, experience moderates the relationship between computer playfulness and perceived ease of use. With increasing experience, the individual builds a concrete knowledge base about the functioning of the system, causing the curiosity and playfulness towards the new computer system to decrease. While computer playfulness is a critical factor in the perception of the ease of use of a system, especially in the beginning of the use of the system, the positive effect of computer playfulness on perceived ease of use will diminish with increasing experience (Venkatesh, 2000; Venkatesh and Bala, 2008).

> *H19: The positive effect of computer playfulness on perceived ease of use on online grocery shopping will diminish with experience.*

Enjoyment (ENJ) and the Influence of Experience

Enjoyment is defined as the extent to which an individual perceives the usage of a new technology or system to be enjoyable, independent of the consequences of the system usage (Venkatesh, 2000; Venkatesh and Bala, 2008).

As a determinant of perceived ease of use, enjoyment refers to the usage process of a new technology. Enjoyment has a positive influence on perceived ease of use, but no influence on perceived usefulness, since enjoying using the system does not necessarily help to fulfill the given task more effectively.

> *H20: Enjoyment has a positive effect on perceived ease of use of online grocery shopping.*

It is also expected that enjoyment will intensify with experience. With an increase in experience with the system, the individual can assess not only the effort it takes to use the system, but also explore the aspects of the new system or technology that provide enjoyment (Venkatesh and Bala, 2008).

H21: The positive effect of enjoyment on perceived ease of use of online grocery shopping will intensify with experience.

6.4.2 New Relationships

Enjoyment (ENJ) on Behavioral Intention of Online Grocery Shopping

For the proposed research framework, I suggest that enjoyment has a direct effect on the behavioral intention to shop for groceries online. Childers et al. state that shopping motivations can be divided into utilitarian and hedonic motivations and that the type of motivation has a direct effect on the behavioral intention to purchase (Childers et al., 2001).

Individuals with utilitarian motivations are concerned with reaching a predefined goal, for example purchasing groceries, in an effective way that minimizes irritations. On the contrary, individuals with hedonic motivation seek entertainment and enjoyment experiences throughout the shopping process. As the enjoyment of using online grocery shopping increases, their attitude towards online shopping will become more positive. For utilitarian individuals, the enjoyment of the shopping process will have a weaker influence on their behavioral intention to shop groceries online (Childers et al., 2001).

H22: Enjoyment has a positive effect on behavioral intention of online grocery shopping.

Trust (TRU) and the Influence of Experience

A further newly suggested construct for the proposed framework is trust. Trust in the vendor helps consumers "to overcome perceptions of uncertainty and risk and engage in trust-related behaviors"(McKnight et al., 2002, p.335), like repeatedly shopping with a certain vendor. This especially applies to online environments, since there is no personal face-to-face interaction with the retailer and one cannot personally evaluate the quality of the products, such as by looking at them, touching them, and smelling them (Gefen et al., 2003; Güsken et al., 2019). Satisfied grocery shoppers develop a higher level of trust for the vendor (Jarvenpaa et al., 2000) and therefore are more likely to buy from this vendor again (Mortimer et al., 2016; Müller-Lankenau et al., 2005; Reichheld and Schefter, 2000). Repetitive voluntary behavior is not only what vendors aim for in the connection of loyalty and economic success, but it also serves as a strong indication for the acceptance of a technological system.

Based on the literature and the qualitative findings of the three workshops I conducted, trust in the e-vendor is a strong predictor for the perceived usefulness of online shopping systems, and consequently its acceptance (Borle et al., 2005; Boyer and Hult, 2006; Danaher et al., 2003; Gefen et al., 2003; Kim and Peterson, 2017; McKnight et al., 2002; Moriuchi and Takahashi, 2018). The

more trust the shopper feels, the more likely it is that he or she will build a positive perception of perceived usefulness and therefore strengthen the intention towards online grocery shopping.

> *H23: Perceived trust has a positive effect on perceived usefulness of online grocery shopping.*

The feeling of trust is strengthened by experience, as it can transform insecurities into securities (Gefen et al., 2003). The more experience the one gains in the process of online grocery shopping, the more knowledge one collects about the relevant process and the results. This leads to an increased feeling of trust. If the perceived result is not of the desired quality, experience, in turn, might lead to less trust in online grocery shopping (Boyer and Hult, 2006; McKnight et al., 2002). However, as experience with online grocery shopping increases, the effect of trust on perceived ease of use diminishes, because now the consumer has established a basis of trust. Consequently, with increased experience, the perception of usefulness is characterized by the fact that less importance is attributed to the trustworthiness of online grocery shopping.

> *H24: The positive effect of trust on perceived usefulness of online grocery shopping will subside with increased experience.*

Product Involvement (PI)

Product involvement is described as one's interest in a product (Walia et al., 2016) as well as the degree to which one is devoted to assessing the advantages and disadvantages of a product (Koufaris, 2002; Mittal, 1989; Petty et al., 1983; Roe and Bruwer, 2017). Product involvement is a variable that differs among consumers (Laurent and Kapferer, 1985) resulting in differing levels of involvement among various product categories (Roe and Bruwer, 2017). Based on the involvement level, consumers differ in their purchase decision (Laurent and Kapferer, 1985). When shopping for groceries, individuals typically also assess and evaluate the products through smelling, touching, and seeing the product, which is impossible when shopping for groceries online (Boyer and Hult, 2006). Given this paradigm, I argue that high product involvement harms perceived usefulness, based on the assumption that individuals with a high level of product involvement in groceries will perceive online grocery shopping as less useful.

> *H25: Product involvement in groceries has a negative effect on the perceived usefulness of online grocery shopping.*

Product Quality (PQ)

The quality of a product is an important factor in the purchasing decision. If the individual considers the quality as sufficiently good, the purchase is more likely (Boyer and Hult, 2006). Products can be categorized as *intangible* and *tangible* products. Intangible goods, such as airline

tickets and software, do not require physical evaluation by touch, vision, or smell. It is therefore possible to assess the quality of the product based on the information associated with it. In contrast, tangible products, such as groceries invite physical evaluation (Boyer and Hult, 2006). In the context of online shopping, physical assessment is not possible. Thus, consumers fear receiving low quality goods (Anckar et al., 2002) and may end up with misconceptions about the quality of products offered online. In the process of accepting a new technology, the individual will, therefore, judge how well the technology can support the task – in this context, to support the process of shopping for groceries of the desired quality (Venkatesh and Davis, 2000). Since product quality is a decisive factor in the purchasing decision, I argue that a high perceived product quality in an online grocery context has a positive effect on the perceived usefulness of online grocery shopping.

> *H26: Perceived product quality has a positive effect on perceived usefulness of online grocery shopping.*

Additionally, I propose that the higher the perceived quality, the stronger the effect is of job relevance on perceived usefulness, since the relevance of a new system is judged to be higher when the outcome is of high quality (Venkatesh and Bala, 2008).

> *H27: Perceived product quality has a moderating effect on job relevance. The higher the perceived product quality, the stronger the effect job relevance will have on perceived usefulness.*

I further hypothesize that the higher the perceived quality, the stronger the effect of trust on perceived usefulness becomes. If the individual perceives that the product is of high quality, then positive characteristics are assigned to the vendor that make it possible to form trust concerning online grocery shopping (Jarvenpaa et al., 2000; McKnight et al., 2002).

> *H28: Perceived product quality has a moderating effect on trust. The higher the perceived product quality, the stronger the effect trust will have on perceived usefulness.*

Product Freshness (PF)

Product freshness is one of the most important influencing factors for consumer behavior in supermarkets (Boyer and Hult, 2006, 2005), but has rarely been researched upon in online contexts. Pechtl identifies the "missing touch and feel experience as the most influential negative obstacle" (Pechtl, 2003, p. 145) in online grocery shopping. Given the fact that physical evaluation is impossible in an online context, product freshness is as a critical factor in online purchasing decisions. In online contexts, the individual, therefore, evaluates whether the products seem as fresh as they do in the traditional and stationary offline shopping process (Boyer and

Hult, 2006, 2005). I argue that a positive perception of product freshness will have a positive effect on the perceived usefulness of online grocery shopping.

H29: Perceived product freshness has a positive effect on perceived usefulness of online grocery shopping.

E-Shopping Quality (eTailQ) and the Influence of Experience

Quality, whether of goods or of services is linked to customer satisfaction, purchase intention, and loyalty and is an important factor for the economic success of the retailer (Al-dweeri et al., 2017; Wolfinbarger and Gilly, 2003). E-shopping quality is the customer's perception of the excellence of the e-shopping service (Lee and Lin, 2005). Four factors predict user's judgment of quality, as well as their satisfaction, customer loyalty and attitude towards a website or application: *website design*, *fulfillment/reliability*, *privacy/security*, and *customer service* (Wolfinbarger and Gilly, 2003).

While the determinants of perceived usefulness are concerned with the system results, the determinants of perceived ease of use influence the process of the usage (Venkatesh, 2000). The perception of a new system or technology as useful is also concerned with the quality of the output. Therefore, quality such as product quality, or e-shopping quality, is a determinant of perceived usefulness. A closer look at the construct of e-shopping quality reveals that the four subconstructs (website design, fulfillment/reliability, privacy/security, and customer service) are not only result determinants but also process-related factors. Website design and customer service not only help to fulfill a task to successfully shop for groceries but also help to solve the task easily. Based on the fact that e-shopping quality is composed of process- and result- oriented subconstructs, I argue that it has an influence on both perceived usefulness and perceived ease of use.

H30: E-shopping quality has a positive effect on perceived usefulness.

H31: E-shopping quality has a positive effect on perceived ease of use.

Additionally, it can be assumed that the higher the perceived e-shopping quality, the stronger the effect of trust on perceived usefulness will become. High perceived e-shopping quality creates positive associations with shopping groceries online and thus strengthens trust in online grocery shopping (McKnight et al., 2002; Venkatesh and Bala, 2008).

H32: E-shopping quality has a moderating effect on trust. The higher the perceived e-shopping quality, the stronger the relationship of trust on perceived usefulness will become.

Furthermore, I expect that e-shopping quality evaluations are influenced by the individual's experience level. Wolfinbarger and Gilly (2003) state that not having bad experiences results in higher estimations of e-shopping quality. With increasing experience, the judgment of the perceived experience becomes more concrete, which means that individuals who had mainly good experiences will tend to positively evaluate the e-shopping quality while individuals who had mainly bad experiences will not (Boyer and Hult, 2006; McKnight et al., 2002; Wolfinbarger and Gilly, 2003). However, consumer expectations and desires change over time and with experience. In this course, e-shopping quality can become more important (Wolfinbarger and Gilly, 2003). Therefore, I hypothesize that experience has a moderating effect on the influences of e-shopping quality on perceived usefulness and perceived ease of use, such that with increasing experience the relationship of e-shopping quality with perceived usefulness and perceived ease of use will become stronger.

> *H33: The positive effect of e-shopping quality on perceived usefulness and perceived ease of use of online grocery shopping will increase with experience.*

6.5 Research Methodology

6.5.1 Procedure and Measurement

Following common practice on acceptance research, I tested the proposed framework with an online survey. Before the survey phase, I carried out a pilot test on five respondents. These respondents are experts in the fields of psychology and sociology. Based on their remarks, I modified the online questionnaire and created the final version of the survey.

The final questionnaire contains eighteen question constructs with varying numbers of items for each construct and, additionally, nine demographical background questions. The survey is composed of two streams, one directed at participants with online grocery shopping experience and the other directed at participants without online grocery shopping experience.

The first nine questions are the same for both streams. Question Nine, "*Have you purchased groceries online*?" divides the participants into two groups: *with experience* and *without experience*. From there, all the following questions are identical in content for both streams but differ in their formulation. For the *with experience* stream, the survey requested the assessment of the actual online grocery experiences while participants without experience assessed their expectations of an online grocery shopping experience. Participants who had experience with online grocery shopping additionally had to specify their level of experience. For all questions, I used a seven-point Likert scale but with different scale characteristics. The different seven-point

Likert scale specifications for the eighteen questions (excluding questions concerning the demographical background) are shown in Table 9. An overview of all items used for both streams and their corresponding constructs can be found in Appendix E and Appendix F.

I carried out the online survey in German using Unipark online software by Questback over four weeks. To reach out to a cross-section of the German population, I sent the survey to people from every age group and social background as well as geographical location. I distributed the online questionnaire through different channels – e-mail, Twitter, and Facebook – and used the same channels to send out the reminder.

Table 9: Scales in the Online Survey

Questions (Q)	**Scales**		
Q1 (Computer Playfulness	1= Strongly Disagree		5= Somewhat Agree
Q2 (Computer Anxiety)	2= Disagree		6= Agree
Q4 (E-shopping Quality)	3= Somewhat Disagree		7= Strongly Agree
Q5 (Computer Self-Efficacy)	4= Neutral		
Q6 (Image)			
Q7 (Subjective Norm)			
Q8 (Job Relevance)			
Q10 (Enjoyment)			
Q11 (Perceptions of External Control)			
Q12 (Trust)			
Q13 (Product Quality)			
Q15 (Result Demonstrability)			
Q16 (Perceived Ease of Use)			
Q17 (Perceived Usefulness)			
Q18 (Behavioral Intention)			
Q3 (Product Involvement)	Important	O O O O O O O	Unimportant
	Relevant	O O O O O O O	Irrelevant
	Means a lot to me	O O O O O O O	Means nothing to me
Q9 a) (Experience)	Yes/No		
Q9b) (Experience)	1= Not at all		5= 4-5 times a month
	2= Less than once a month		6= About once a week
	3= About once a month		7= Several times a week
	4= 2-3 times a month		

Table 9: Scales in the Online Survey (Continued)

Questions (Q)	Scales	
Q9c) (Experience)	1= Extreme infrequently 2= Quite infrequent 3= Slightly infrequently 4= Neither	5= Slightly frequent 6= Quite frequent 7= Extreme frequent.
Q14 (Product Freshness)	1= Much worse than in-store shopping 2= Worse than in-store shopping 3= Somewhat worse than in-store shopping 4= About the same to	5= Somewhat better than in-store shopping 6= Better than in-store shopping 7= Much better than in-store shopping

6.5.2 Participants

The conducted online survey resulted in a data sample of 213 participants, varying in gender, age, residence (urban or rural), and income, as well as experience with online grocery shopping. With 48.8% of the participants being female and 50.2% male (1% of the participants did not provide information concerning their gender), the gender ratio is balanced.[11] For illustrative purposes, the age distribution of the participants is shown in groups. Participants under 20 years old account for 2.8% of all participants. 40.3% were 21-30, 26.7% were 31-40, 8.9% were 41-50, and 21.1% were over 50. 87.8% of the participants were city dwellers and 12.2% were rural. I also recorded the participants' reported net income per month based on predefined categories and visualized the overview in Figure 14. A summary of the prior experience of the participants with online grocery shopping is shown in Table 10.

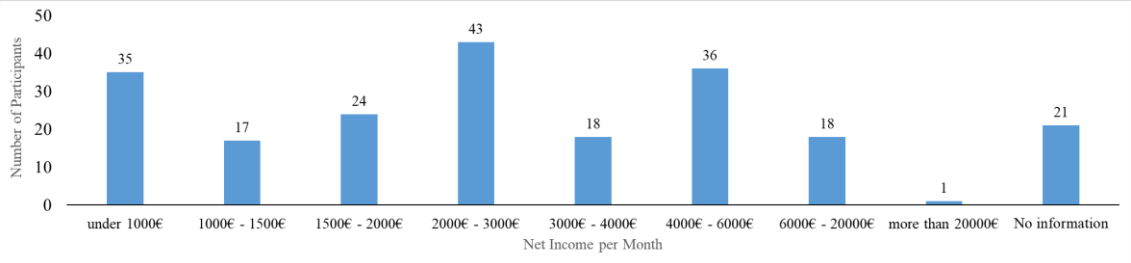

Figure 14: Net Income per Month of the Study Participants

[11]Participants were allowed to choose their sex among female, male and diverse as well as the option of no responding.

Table 10: Number of Online Grocery Purchases per Month (for Consumers with Experience)

Number of online grocery purchases per month						
Never	Less than once a week	One time per month	2-3 times per month	4-5 times per month	Once a week	Several times a week
10.53%	57.89%	18.42%	2.63%	7.89%	2.63%	0%

6.5.3 Partial Least Square

To analyze the data, I used a variance-analytical approach of the structural equation modeling technique, the partial least square (PLS) method. For technical support in processing, analyzing, and interpreting the data, and assessing the structural model, I utilized SmartPLS Version 3.2.9.

PLS is a structural equation modeling (SEM) method based on an iterative approach that maximizes the explained variance of endogenous constructs (Fornell and Bookstein, 1982). For this reason, it is also referred to as a variance-based structural equation modeling (VB-SEM) technique. The method operates along the lines of regression analysis and depends upon relevant hypotheses and concrete data as a basis for its application. PLS-SEM is used for predicting and identifying key driver constructs as well as testing an extension of an existing structural theory (Hair et al., 2011).

Usage of PLS-SEM is increasing due to its ability to handle complex relationships among variables. PLS-SEM is most commonly used in research that has non-normal data, small sample sizes and formatively measured constructs (Hair et al., 2014). While covariance-based structural equation modeling (CB-SEM) focuses only on measurement errors or a set of model parameters (Reinartz et al., 2009), PLS-SEM enables researchers to assess both causal relationships between indicators and further causal relationships between latent constructs (Gudergan et al., 2008). Unlike CB-SEM, PLS-SEM is also suitable for exploratory and confirmatory research and analysis (Gefen et al., 2000; Westland, 2007) in the assessment of complex and large relationships (several indicators and constructs) (Chin et al., 2003; Sarstedt, 2008). Additionally, "(…) the PLS algorithm allows each indicator to vary in how much it contributes to the composite score of the latent variable" (Chin et al., 2003, p. 25), demonstrated by inner model assessment. In comparison with first-generation regression models such as linear regression and ANOVA, SEM provides the ability to test relationships among multiple dependent and independent variables simultaneously (Anderson and Gerbing, 1988).

An important characteristic of the PLS-SEM technique is that it readily incorporates both reflective and formative measures (Hair et al., 2016). In this research, and in accordance with online grocery shopping literature, I measured the exogenous constructs (independent variables)

formatively and the endogenous constructs (dependent variables) reflectively. I also considered this categorization in the formulation of the questions of the survey itself.

Following relevant online grocery shopping literature, the reasonable number or minimum requirement of sample size is 100-150 samples (Delice, 2010; Rezaei, 2015) to test the model using PLS-SEM. Additionally, PLS-SEM is a desirable multivariate data analysis method because of its remarkable ability to achieve acceptable power at very small sample sizes (Hair et al., 2014, 2011)

6.6 Findings

I carried out the PLS-SEM analysis in two steps. The first step involved assessing the reliability of the measurements (the questionnaire responses) and consequently judging the construct validity. In the second step, I assessed the structural models. In my analysis, I examined two models on online grocery acceptance

- one in which users have experience with online grocery shopping, and that experience influences their acceptance of it

and

- one in which users do not have experience with online grocery shopping, and thus, there is no influence of experience on their acceptance of it.

These are further referred to as models with and without experience. The two models and their corresponding findings are presented in the following subsections.

6.6.1 Construct Validity Assessment

To assess the internal consistency of the in-scale items, for both the research models, with and without experience, I evaluated the Cronbach's alpha, the composite reliability (CR), and the average variance extracted (AVE). Table 11 and Table 12 show the final results for these three measures for both models. Next, to test the discriminant validity, I used the heterotrait-monotrait ratio (HTMT) criterion. The results for the HTMT criterion for both models are shown in Table 13 and Table 14.

Internal consistency is ensured when the value of Cronbach's alpha is 0.7 and above (Saunders et al., 2009), which is the case for all the proposed constructs. Similarly, CR values have been tested and exceeded the recommended threshold of 0.7 (Hair et al., 2016). I also tested the AVE values and the numerical results exceeded the threshold value of 0.5, as suggested in the literature (Fornell and Larcker, 1981). Lastly, since an HTMT value of less than 0.85 means that

discriminant validity has been established between two reflective constructs (Kline, 2015), all of the proposed constructs fulfill the numerical threshold requirements for internal consistency and discriminant validity.

Table 11: Construct Validity Assessment (for Consumers with OGS Experience)

Constructs	Cronbach's Alpha	Composite Reliability	AVE
Behavioral Intention to OGS	0.867	0.758	0.649
Computer Anxiety	0.934	0.931	0.759
Computer Playfulness	0.906	0.729	0.553
Computer Self-Efficacy	0.839	0.855	0.592
E-Shopping Quality	0.882	0.796	0.741
Enjoyment	0.796	0.806	0.605
Image	0.912	0.927	0.761
Job Relevance	0.780	0.873	0.646
Perceived Ease of Use	0.754	0.894	0.597
Perceived Usefulness	0.902	0.932	0.724
Perceptions of External Control	0.962	0.866	0.665
Product Freshness	0.828	0.874	0.519
Product Involvement	0.810	0.757	0.528
Product Quality	0.752	0.830	0.595
Result Demonstrability	0.830	0.629	0.612
Subjective Norm	0.888	0.930	0.778
Trust	0.792	0.868	0.580

Table 12: Construct Validity Assessment (for Consumers without OGS Experience)

Constructs	Cronbach's Alpha	Composite Reliability	AVE
Behavioral Intention to OGS	0.836	0.881	0.647
Computer Anxiety	0.905	0.983	0.719
Computer Playfulness	0.962	0.706	0.639
Computer Self-Efficacy	0.873	0.979	0.590
E-Shopping Quality	0.712	0.823	0.588
Enjoyment	0.764	0.889	0.628
Image	0.839	0.801	0.623
Job Relevance	0.730	0.865	0.721
Perceived Ease of Use	0.927	0.832	0.763
Perceived Usefulness	0.722	0.818	0.682
Perceptions of External Control	0.822	0.760	0.502
Product Freshness	0.844	0.731	0.783
Product Involvement	0.929	0.726	0.641
Product Quality	0.837	0.717	0.513
Result Demonstrability	0.721	0.875	0.511
Subjective Norm	0.726	0.842	0.619
Trust	0.745	0.895	0.690

Table 13: Heterotrait-Monotrait Ratio (for Consumers with Experience)

Constructs	Behavioral Intention to OGS	Image	Job Relevance	Perceived Usefulness	Product Freshness	Product Involvement	Product Quality	Result Demonstrability	Subjective Norm	Trust
Behavioral Intention to OGS	-	-	-	-	-	-	-	-	-	-
Image	0.284	-	-	-	-	-	-	-	-	-
Job Relevance	0.743	0.215	-	-	-	-	-	-	-	-
Perceived Usefulness	0.621	0.184	0.722	-	-	-	-	-	-	-
Product Freshness	0.464	0.099	0.401	0.368	-	-	-	-	-	-
Product Involvement	0.158	0.139	0.129	0.267	0.109	-	-	-	-	-
Product Quality	0.362	0.257	0.447	0.444	0.552	0.295	-	-	-	-
Result Demonstrability	0.625	0.176	0.530	0.474	0.342	0.125	0.381	-	-	-
Subjective Norm	0.336	0.470	0.196	0.307	0.229	0.115	0.388	0.174	-	-
Trust	0.478	0.139	0.339	0.461	0.422	0.325	0.699	0.446	0.161	-

Table 14: Heterotrait-Monotrait Ratio (for Consumers without Experience)

Constructs	Behavioral Intention to OGS	Image	Job Relevance	Perceived Usefulness	Product Freshness	Product Involvement	Product Quality	Result Demonstrability	Subjective Norm	Trust
Behavioral Intention to OGS	-	-	-	-	-	-	-	-	-	-
Image	0.241	-	-	-	-	-	-	-	-	-
Job Relevance	0.756	0.409	-	-	-	-	-	-	-	-
Perceived Usefulness	0.823	0.331	0.619	-	-	-	-	-	-	-
Product Freshness	0.469	0.332	0.359	0.433	-	-	-	-	-	-
Product Involvement	0.060	0.049	0.165	0.082	0.135	-	-	-	-	-
Product Quality	0.347	0.430	0.422	0.357	0.563	0.199	-	-	-	-
Result Demonstrability	0.531	0.171	0.444	0.584	0.304	0.209	0.402	-	-	-
Subjective Norm	0.433	0.420	0.419	0.233	0.426	0.129	0.308	0.208	-	-
Trust	0.386	0.468	0.370	0.406	0.603	0.188	0.581	0.287	0.308	-

6.6.2 Structural Model Analysis

I analyzed the relationships between the two models using path analysis. This involved testing the quality of the causal relationships between all the latent variables and identifying the weight of each of the independent variables within the models. For this purpose, as suggested in recent literature (Hair et al., 2011), I performed the bootstrapping procedure with 5000 sub-samples.

All the stated hypotheses in the structural model prove significant at the significance levels of 0.05 for the p-value and 1.96 for the t-value, except for two hypotheses: that product quality influences perceived usefulness and that product quality moderates the relationship between job relevance and perceived usefulness. This means that the construct of product quality has no statistically significant effect on perceived usefulness within the structural models. Similarly, product quality does not moderate or affect the relationship between job relevance and perceived usefulness as originally assumed. Table 15 and Table 16 give an overview of the path coefficients, t-statistics, and p-values.

Table 15: Path Coefficient Analysis for Structural Model (for Consumers with Experience) a) b)

Relationships	Path Coefficients	T-Statistics	P Values
Computer Anxiety → Perceived Ease of Use	-0.123	2.856	0.008
Computer Playfulness → Perceived Ease of Use	0.012	2.215	0.024
Computer Self-Efficacy → Perceived Ease of Use	0.110	1.996	0.041
E-Shopping Quality → Perceived Ease of Use	0.321	1.988	0.049
E-Shopping Quality → Perceived Usefulness	0.251	2.122	0.012
Enjoyment → Behavioral Intention to OGS	0.305	2.209	0.024
Enjoyment → Perceived Ease of Use	0.188	2.137	0.013
Image → Perceived Usefulness	0.039	1.973	0.052
Job Relevance → Perceived Usefulness	0.352	2.926	0.002
Perceived Ease of Use → Behavioral Intention to OGS	0.122	1.985	0.046
Perceived Ease of Use → Perceived Usefulness	0.158	2.228	0.026
Perceived Usefulness → Behavioral Intention to OGS	0.324	2.037	0.038
Perceptions of External Control → Perceived Ease of Use	0.414	2.809	0.007
Product Freshness → Perceived Usefulness	0.109	2.261	0.026
Product Involvement → Perceived Usefulness	-0.175	1.979	0.045
Product Quality → Perceived Usefulness	-0.028	1.874	0.066
Result Demonstrability → Perceived Usefulness	0.056	1.994	0.047
Subjective Norm → Behavioral Intention to OGS	0.178	2.125	0.015
Subjective Norm → Perceived Usefulness	0.151	2.238	0.029
Subjective Norm → Image	0.146	2.118	0.035
Trust → Perceived Usefulness	0.155	2.217	0.027
***Moderator Relationships:**			
Product Quality* (Trust → Perceived Usefulness)	0.118	3.257	0.0028
Product Quality* (Job Relevance → Perceived Usefulness)	-0.112	1.838	0.0751
E-Shopping Quality* (Trust → Perceived Usefulness)	0.126	3.942	0.0015

[a)] p-values significant at 0,05 level, [b)] t-values significant at 1,96 level

Table 16: Path Coefficient Analysis for Structural Model (for Consumers without Experience) a) b)

Relationships	Path Coefficients	T-Statistics	P Values
Computer Anxiety → Perceived Ease of Use	-0.028	2.728	0.025
Computer Playfulness → Perceived Ease of Use	0.020	2.638	0.029
Computer Self-Efficacy → Perceived Ease of Use	0.109	3.274	0.001
E-Shopping Quality → Perceived Ease of Use	0.320	2.279	0.038
E-Shopping Quality → Perceived Usefulness	0.244	3.295	0.003
Enjoyment → Behavioral Intention to OGS	0.236	2.016	0.045
Enjoyment → Perceived Ease of Use	0.183	2.892	0.019
Image → Perceived Usefulness	0.027	1.983	0.048
Job Relevance → Perceived Usefulness	0.367	2.874	0.017
Perceived Ease of Use →Behavioral Intention to OGS	0.125	3.227	0.005
Perceived Ease of Use → Perceived Usefulness	0.143	2.741	0.022
Perceived Usefulness → Behavioral Intention to OGS	0.416	2.483	0.034
Perceptions of External Control → Perceived Ease of Use	0.465	2.115	0.040
Product Freshness → Perceived Usefulness	0.103	2.119	0.039
Product Involvement → Perceived Usefulness	-0.162	2.882	0.018
Product Quality → Perceived Usefulness	-0.029	1.762	0.073
Result Demonstrability → Perceived Usefulness	0.053	1.981	0.049
Subjective Norm → Behavioral Intention to OGS	0.186	3.239	0.008
Subjective Norm → Perceived Usefulness	0.168	2.316	0.035
Subjective Norm → Image	0.154	2.932	0.028
Trust → Perceived Usefulness	0.167	2.737	0.023
***Moderator Relationships:**			
Product Quality* (Trust → Perceived Usefulness)	0.137	4.081	0.0012
Product Quality* (Job Relevance → Perceived Usefulness)	-0.124	1.592	0.0594
E-Shopping Quality* (Trust → Perceived Usefulness)	0.119	3.327	0.0038

[a)] p-values significant at 0,05 level, [b)] t-values significant at 1,96 level

Considering the R^2 measures, the proposed online grocery shopping acceptance model with experience explains between 38% (R^2 adjusted) and 41.3% of the variance in behavioral intention to use online grocery shopping as well as between 44.6% (R^2 adjusted) and 49% of the variance in perceived ease of use. Lastly, it explains between 53.2% (R^2 adjusted) and 60.6% of the variance in perceived usefulness (see Table 17).

Table 17: R Squared Values of Endogenous Constructs (for Consumers with Experience)

Construct	R Square	R Square Adjusted
Behavioral Intention to OGS	0.413	0.380
Perceived Ease of Use	0.490	0.446
Perceived Usefulness	0.606	0.532

The online grocery shopping acceptance model without experience describes between 41% (R^2 adjusted) and 43.4% of the variance in behavioral intention to online grocery shopping, between

43.2% (R^2 adjusted) and 48.3% of the variance in perceived ease of use and between 52.1% (R^2 adjusted) and 60.3% of the variance in perceived usefulness (see Table 18).

Table 18: R Squared Values of Endogenous Constructs (for Consumers without Experience)

Construct	R Square	R Square Adjusted
Behavioral Intention to OGS	0.434	0.410
Perceived Ease of Use	0.483	0.432
Perceived Usefulness	0.603	0.521

The assessment of the threshold for the R^2 value to be regarded as high enough depends largely on the discipline in which the research is conducted. While consumer behavior research considers a value of 0.2 as high, values of up to 0.75 are also achieved in marketing (Hair et al., 2011). I consider this research to be in the discipline of consumer behavior. In this study, all R^2 values are far above 0.2. Therefore, I consider the expressiveness of the statistical results to be very powerful.

Additionally, I tested the presence of multicollinearity among the indicators using variance inflation factor (VIF) values. In both models, all VIF values are, as recommended, significantly lower than the value of 3.3 (Petter et al., 2007) (see Table 19 and Table 20).

Table 19: VIF Values for Exogenous Constructs (for Consumers with Experience)

Constructs	Behavioral Intention to OGS	Perceived Ease of Use	Perceived Usefulness
Computer Anxiety	-	1.586	-
Computer Playfulness	-	1.503	-
Computer Self-Efficacy	-	1.451	-
E-Shopping Quality	-	1.420	1.524
Enjoyment	1.950	1.406	-
Image	-	-	1.321
Job Relevance	-	-	1.592
Perceived Ease of Use	1.379	-	1.669
Perceived Usefulness	1.945	-	-
Perceptions of External Control	-	2.030	-
Product Freshness	-	-	1.497
Product Involvement	-	-	1.056
Product Quality	-	-	2.120
Result Demonstrability	-	-	1.491
Subjective Norm	1.152	-	1.324
Trust	-	-	1.713

Table 20: VIF Values for Exogenous Constructs (for Consumers without Experience)

Constructs	Behavioral Intention to OGS	Perceived Ease of Use	Perceived Usefulness
Computer Anxiety	-	1.623	-
Computer Playfulness	-	1.551	-
Computer Self-Efficacy	-	1.445	-
E-Shopping Quality	-	1.452	1.528
Enjoyment	1.965	1.437	-
Image	-	-	1.322
Job Relevance	-	-	1.605
Perceived Ease of Use	1.392	-	1.723
Perceived Usefulness	1.939	-	-
Perceptions of External Control	-	1.966	-
Product Freshness	-	-	1.497
Product Involvement	-	-	1.086
Product Quality	-	-	2.012
Result Demonstrability	-	-	1.504
Subjective Norm	1.152	-	1.335
Trust	-	-	1.681

6.7 Discussion

In this research, I examined the influences of fourteen independent variables on the perceived usefulness and the perceived ease of use of online grocery shopping. I showed numerically how strong these factors are related to usage intention. I proposed 33 hypotheses, of which I confirmed 31. With this research, I successfully provide a comprehensive framework describing consumer acceptance of online grocery shopping in Germany and thus contribute to the understanding of what requirements and needs are shaping behavioral intentions to use online grocery shopping. In the following, the most interesting results are discussed and implications for theory and practice given.

6.7.1 Influences on Online Grocery Shopping Acceptance

Influences on Behavioral Intention to Use Online Grocery Shopping

One of the best predictors for the usage of a novel technology is behavioral intention (Liébana-Cabanillas et al., 2017; Venkatesh and Davis, 2000; Zhang et al., 2012). Behavioral intention to shop for groceries online thus serves as a direct ancestor to actually shopping of online groceries online. My research models explain between 38.0% (R^2 adjusted) and 41.3% of the variance in behavioral intention for the model with experience and 41.0% (R^2 adjusted) and 43.4% for the model without experience (see Tables 14 and 15). I find that perceived usefulness is the strongest predictor of behavioral intention to use online grocery shopping (H1). This leads to the interpretation that in building an intention to use online grocery shopping, perceived usefulness

has a stronger impact than does perceived ease of use (H2). Resulting from this, the drivers of perceived usefulness have a stronger impact on behavioral intention than do the drivers of perceived ease of use. However, the R^2 values of perceived usefulness and perceived ease of use also show that the proposed research model explains perceived usefulness a little better than perceived ease of use.

This implies, on the one hand that perceived ease of use is influenced by more factors than the ones I measured. On the other hand, I assume that with the increasing explanatory power of perceived ease of use, the strength of its effect on behavioral intention will rise. Subsequently, attention should not only be paid to the influencing factors of perceived usefulness, as with increasing explanatory power, the factors of perceived ease of use are of similar importance in explaining behavioral intention.

This implication is also supported by the strong direct influence of enjoyment on behavioral intention (H22). Enjoyment is a process-related, hedonic driver, while the factors influencing perceived usefulness are output-related, mainly utilitarian drivers. This strong hedonic influence implies that it is not only factors related to usefulness that play a great role in building a usage intention to shop for groceries online, but also factors permitting the consumers to feel the usage of a new system to be enjoyable, independent of the consequences of the usage of the system. As this relationship is stronger for the model with experience, I conclude that hedonic influences play more important roles when the process is actually carried out and not just imagined.

Explaining the Perceived Usefulness of Online Grocery Shopping

The proposed research framework explains between 53.2% (R^2 adjusted) and 60.6% of the variance in perceived usefulness in the model with experience and between 52.1% (R^2 adjusted) and 60.3% in the model without experience. More specifically, I find that e-shopping quality (H30), product freshness (H29), result demonstrability (H13), job relevance (H12), product involvement (H25), trust (H23), image (H11), subjective norm (H7), and perceived ease of use (H3) are significant predictors of the perceived usefulness of online grocery shopping.

Among these, job relevance has the greatest influence on perceived usefulness. I also observe that job relevance has a slightly stronger influence on perceived usefulness for the model without experience. This implies that for consumers without experience, job relevance has a greater impact on the perceived usefulness than for consumers with experience. Furthermore, the strong influence of perceived e-shopping quality on perceived usefulness (H30) indicates that the reliability of online grocery purchase, the product assortment, the clearly-arranged website design that facilitates speedy transactions, the privacy and security protection settings, as well as the presence of good customer service are significant drivers for the consumers to perceive an online

grocery system to be useful. When people have their own experiences, external influences weaken and those personal experiences play a greater role in this assessment.

I find that the subjective norm, has a positive influencing effect on the perceived usefulness and also a direct influencing effect on behavioral intention to use online grocery shopping. Moreover, my research shows that if consumers have no experience with online grocery shopping, they rely on the opinions of others in their assessment of its usefulness. When own experiences are made, external influence weakens, and own experiences play a greater role in this assessment.

I find no significant effect of product quality on perceived usefulness (H26) and no significant moderating effect of product quality on job relevance (H27), but that product quality has a moderating effect on trust such that with increasing product quality, the effect of trust on perceived usefulness is stronger (H28). In contrast to this, I find a positive influence of product freshness on perceived usefulness (H29), which even becomes stronger with experience. This allows the interpretation that product quality is not perceived as an issue in online grocery shopping, whereas product freshness is perceived as a critical element, especially for experienced users.

Explaining Perceived Ease of Use of Online Grocery Shopping

Overall, my research framework on online grocery shopping acceptance explains between 44.6% (R^2 adjusted) and 49.0% of the variance in perceived ease of use for the model with experience and between 43.2% (R^2 adjusted) and 48.3% for the model without experience (see Tables 14 and 15). For both models I find that enjoyment (H20), computer playfulness (H18), computer anxiety (H16), perceptions of external control (H15), computer self-efficacy (H14), and e-shopping quality (H31) are significant predictors of perceived ease of use of online grocery shopping. E-shopping quality and perceptions of external control show to have the greatest influences.

E-shopping quality is a newly introduced construct strongly influencing perceived usefulness as well as perceived ease of use. For this construct I make two observations: (1) the influence of e-shopping quality on perceived ease of use is stronger than the influence of e-shopping quality on perceived usefulness and (2) the influences of e-shopping quality on perceived ease of use and perceived usefulness are moderated by experience.

Interpreting the first observation, I conclude that with increasing e-shopping quality, perceived ease of use will increase more than perceived usefulness, regardless of one's level of experience with online grocery shopping. This may be because e-shopping quality is comprised of numerous factors that relate to the process of usage instead of the outcome. Furthermore, the positive influencing effect of e-shopping quality becomes stronger with experience. This shows that

consumer' desires change as their experience increases (Wolfinbarger and Gilly, 2003). As consumers use the online system to shop for groceries, they recognize how important good e-shopping quality is to successfully and efficiently carry out the task of buying groceries (Boyer and Hult, 2006). I observe that participants who have had experience with online grocery shopping attach greater importance to e-shopping quality than do the participants without experience. Therefore, I assume that the e-shopping in online grocery models to which the participants refer has room for improvement on the area of quality.

The influence of perceptions of external control (combining items on: control over purchase, necessary resources, easy handling, and daily-life compatibility) has the strongest effect in explaining perceived ease of use. I further observe that for the model with experience, this relationship is slightly lower than for the model without experience. This means that for consumers without experience in online grocery shopping, the perceived external control over online grocery shopping influences the perceived ease of use more strongly than it does for consumers with online grocery shopping experiences. Consequently, it can be assumed that when the evaluation of online grocery shopping becomes concrete through experience, the assessment of perceived ease of use is affected less by perceptions of external control.

Part of measuring perceptions of external control is assessing the integration of online grocery shopping into one's daily life; participants were asked to what degree they agreed or disagreed with the statement *Buying groceries online is not compatible with my daily life*. My results confirm the presumption that consumers with online grocery shopping experience find it easier to integrate online grocery shopping into their daily lives than do consumers without experience. The analysis of the individual items of this construct reveals a further surprising aspect: The statement concerning the one's feeling of control over the purchase – *I have control over my purchases when I buy groceries online* – is confirmed by 35% of the participants without online grocery shopping experience and only by 26.3% of the participants with online grocery shopping experience. The question arises: Why do consumers with online grocery shopping experience feel they have less control over their purchases than do consumers without experience? The answer might lie in the perceived e-shopping quality, which becomes a more important factor with increasing experience, and in the rising importance of product freshness, which has a stronger influence on perceived usefulness for the users with experience.

6.7.2 Implications for Theory and Practice

A holistic framework on online grocery acceptance and its corresponding evidence for Germany and worldwide has been missing. In uniting the aforementioned models and factors, I complement the existing literature that has focused predominantly on single acceptance factors and provide a more complete background to gain a broader picture of the underlying effects occurring in the context of online grocery shopping acceptance.

Among all the factors I examined, job relevance, e-shopping quality, and enjoyment have the strongest influences on perceived usefulness, perceived ease of use, and behavioral intention. Contrary to the propositions of Venkatesh and Bala (2008), who state that the determinants of perceived ease of use will not have a significant impact on the determinants of perceived usefulness, I provide the theoretical justification and empirical support for why e-shopping quality has a significant effect on both perceived ease of use and perceived usefulness.

I base my research upon the technology acceptance model (Davis, 1989; Davis et al., 1989; Venkatesh, 2000; Venkatesh and Bala, 2008) as well as on a variety of findings on consumer acceptance factors in recent literature (e.g. Boyer and Hult, 2006; Childers et al., 2001; Desrochers et al., 2019; Gefen et al., 2003; McKnight et al., 2002) and add qualitative data from consumer acceptance workshops (Güsken et al., 2019). My research is methodologically innovative: Using the Bewextra method, introduced by Kaiser and Kragulj in 2016, I applied a new and innovative type of qualitative workshop to extract consumer requirements that has rarely been used in innovation research.

My research relies on the notion that although the online grocery industry has great potential, it has not reached its anticipated success. From this, I deduce that online grocery customer behavior has not been sufficiently understood, and that current business models do not yet deliver sufficient value to the consumer. To successfully operate business models, business owners need to attract consumers who will subsequently develop loyal behavior (Kumar and Anjaly, 2017; Lemon and Verhoef, 2016). Business owners have to understand the consumers' needs, their behavioral intentions to grocery shop online, and their resulting acceptance of the models that are available to them (Teece, 2010). By investigating the online grocery shopping acceptance factors, I thus contribute to research on business model innovation in the online grocery market.

Considering the practical implications for online grocery providers, I sequence the significant factors I tested according to the strength of their influence in descending order and present them in the following tables. Table 21 shows the influencing factors on online grocery acceptance for consumers with experience and serves to improve the business offerings for current consumers,

to cement their loyalty and encourage them to repeat their purchases. Table 22 shows the strongest influencing factors for consumers without experience and provides factors that have to be fulfilled to attract new customers. Between the models, the ranking of the factors influencing perceived usefulness differs, which confirms the influence of the moderator *Experience*.

Table 21: Influencing Factors to Reach a Behavioral Intention to Use OGS for Consumers with Experience

Prioritization	Perceived Usefulness	Perceived Ease of Use	Behavioral Intention
1	Job Relevance	Perceptions of External Control	Perceived Usefulness
2	E-Shopping Quality	E-Shopping Quality	Enjoyment
3	Product Involvement	Enjoyment	Subjective Norm
4	Perceived Ease of Use	Computer Anxiety	Perceived Ease of Use
5	Trust	Computer Self-Efficacy	
6	Subjective Norm	Computer Playfulness	
7	Product Freshness		
8	Result Demonstrability		
9	Image		

Table 22: Influencing Factors to Reach a Behavioral Intention to Use OGS for Consumers without Experience

Prioritization	Perceived Usefulness	Perceived Ease of Use	Behavioral Intention
1	Job Relevance	Perceptions of External Control	Perceived Usefulness
2	E-Shopping Quality	E-Shopping Quality	Enjoyment
3	Subjective Norm	Enjoyment	Subjective Norm
4	Trust	Computer Self-Efficacy	Perceived Ease of Use
5	Product Freshness	Computer Playfulness	
6	Result Demonstrability	Computer Anxiety	
7	Image		
8	Product Quality		
9	Product Involvement		

While the initial adoption is important, long-time use and customer loyalty indicate the success of a business model (Kumar and Anjaly, 2017; Lemon and Verhoef, 2016; Wolfinbarger and Gilly, 2003). This is why it is important to understand the role of experience in online grocery shopping usage. The proposed framework posits that with experience, the influences of subjective norm, trust, and product freshness on perceived usefulness becomes weaker. This indicates that the initial fulfillment of fresh delivery and the communication to the potential customer via the social environment are key influences for the adoption process to (a) appeal new customer groups and (b) activate the feelings of trust and freshness to initiate further purchases.

With job relevance the strongest influencing factor on perceived usefulness, it is necessary for new and current business models to work out how and why online grocery shopping can become relevant to the consumer. Therefore, initially, those factors that define the online grocery shopping

relevance for the consumer need to be examined. Subsequently, relevance factors need to be translated into business models and also communicated to existing and potential customers.

E-shopping quality is the second most important acceptance factor, measured by its influence on perceived usefulness and perceived ease of use. Against the backdrop of the lack of success of current business models, the importance of quality confirms my finding that the e-shopping quality that current business models provide is not sufficient for existing consumers to develop them into loyal ones, and the e-shopping quality is not being communicated adequately to potential customers. E-vendors should check, first of all, whether they meet the e-shopping quality criteria that have been elaborated in prior research: website design, fulfillment/reliability, privacy/security, and customer service (Wolfinbarger and Gilly, 2003) (for a listing of the single items of this criteria see Appendices E and F). Furthermore, I observe that quality perceptions and desires may change with time and experience. Continuous monitoring of satisfaction and beyond is therefore recommended for practitioners.

The construct perceptions of external control is the strongest influencing factor on perceived ease of use. In earlier research, Venkatesh (2000) postulated that to improve perceptions of external control, it is essential to understand the conditions that facilitate the usage of a new technology. I scientifically applied the construct *perceptions of external control* to the online grocery context and thus contribute to the further understanding of this measure in different contexts. I show that participants with experience perceive that they have less control over the purchase than do the participants without experience. The implication for managers is that they need to address the issue of why customers perceive a loss of control when shopping for groceries online.

For consumers without experience, subjective norm is the third most powerful direct influence on behavioral intention. This finding implies that the social environment is an important factor for the adoption of online grocery business models. One part of subjective norm is its influencing power to increase or decrease trust in new systems. The numerical finding supports the assumption that in online grocery shopping environments, subjective norm is an important influence. It is noticeable that subjective norm has a stronger direct influence on behavioral intention than it has on perceived usefulness. Previous literature has confirmed the importance of subjective norm on the general intention to use online shopping (Hasbullah et al., 2016; Ho and Chen, 2014; Lim et al., 2016; Mosavi and Ghaedi, 2012; Ramadania and Braridwan, 2019), but has not applied subjective norm any specific online shopping sector. With this research, I contribute to the existing body of knowledge by confirming the influence of subjective norm on behavioral intention and extend its validity to the specific field of online grocery shopping.

The proposed framework posits that enjoyment of the shopping process not only has a strong positive effect on perceived ease of use (Driediger and Bhatiasevi, 2019; Ha and Stoel, 2009; Venkatesh and Bala, 2008), but also has a strong positive direct effect on behavioral intention. The direct effect of enjoyment on the general attitude toward online shopping (Bedi et al., 2017; Horváth and Adıgüzel, 2018) has only been tested once in an online grocery context, by Childers et al. (2001). The proposed framework emphasized the unique role of enjoyment, as it has a stronger influence on behavioral intention than perceived ease of use. The effect of enjoyment is stronger for consumers with online grocery shopping experience. This result indicates that online grocery businesses need to provide interesting and exciting functionalities that give enjoyment and mitigate boredom. At the same time, the clarity and simplicity of usage must be maintained, which, in turn, goes hand in hand with the quality of e-shopping.

6.7.3 Limitations and Further Research

This study approach is not free of limitations. First, this research relies on the technology acceptance model (TAM), which was mainly developed for exploring technology acceptance in the work-place (Davis, 1989; Davis et al., 1989). It has been modified and used in various research areas, including in the area of online shopping acceptance. Nevertheless, some other technology acceptance measures have substantive differences in their composition (see Section 6.2). Thus, the acceptance of online grocery shopping technology deserves further investigation with different measures. The present study is, to the best of my knowledge, the only one of its kind and should be replicated within other methodologies as well.

Second, the measures of all constructs in my study were collected at the same time. Therefore, the moderator *Experience* is only measured in two states – with and without experience. A more detailed investigation could focus on the influence of experience by covering respondents' experience levels across different points in time. Such a study would be useful, especially as it would help to discern what factors are decisive at what levels of customer experience in encouraging the users to buy again.

Third, the data did not support the hypothesis on product quality being a decisive factor for the behavioral intention to use online grocery shopping. Since product quality has been researched and found to be "an important aspect of the purchasing decision" while "the importance generally is intensified when purchasing over the internet" (Boyer and Hult, 2006, p. 127), more detailed investigations on the influence of product quality in the context of online grocery shopping, especially as distinct from product freshness, should be undertaken.

Fourth, in every study, the larger the sample size, the greater the generalizability of the proposed findings. Although my data set shows a good mix of demographic backgrounds, the extent to which these findings apply to a variety of online grocery business models varies by case and needs to be further established through future research with larger sample sizes. Since online grocery shopping is a relatively new trend in Germany, the sample sizes of participants with and without experience show an unequal distribution to the advantage of the model without experience. A more uniform distribution would enable a more accurate comparison of the two models.

Fifth, the R^2 values for perceived ease of use, perceived usefulness, and behavioral intention to online grocery shopping, and thus the quality of the fit of my model, are quite high, explaining the behavioral intention up to 41.3% for the model with experience and 43.4% for the model without experience. Yet the framework does not fully explain the behavioral intention to shop for groceries online. This means that other factors influence the behavioral intention that have not been examined in this research. To uncover further factors that explain the acceptance of online grocery shopping even better, I propose a qualitative research approach. By observing consumers' actual online purchasing behavior, factors that have so far remained hidden to quantitative research can be uncovered.

Sixth, in its basic form, the PLS-SEM technique cannot be applied when structural models contain causal loops or circular relationships between the latent variables (Hair et al., 2016). Additionally, since PLS-SEM does not have an established global goodness-of-fit measure, its use for theory testing and confirmation is generally limited (Hair et al., 2016). This implies that PLS-SEM is subject to constraints related to the assessment of model fit and consistency of the parameter estimates. Other characteristics of PLS-SEM include that the parameter estimates are not optimal regarding consistency – a characteristic often referred to as PLS-SEM bias (Hair et al., 2016). Generally, PLS-SEM tends to underestimate the structural paths connecting constructs to one another and overestimate the measurement paths connecting constructs to their indicators (Chin et al., 2003; Lohmöller, 1989; Marcoulides et al., 2012; Reinartz et al., 2009). While these deviations are usually relatively small, the interplay between inflated AVE values and deflated structural model relationships in the assessment of discriminant validity has not been systematically examined.

Seventh, in the composition of the comprehensive framework, I excluded three factors influencing online grocery acceptance that I extracted in my literature review: financial savings, delivery fees, and environmental relief. This was mainly because no validated scales have been developed to describe their influences on online grocery shopping acceptance. Future research should, therefore, engage in developing and validating constructs to investigate the influences of these

factors on online grocery acceptance. In a further step, these scales can be added to the proposed framework to explain online grocery shopping acceptance even better.

Eighth, I used online grocery shopping as the object of this investigation. Online grocery penetration in Germany has strongly increased due to the coronavirus crisis. Because of the risk of infection, many people have felt compelled to buy groceries online. This strongly supports the proposed and confirmed strong influence of *Job Relevance* on *Perceived Usefulness* (H 12). Since the situational factor has changed radically, online grocery shopping has increased. With a sharp increase in the number of users, the online grocery systems of almost every online grocery provider collapsed, so that the product selection was very limited and delivery times grew up to six weeks. Nevertheless, the demand for online groceries did not diminish. While the understanding of online grocery acceptance is precisely one of the reasons why I chose this research objective, I did not expect an exceptional situation to emerge. Fundamental factors like *E-shopping Quality* – which includes factors such as product assortment, website design, and fulfillment reliability – have been overruled and emergency solutions accepted. While it is expected that the big storm on online grocery shopping will decrease again once the risk of infection is perceived to have gone down, it is also assumed that many people who did not purchase groceries online before the crisis will still do so afterwards. Further studies, both quantitative and qualitative, will enable the understanding of the acceptance of online grocery shopping, in and outside crisis-driven situations, and provide recommendations for actions to make online grocery business models more successful.

In conclusion, online grocery shopping is complex and its implementation costs are high. Reluctance to adopt causes the failure of such business models. It is therefore crucial to develop an understanding of online grocery shopping adoption and identify the determinants that can favorably be influenced to maximize its adoption. With the proposed framework, I present a tool to understand influences on online grocery shopping adoption that can facilitate further inquiries about the acceptance of online grocery shopping.

Appendix

APPENDIX A: LITERATURE ON ONLINE GROCERY ACCEPTANCE RESEARCH

Category	Sub-Category 1	Sub-Category 1
Cluster: Factors on Usefulness		
Environmental Relief	**Efficient Logistics** (Boyer and Hult, 2005; Chintagunta et al., 2012; Seow et al., 2003)	
Financial Savings	**Travel Costs** (Arce-Urriza et al., 2017, p. 72; Chintagunta et al., 2012, p. 34)	
Physical Relief	**Comfort/Convenience** (Andrews and Currim, 2004; Arce-Urriza et al., 2017, pp. 72–74; Avery et al., 2012; Breugelmans and Campo, 2016, p. 3; Chu et al., 2008; Gupta and Kim, 2007; Richards et al., 2016, p. 3ff; Souitaris and Balabanis, 2007, p. 248)	
	Transportation of Goods (Arce-Urriza et al., 2017, p. 72; Chintagunta et al., 2012)	**Portability** (Arce-Urriza et al., 2017, pp. 72–74; Chintagunta et al., 2012, p. 12f; Melis et al., 2015)
	Weather (Arce-Urriza et al., 2017, p. 72; Chintagunta et al., 2012)	
Mental Relief (Chintagunta et al., 2012; Devaraj et al., 2002; Ingene, 1984)	**Flexibility** (Chintagunta et al., 2012, p. 15,26)	
Time Savings (Anesbury et al., 2016; Avery et al., 2012; Bhatnagar et al., 2000; Boyer and Hult, 2005; Breugelmans and Campo, 2016, p. 3; Donthu and Garcia, 1999; Gupta and Kim, 2007)	**Waiting Time at the Checkout** (Anesbury et al., 2016; Arce-Urriza et al., 2017; Chintagunta et al., 2012)	
	Travel Time (Arce-Urriza et al., 2017; Chintagunta et al., 2012)	

	Quality Control/Item Evaluation (Arce-Urriza et al., 2017; Chintagunta et al., 2012)	
	Selection and Navigation Time (Andrews and Currim, 2004; Anesbury et al., 2016; Arce-Urriza et al., 2017; Chintagunta et al., 2012; Chu et al., 2008; Degeratu et al., 2000; Richards et al., 2016)	
Cluster: Factors on Effort		
Financial	**Delivery Fees** (Chintagunta et al., 2012; Kacen et al., 2013; Lewis et al., 2006; Smith and Brynjolfsson, 2001)	
Mental	**Risk/Uncertainty** (Danaher et al., 2003)	
Time	**Selection- and Navigation Time** (Arce-Urriza et al., 2017, pp. 1–3, 13ff, 23; Boyer and Hult, 2005, pp. 130–134; Diehl and Poynor, 2010; Ellis, 2003; McAlister and Pessemier, 1982)	
	Waiting Time for the Delivery (Chintagunta et al., 2012, p. 16f.)	
Cluster: Factors on Offering		
Product	**Price** (Andrews and Currim, 2004, p. 72,74; Arce-Urriza et al., 2017; Avery et al., 2012; Bakos, 1997; Breugelmans and Campo, 2016, p. 3; Cachon et al., 2008; Chintagunta et al., 2012, p. 2; Chu et al., 2010, 2008; Degeratu et al., 2000; Moriuchi and Takahashi, 2018, p. 383; Richards et al., 2016, pp. 7, 25ff.; Zhou, 2014)	
	Product Information (Danaher et al., 2003, p. 461; Degeratu et al., 2000; Richards et al., 2016, p. 3)	
	Product Quality (Boyer and Hult, 2005; Chintagunta et al., 2012, p. 12f.; Danaher et al., 2003, p. 462; Moore and Andradi, 1996; Richards et al., 2016, p. 11ff., 25ff.; Souitaris and Balabanis, 2007, p. 249)	

	Product Range/Assortment (Arce-Urriza et al., 2017, pp. 1–3, 13ff., 23; Bakos, 1997; Boatwright and Nunes, 2001; Borle et al., 2005, pp. 617–620; Cachon et al., 2008; Chu et al., 2008; Degeratu et al., 2000; Diehl and Poynor, 2010; Dreze et al., 1994; Iyengar and Lepper, 2000; McAlister and Pessemier, 1982, 1982; Richards et al., 2016, pp. 3, 22–25; Souitaris and Balabanis, 2007, p. 249)	
Delivery (Arce-Urriza et al., 2017, p. 72; Chintagunta et al., 2012, p. 17)	**Order Tracking** (Souitaris and Balabanis, 2007, p. 248)	
	Delivery Date and Time	**Reception** (Boyer and Hult, 2006, p. 144)
	Reliability (Moriuchi and Takahashi, 2018, p. 384; Souitaris and Balabanis, 2007, p. 248)	
Service (Moriuchi and Takahashi, 2018, p. 384; Richards et al., 2016, p. 11 ff.; Souitaris and Balabanis, 2007, p. 250)	**Ergonomics** (Arce-Urriza et al., 2017, p. 84)	**User Functions** (Andrews and Currim, 2004; Arce-Urriza et al., 2017, p. 72; Chintagunta et al., 2012; Danaher et al., 2003, pp. 461, 474; Degeratu et al., 2000; Richards et al., 2016, p. 3)
		Website/App Design (Souitaris and Balabanis, 2007, p. 250)
	Customization/Individualization (Souitaris and Balabanis, 2007, p. 249)	
	Quality of the Service (Boyer and Hult, 2005; Kaynama and Black, 2000; Meuter et al., 2000; Moriuchi and Takahashi, 2018, p. 383; Parasuraman et al., 1985; Rabinovich and Bailey, 2004; Wolfinbarger and Gilly, 2003)	

Cluster: Factors on Consumer Focus		
Demographic Factors	**Age** (Bell and Song, 2007, p. 387; Danaher et al., 2003, p. 463; Degeratu et al., 2000)	
	Occupation (Arce-Urriza et al., 2017, p. 74ff.; Chintagunta et al., 2012)	
	Educational Level (Arce-Urriza et al., 2017, p. 74ff.; Bell and Song, 2007, p. 387; Chintagunta et al., 2012; Danaher et al., 2003, p. 463; Degeratu et al., 2000)	
	Income (Andrews and Currim, 2004; Bell and Song, 2007, p. 387; Chu et al., 2008; Danaher et al., 2003, p. 463; Degeratu et al., 2000; Richards et al., 2016, p. 3ff.)	
	Ethnicity (Bell and Song, 2007, p. 387)	
	Marital Status/Family Status (Bell and Song, 2007, p. 387; Chintagunta et al., 2012; Danaher et al., 2003, p. 463; Degeratu et al., 2000)	
	Gender (Bell and Song, 2007, p. 387)	
	Place of Residence (Bell and Song, 2007, p. 387)	**Population and Density** (Bell and Song, 2007, pp. 370, 387)
		Level of Urbanization (Bell and Song, 2007, p. 387)
Situational Factors	**Restrictions/Disabilities** (Arce-Urriza et al., 2017, p. 74f.; Chintagunta et al., 2012; Hand et al., 2009, pp. 1209–1211)	**Occupation** (Arce-Urriza et al., 2017, p. 24ff.; Breugelmans and Campo, 2016, p. 6; Chintagunta et al., 2012; Degeratu et al., 2000)
		Marital Status/Family Status (Hand et al., 2009, pp. 1209–1211)

		Health (Hand et al., 2009, pp. 1209–1211)
		Mobility (Hand et al., 2009, pp. 1209–1211)
	Accessibility (Chintagunta et al., 2012, p. 13; Richards et al., 2016, pp. 11–13)	**Distance to Traditional Retailers** (Bell and Song, 2007, p. 362; Chintagunta et al., 2012, p. 26)
		Internet Access (Bell and Song, 2007, p. 387)
Trust and Experience (Borle et al., 2005, p. 621; Boyer and Hult, 2005, pp. 126–130, 143; Boyer and Olson, 2002; Chen and Hitt, 2002; Coulter and Coulter, 2002; Fukuyama, 1995; Marcoulides et al., 2012; Moriuchi and Takahashi, 2018, pp. 383–384)	**Brand and Chain Loyalty** (Arce-Urriza et al., 2017, p. 72; Chu et al., 2010; Danaher et al., 2003, pp. 462, 474; Degeratu et al., 2000, p. 76; Moore and Andradi, 1996; Richards et al., 2016, p. 3; Souitaris and Balabanis, 2007, pp. 246, 249)	
	Multi-Channel Retailer (Arce-Urriza et al., 2017, p. 70; Breugelmans and Campo, 2016, p. 1; Melis et al., 2015)	
	Product Quality (Boyer and Hult, 2005; Ellis, 2003; Seow et al., 2003; Tanskanen et al., 2002)	**Quality Control** (Chintagunta et al., 2012, pp. 17, 27–28)
	Recommendation/Advertisement (Bell and Song, 2007, pp. 364–366, 395; Goolsbee and Klenow, 2002)	
	Promotional Offer (Ailawadi et al., 2007; Arce-Urriza et al., 2017, pp. 72–74; Blattberg et al., 1995; Breugelmans and Campo, 2016, pp. 1–3, 13–16; Chintagunta et al., 2012; Liu and Balachander, 2014; Van Heerde and Neslin, 2017)	

APPENDIX B: QUESTIONAIRE FROM REQUIREMENTS WORKSHOP

How important are the following criteria concerning the products for your purchase decision?

	Very Important	Important	Neither	Not Important	Not Important at All
Appealing Product Pictures					
Product Videos					
Detailed Product Information					
Quality of the Product					
Price of the Product					
Freshness of the Product					

How important are the following criteria regarding the shop system for your purchase decision?

	Very Important	Important	Neither	Not Important	Not Important at All
Possibility to Purchase Specific Theme Baskets (Vegan, Vegetarian, etc.)					
Feeling of a New Shopping Experience					
Time Savings					
Quality Seal of the Shop					
Big Product Assortment					
Personal Consultation (Telephone, Video, Chat)					
Security of Customer Data (Data Protection)					
Reliability					
Usability/User-Friendliness					
Offering of Personalized Products					
Integration of Personal Recommendations of Social Media Contacts					

How important are the following criteria regarding the shop system for your purchase decision?

	Very Important	Important	Neither	Not Important	Not Important at All
Appealing Website Design					
History of the Platform					
Uncomplicated Delivery					
Uncomplicated Payment					
Free Payment Options (PayPal, Credit Card, Invoice)					
Membership Models (see Amazon Prime)					
Simple Cancellation of the Order					
Savable Shopping Carts					
Wishlist					
Product Suggestions					
Customer Reviews					
Trust in the Retailer					
Same Day Delivery					
Same Hour Delivery					
Self-Defined Delivery Time Window					
Retailer Reviews					
CO2-neutral Delivery					
Free Possibility of Returns					
Product Subscriptions (daily/weekly/monthly)					

*All questions were asked in German language.

APPENDIX C: VALIDATED HYPOTHESES BEWEXTRA WORKSHOP GENERAL RETAIL

- When I go shopping, I wish not only to be able to be navigated to the front of the door of the shop, but also directly to the desired product shelf in the shop.
- I feel comfortable in a shopping environment with larger open spaces.
- I wish for individual, small, owner-managed retailers.
- I would like to see the retailers to cooperate with each other.
- I wish I could combine shopping with leisure activities. For example, there should be gastronomy or wellness offers that can be simply connected with shopping.
- I would like to have lounge-like shopping areas, with upholstered seating areas.
- I would like to have the opportunity to use an extended or augmented reality system that guides me through the shopping areas in the store.
- I would like shopping windows to be decorated in a contemporary way, for example through the use of new digital technologies.
- I would like to have a recommendation system in the store, which is based on the recommendations of other customers.
- I would like to have a recommendation system in the store that recommends alternative and complementary or suitable products to me.
- It is important for me to be advised by the retailer competently and individually while I purchase products
- It is important to me that the expert advice is given by a human being (not a robot or other artificial intelligence).
- I would like to be able to arrange appointments for expert advice.
- I desire that products can also be customized (e.g. specially adapted to my wishes) in stationary retail.
- I would like to be able to safely store the goods I have purchased until I have finished my purchase, and not have to keep them with me during the rest of my purchase.
- I would like a system that transports or holds ready for me the goods that I gradually buy or whose purchase I am considering, without having to worry about them myself. A shopping cart that follows me like a shadow on its own could be such a solution.
- I would like an intelligent shopping experience in which necessary tasks such as weighing and scanning the goods are automated, e.g. using a “smart shopping cart”.
- I would like to make a purchase where I do not have to stand in a queue (at the cash desk, at a pay machine or at a changing room).
- I wish for simple, cashless payment systems.
- I would like to have a delivery service that delivers the goods that I purchase (offline) to my house after the purchase.
- It is important to me that delivery services do not additionally pollute the environment (e.g. by using cargo bikes).

APPENDIX D: VALIDATED HYPOTHESES BEWEXTRA WORKSHOP GROCERY RETAIL

- I would like to have a digital interactive support in planning my grocery shopping (e.g. via an app on my smartphone), which allows me to…
    - record my shopping list using speech recognition.
    - automatically create a shopping list only by recording the recipe or menu.
    - see the current availability of products at each retailer.
    - compare the product prices of different retailers.
    - see daily updated offers from retailers near me.
    - directly obtain information concerning the available food, such as degree of ripeness, freshness, origin, etc.
    - order directly online via a common platform of the dealers within my reach.
    - see and manage my previous grocery purchases.
    - create a recipe database for me.
    - view friend's recipe databases.
    - receive recipe suggestions of the retailers, oriented to their daily offers.
    - plan my shopping route and navigate me to the individual retailers in the best possible way.

- I would like to have a digital interactive support (e.g. a smart shopping cart) during my food shopping…
    - that reminds me to buy a product from my shopping list, if I'm standing in the store in front of this product.
    - that integrates an automatic weighing function.
    - which provides me with additional information about products using augmented reality (AR).
    - identifies and lists the products that have been added to (or removed from) my shopping cart.
    - which automatically sends my purchases to the cash register so that my goods can be left in the trolley at the end of my shopping.
    - that reminds me when I forget something from my shopping list, before I leave the store.
    - that lets me pay for my purchase automatically when I leave without having to queue at a checkout.

- Despite (or in addition to) increasing automation in retail, I would like to have competent (human) personnel to advise me.

- For my grocery shopping I would like a shopping atmosphere that…
    - which is similar to weekly markets with individual stands.
    - offers smaller sales areas and smaller shops instead of large supermarkets.
    - gives me the opportunity to experience something in connection with food.
    - avoids larger gatherings of people.

- I would like to be able to select quantities individually for both offline and online purchases.

- I wish for a grocery selection that…
    - offers an extensive product range with both regional and exotic products.
    - offers mainly regional and seasonal products.
    - enables me to order products online from home and then pick them up in the shops (Click and Collect Option).
    - provides me with comprehensive information about the various groceries.
    - is equipped with a meaningful and transparent certificate system.
    - gets by with significantly less overproduction. I am happy to resign an extensive selection at closing time if less food has to be disposed.
    - avoids packaging and uses environmentally friendly packaging wherever possible.
    - offers overly produced products at a discount.

  - is characterized by sustainable production.

- I would consider/use the possibility of having my groceries delivered by the retailer (online and offline) more often if …
  - it happens immediately after my purchases (within the next hour).
  - it is delivered within a short time window (of 30 minutes) specified by me.
  - my "standard groceries" (also from different dealers) are delivered at regular, easily organized intervals.
  - it is delivered by an environmentally friendly delivery service (e.g. by cargo bicycle).
  - it could be delivered to a refrigerated packing station near me.

- I would like to have an infrastructure (e.g. bicycle parking, delivery service) that allows me to do my grocery shopping comfortably by bicycle.

APPENDIX E: ITEMS FOR PROPOSED RESEARCH FRAMEWORK WITH EXPERIENCE

Constructs		Items[a]
Behavioral Intention (BI)	BI1	I predict that I will continue to buy groceries online.
	BI2	I plan to buy groceries online in the next month.
	BI3	I will not buy groceries online.
Perceived Usefulness (PU)	PU1	Shopping groceries online improves my grocery shopping performance.
	PU2	Shopping groceries online increases my shopping productivity (because I can, for example, use the time gained for something else).
	PU3	Shopping groceries online enhances my effectiveness for other everyday things.
	PU4	I find online grocery shopping to be useful.
Perceived Ease of Use (PEU)	PEU1	My interaction with the online grocery website or application that I already used is clear and understandable.
	PEU2	Interacting with the online grocery website or application that I already used does not require a lot of my mental effort.
	PEU3	I find it to be easy to use online grocery shopping.
	PEU4	I find it easy to get the online grocery website or application to get to do what I want it to do.
Experience (EXP)	EXP1	Have you already bought groceries online?
	EXP2	How many times do you use Online Grocery Shopping during a month?
	EXP3	How many hours do you use Online Grocery Shopping every month?
	EXP4	How frequently do you use Online Grocery Shopping?
Subjective Norm (SN)	SN1	People who are important to me think that I should use online grocery shopping.
	SN2	People who influence my behavior think that I should use online grocery shopping.
	SN3	In general, I have the feeling that online grocery shopping is supported.
Image (IMG)	IMG1	People in my environment, who use online grocery shopping have more prestige than those who do not.
	IMG2	People in my environment, who use online grocery shopping have a high profile.
	IMG3	Shopping groceries online is a status symbol.
	IMG4	People in my environment, who use online grocery shopping attach great importance to a conscious lifestyle.

Trust (TRU)	TRU1	Based on my experience with online grocery retailers in the past, I know it is honest.
	TRU2	Based on my experience with online grocery retailers in the past, I know it cares about customers.
	TRU3	Based on my experience with online grocery retailers in the past, I know it is not opportunistic.
	TRU4	Based on my experience with online grocery retailers in the past, I know it provides good service.
	TRU5	Based on my experience with online grocery retailers in the past, I know it is predictable.
	TRU6	Based on my experience with online grocery retailers in the past, I know it is trustworthy.
	TRU7	Based on my experience with online grocery retailers in the past, I know it knows its market.
Product Involvement (PI)		Please use the series of descriptive words listed to indicate your level of interest in groceries
	PI1	Important O O O O O O O Unimportant
	PI2	Relevant O O O O O O O Irrelevant
	PI3	Means a lot to me O O O O O O O Means nothing to me
Job Relevance (REL)	REL1	For my grocery supply is the possibility of shopping groceries online important.
	REL2	For my grocery supply is the possibility of shopping groceries online relevant.
	REL3	The possibility to shop groceries online is pertinent to handle my grocery supply.
Product Quality (PQ)		Please rate the product quality based on your online grocery shopping experiences…
	PQ1	Online, prestigious products are offered.
	PQ2	Online, an excellent assortment of products is offered.
	PQ3	Products that are offered online are among the best.
	PQ4	Online, a sufficient range of product choices is offered (I can get what I want).
	PQ5	The products are the same quality as I can get in store.
Product Freshness (PF)		Please rate the degree of change when using the Internet for ordering groceries in comparison to shopping in a neighborhood store. Scale from 1 = Much worse than in-store shopping, to 4= about the same to 7= Much better than in-store shopping:
	PF1	The freshness of food
	PF2	The freshness of bakery goods
	PF3	The freshness of fish and meat
	PF4	The freshness of vegetables and fruits
	PF5	The freshness of dairy products
	PF6	The freshness of canned products

E-Shopping Quality (eTailQ)		Please rate how important the following criteria are to you in order to feel that shopping for groceries online is reliable. I consider it reliable if ...
	eTailQ1	you get what you ordered.
	eTailQ2	the product that came was represented accurately by the website/application.
	eTailQ3	the product is delivered by the time promised.
		Please rate how important the following criteria are to you with regard to the design of a website or application that allows you to buy groceries online. It is important for me that ...
	eTailQ4	the website/application has a good selection.
	eTailQ5	the website/application provides in-depth information about the groceries offered.
	eTailQ6	the level of personalization at the website/application is about right, not too much or too little.
	eTailQ7	the website/application doesn't waste my time.
	eTailQ8	it is quick and easy to complete a transaction at the website/application.
		Please rate how important the following criteria are to you in terms of "privacy" when shopping for groceries online. It is important to me that…
	eTailQ9	I feel like my privacy is protected while shopping groceries online via a website/application.
	eTailQ10	the website/application has adequate security features e.g. to protect credit card or personal information.
	eTailQ11	I feel safe in my transactions with a website/application.
		Please rate how important the following criteria are to you in terms of "customer service" when shopping for groceries online. It is important to me that...
	eTailQ12	when you have a problem, the website/application shows a sincere interest in solving it.
	eTailQ13	the online retailer is willing and ready to respond to customer needs.
	eTailQ14	Inquiries are answered promptly.
Computer Self-Efficacy (CSE)		I could buy groceries online…
	CSE1	if there was no one around to tell me what to do as I go.
	CSE2	if I had just the built-in help facility for assistance.
	CSE3	if someone showed me how to do it first.
	CSE4	if online grocery shopping is just as easy to use as other online shopping options that I have already tried.

Perceptions of External Control (PEC)	PEC1	I have control over my purchase using online grocery shopping.
	PEC2	I have the resources necessary (knowledge, digital device) to use online grocery shopping.
	PEC3	Given the resources, opportunities and knowledge it takes to shop online for groceries, it would be easy for me to use online grocery shopping.
	PEC4	Shopping groceries online is not compatible with my daily life.
Computer Anxiety (CANX)	CANX1	Digital devices do not scare me at all.
	CANX2	Working with a digital device makes me nervous.
	CANX3	Digital Devices make me feel uncomfortable.
	CANX4	Digital Devices make me feel uneasy.
Computer Playfulness (CPLAY)		The following questions ask you how you would characterize yourself when you use digital devices:
	CPLAY1	…spontaneous.
	CPLAY2	…creative.
	CPLAY3	…playful.
	CPLAY4	…unoriginal.
Enjoyment (ENJ)		I find that shopping for groceries on the Internet...
	ENJ1	is fun for its own sake.
	ENJ2	makes me feel good.
	ENJ3	is boring.
	ENJ4	involves me in the shopping process sufficiently.
	ENJ5	is exciting.
	ENJ6	is enjoyable.
	ENJ7	is uncomfortable.
	ENJ8	is interesting.
Result Demonstrability (RES)	RES1	I have no difficulty telling others about the results of online grocery shopping.
	RES2	I believe I could communicate to others the consequences of using online grocery shopping.
	RES3	The results of using the system are apparent to me.
	RES4	I would have difficulty explaining why using online grocery shopping may or may not be beneficial

[a]Asked questions with experience. All questions were asked in German language.

APPENDIX F: ITEMS FOR PROPOSED RESEARCH FRAMEWORK WITHOUT EXPERIENCE

Constructs		Items[a]
Behavioral Intention (BI)	BI1	Assuming I have the necessary resources, I predict that I will buy groceries online.
	BI2	I plan to buy groceries online in the next month.
	BI3	I will not buy groceries online.
Perceived Usefulness (PU)	PU1	I imagen that shopping groceries online improves my grocery shopping performance.
	PU2	I imagen that shopping groceries online increases my shopping productivity (because I can, for example, use the time gained for something else).
	PU3	I imagen that shopping groceries online enhances my effectiveness for other everyday things.
	PU4	I find online grocery shopping to be useful.
Perceived Ease of Use (PEU)	PEU1	I imagen that my interaction with an online grocery website or application is clear and understandable.
	PEU2	I think that interacting with an online grocery website or application does not require a lot of my mental effort.
	PEU3	I imagen that online grocery shopping is easy.
	PEU4	I think that I would find it easy to get the online grocery website or application to get to do what I want it to do.
Experience (EXP)	EXP1	Have you already bought groceries online?
Subjective Norm (SN)	SN1	People who are important to me think that I should use online grocery shopping.
	SN2	People who influence my behavior think that I should use online grocery shopping.
	SN3	In general, I have the feeling that online grocery shopping is supported.
Image (IMG)	IMG1	People in my environment, who use online grocery shopping have more prestige than those who do not.
	IMG2	People in my environment, who use online grocery shopping have a high profile.
	IMG3	Shopping groceries online is a status symbol.
	IMG4	People in my environment, who use online grocery shopping attach great importance to a conscious lifestyle.
Trust (TRU)	TRU1	Based on my expectations of online grocery retailers, I imagen it is honest.
	TRU2	Based on my expectations of online grocery retailers, I imagen it cares about customers.
	TRU3	Based on my expectations of online grocery retailers, I imagen it is not opportunistic.
	TRU4	Based on my expectations of online grocery retailers, I imagen it provides good service.
	TRU5	Based on my expectations of online grocery retailers, I imagen it is predictable.
	TRU6	Based on my expectations of online grocery retailers, I imagen it is trustworthy.
	TRU7	Based on my expectations of online grocery retailers, I imagen it knows its market.

Product Involvement (PI)		Please use the series of descriptive words listed to indicate your level of interest in groceries
	PI1	Important O O O O O O O Unimportant
	PI2	Relevant O O O O O O O Irrelevant
	PI3	Means a lot to me O O O O O O O Means nothing to me
Job Relevance (REL)	REL1	For my grocery supply is the possibility of shopping groceries online important.
	REL2	For my grocery supply is the possibility of shopping groceries online relevant.
	REL3	The possibility to shop groceries online is pertinent to handle my grocery supply.
Product Quality (PQ)		Please rate the product quality based on your expectations, if you buy groceries online…
	PQ1	Online, prestigious products are offered.
	PQ2	Online, an excellent assortment of products is offered.
	PQ3	Products that are offered online are among the best.
	PQ4	Online, a sufficient range of product choices is offered (I can get what I want).
	PQ5	The products are the same quality as I can get in store.
Result Demonstrability (RES)	RES1	I think, I would have no difficulty telling others about the results of online grocery shopping.
	RES2	I believe I could communicate to others the consequences of using online grocery shopping.
	RES3	The results of using the system are apparent to me.
	RES4	I would have difficulty explaining why using online grocery shopping may or may not be beneficial
Product Freshness (PF)		Please rate the degree of change that you expect, when using the Internet for ordering groceries in comparison to shopping in a neighborhood store. Scale from 1 = Much worse than in-store shopping, to 4= about the same to 7= Much better than in-store shopping:
	PF1	The freshness of food
	PF2	The freshness of bakery goods
	PF3	The freshness of fish and meat
	PF4	The freshness of vegetables and fruits
	PF5	The freshness of dairy products
	PF6	The freshness of canned products

E-Shopping Quality (eTailQ)		Please rate how important the following criteria are to you in order to feel that shopping for groceries online is reliable. I consider it reliable if ...
	eTailQ1	you get what you ordered.
	eTailQ2	the product that came was represented accurately by the website/application.
	eTailQ3	the product is delivered by the time promised.
		Please rate how important the following criteria are to you with regard to the design of a website or application that allows you to buy groceries online. It is important for me that ...
	eTailQ4	the website/application has a good selection.
	eTailQ5	the website/application provides in-depth information about the groceries offered.
	eTailQ6	the level of personalization at the website/application is about right, not too much or too little.
	eTailQ7	the website/application doesn't waste my time.
	eTailQ8	it is quick and easy to complete a transaction at the website/application.
		Please rate how important the following criteria are to you in terms of "privacy" when shopping for groceries online. It is important to me that…
	eTailQ9	I feel like my privacy is protected while shopping groceries online via a website/application.
	eTailQ10	the website/application has adequate security features e.g. to protect credit card or personal information.
	eTailQ11	I feel safe in my transactions with a website/application.
		Please rate how important the following criteria are to you in terms of "customer service" when shopping for groceries online. It is important to me that...
	eTailQ12	when you have a problem, the website/application shows a sincere interest in solving it.
	eTailQ13	the online retailer is willing and ready to respond to customer needs.
	eTailQ14	Inquiries are answered promptly.
Computer Self-Efficacy (CSE)		I could buy groceries online…
	CSE1	if there was no one around to tell me what to do as I go.
	CSE2	if I had just the built-in help facility for assistance.
	CSE3	if someone showed me how to do it first.
	CSE4	if online grocery shopping is just as easy to use as other online shopping options that I have already tried.

Perceptions of External Control (PEC)	PEC1	I have control over my purchase using online grocery shopping
	PEC2	I imagen that I could keep the control over my purchase using online grocery shopping.
	PEC3	I think that I have the resources necessary (knowledge, digital device) to use online grocery shopping.
	PEC4	Given the resources, opportunities and knowledge it takes to shop online for groceries, it would be easy for me to use online grocery shopping.
	PEC5	Shopping groceries online is not compatible with my daily life.
Computer Anxiety (CANX)	CANX1	Digital devices do not scare me at all.
	CANX2	Working with a digital device makes me nervous.
	CANX3	Digital Devices make me feel uncomfortable.
	CANX4	Digital Devices make me feel uneasy.
Computer Playfulness (CPLAY)		The following questions ask you how you would characterize yourself when you use digital devices:
	CPLAY1	…spontaneous.
	CPLAY2	…creative.
	CPLAY3	…playful.
	CPLAY4	…unoriginal.
Enjoyment (ENJ)		I expect that shopping for groceries on the Internet...
	ENJ1	would be fun for its own sake.
	ENJ2	would make me feel good.
	ENJ3	would be boring.
	ENJ4	would involve me in the shopping process sufficiently.
	ENJ5	would be exciting.
	ENJ6	would be enjoyable.
	ENJ7	would be uncomfortable.
	ENJ8	would be interesting.

[a]Asked question without experience. All questions were asked in German language.

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Paper 2: “1000 clicks and it still didn't go as I'd hoped” – Positive and Negative Experiences in E-Grocery Shopping

Abstract

The grocery industry is the largest industry worldwide in terms of revenue, turnover, and customers. Unlike other retailing sectors, online grocery shopping has not yet found its way into the mass market, and consumers are often reluctant to adopt it. The results of this work indicate that the reason for this is that customer needs are not being satisfied. One of the most fundamental problems is that there are many areas throughout Germany that are outside the range of the existing delivery services. Furthermore, I find that the integration of online grocery shopping into daily life is challenging, due to insufficient product assortments, delivery flexibility, and reliability, as well as the consumers' critical assessment of product freshness. By conducting two qualitative studies I find that unplanned, happy discoveries when purchasing groceries are not encouraged and that room for serendipity is largely missing. Through elaborating positive and negative customer experiences and their influences on the intention to use online grocery shopping, I contribute to the understanding of why or why not consumers adopt online grocery shopping. The last part of this work coincidentally fell into the outbreak of the SARS-CoV-2 virus. I discover the resulting coronavirus pandemic as a positive and negative amplifier for the building of a behavioral intention to use online grocery shopping. This work not only advances the understanding of consumer need-information in digital grocery business models literature. By applying research diaries, it also makes valuable contributions to the methodological portfolio for customer-centric innovation management.

Keywords: Customer-Centric Innovation, Online Business Models, Customer Needs, Need-Information, Qualitative Research, Research Diaries, COVID19-Driven Shopping Behavior

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7.1 Introduction

Despite multiple efforts to predict the determinants of online grocery acceptance, the reasons for why consumers do or do not adopt online grocery shopping are still not well understood. Technology acceptance models, which served as a basis in Paper 1, are very good at identifying influences concerning the information system and its output but tend to overlook significant aspects of human interaction and behavior (Chen and Cheng, 2009). Furthermore, the results of the first paper show that factors that had not previously been considered in research influence the behavioral intention to use online grocery shopping such as the outbreak of the SARS-CoV-2 virus.

To understand the basic underlying reasons for the formation of behavioral intentions to shop for groceries online, I chose a multi-method research design to enrich my quantitative data with qualitative research (Christensen et al., 2016; Levy, 2005). Qualitative research in particular supports the holistic understanding of customer behavior, especially when quantitative methods fall short (Levy, 2005). I conducted two ethnographical studies using research diaries in different research settings. One diary study was undertaken in an experimental setting by observing customers using a mock online grocery shopping app that mimics current online grocery shopping environments. The second diary study was performed in a real-life online grocery context.

Given the economical background, the understanding of behavioral intentions to use online grocery shopping is of high economic potential. In Germany, online sales only account for 1.2% of all grocery revenue (Handelsverband Deutschland, 2019). The figure is 1.4% in the United States of America, 1.7% in Spain, and 1.3% in Denmark. The Europe-wide leaders are France, with 5.3%, and the United Kingdom, with 6.9% online grocery sales share. The global leaders in terms of online grocery popularity are Japan with 7.2% and South Korea with 16.6% online grocery sales share (Statista, 2019). The low online grocery penetration in Germany compared to other countries indicates that current business models are not widely used by customers. It also implies that potential customers have not (yet) accepted those models or developed the behavioral intention to shop online for groceries.

My objective of this paper is to move from the macro-level of Paper 1, where I developed and evaluated a holistic online grocery shopping acceptance framework, to the individual level of customer experiences. The goal is to close the research gap by addressing the research questions: *How are customer experiences influencing the usage intention of online grocery shopping in Germany and what elements of an online grocery website or application are driving these experiences?*

The results of this research are threefold. First, I find a total of 52 customer needs. 15 are unique to the first study and 21 from the second study, while 16 appear in both studies. 21 of the discovered needs have not previously been explored in the literature. I find that the flexibility of the delivery and the delivery coverage are determining factors in building up the intention to use online grocery services. I observe that spontaneous shopping is not only blocked by inflexible delivery options but also because current online grocery business models leave no room for spontaneity, for playfulness, for serendipity, for the delight of making happy, unplanned discoveries. Furthermore, the applications and websites are not yet intuitive enough to make digital grocery shopping attractive for all customer groups. Finally, I recognize a rising interest in sustainability-related factors e.g. environmentally friendly packaging and delivery, as well as the wish to support local retailing, both of which can promote the intention to shop for groceries online.

Second, by analyzing the observations, I derive recommendations for online grocery shopping business models to better react to positive and negative customer experiences and consequential opportunities or threats for online grocery shopping adoption. Third, as the last part of this work coincidentally took place the time period of the SARS-CoV-2 virus outbreak, I can derive aspects of crisis-driven online grocery shopping customer behavior and the corresponding performance of German online grocery businesses. I find that the advent of social distancing regulations positively affects the intention to use online grocery shopping. However, long delivery times and limited product assortment caused by the coronavirus crisis in turn negatively influence the behavioral intention to use online grocery shopping.

The paper proceeds as follows. In Section 7.2, I delve into relevant aspects of online grocery acceptance factors, online customer experiences and, their contribution to the success of business models. I also introduce the method of research diaries. In Section 7.3, I describe the research settings of the two qualitative studies, the research samplings, and how I proceeded with the analysis and the coding. In Section 7.4, I present the findings of both studies individually, then compare them. I further compare the qualitative results of this paper with the quantitative study results from Paper 1 and illustrate the new influencing needs that were identified by the qualitative studies. In Section 7.5, I conclude with implications for practice and theory and provide limitations and implications for future research.

7.2 Theoretical Background

7.2.1 International Online Grocery Shopping Behavior: Influences on Usage Intention

In research on the acceptance of e-commerce, it has been suggested that the factors influencing the formation of behavioral usage intentions vary "among different nations and cultures" (Driediger and Bhatiasevi, 2019, p. 224; Zhang et al., 2012). The differences in online grocery penetration rates indicate that this assumption applies to online grocery shopping acceptance. As noted above, while the UK (6.9%), France (5.3%), South Korea (16.6%) and Japan (7.2%) are successfully employing online grocery business models, Germany (1.2%) is still in its infancy. The results of the county-specific literature review of recent research on the UK, France, South Korea, Japan and Germany indicate the various factors influencing online grocery success in different countries (see Table 23).

In the context of studies specific to Germany, the attributes perceived by customers without online grocery experience that most influence online grocery acceptance are *better deals*, *delivery convenience,* and *non-stop opening hours* (Pechtl, 2003). For consumers with online experience, the most influential attributes are *better prices, time savings,* and *more products than in in-store assortment* (Blitstein et al., 2020; Seitz et al., 2017). *Subjective norm* is a strong predictor for the behavioral intention to use online grocery shopping both for consumers with and without experience (Piroth et al., 2020). The *missing physical assessment* of the products and *lack of trust* are the factors that most impede the adoption of online grocery shopping (Pechtl, 2003; Seitz et al., 2017). It furthermore has been observed that *online grocery prices are in the average higher* than those of offline stores, while product prices of pure online providers are higher than the prices of multichannel retailers. Nevertheless, consumers *tend to re-select the online store they made their initial purchase* with (Fedoseeva et al., 2017).

The success of online grocery retailing in France is supported by a nation-wide coverage of drive-through stations for pickup of online grocery orders. Most of the existing research on the success of online grocery shopping in France analyzes the distribution of the pickup-stations and the corresponding logistical advantages and disadvantages (Davies et al., 2019). 3325 drive-through stations are registered in France, accounting for almost twice the number of hypermarkets (Seidel et al., 2016; Wollenburg et al., 2018). Home delivery is only rarely offered (Hübner et al., 2016). The acceptance factors of e-groceries are therefore examined especially in the context of pickup environments. Factors such as flexibility, fast availability, reliability, and a simple ordering process play major roles in consumer satisfaction and acceptance of online grocery drive-through

stations (Hübner et al., 2016; Seidel et al., 2016). Furthermore, it has been found that the quality of the logistics and the perceived product quality are determinants of consumer satisfaction. High perceived quality of the service and products lead to increased purchase frequency (Kaswengi and Lambey-Checchin, 2019).

Table 23: Summary of Country-Specific Factors Influencing Behavioral Intention to Shop for Groceries Online

Country	*Influencing Factors*	*Sources*
France	○ Success mainly driven by comprehensive coverage of drive-through stations ○ Fast availability ○ Service and product quality ○ Reliability	(Hübner et al., 2016; Kaswengi and Lambey-Checchin, 2019; Seidel et al., 2016; Wollenburg et al., 2018)
Germany	○ Price ○ Convenience/delivery convenience ○ Subjective norm ○ Product variety ○ High retailer switching costs ○ Time savings/stress reduction ○ Lack of trust	(Blitstein et al., 2020; Fedoseeva et al., 2017; Pechtl, 2003; Piroth et al., 2020; Seitz et al., 2017)
Japan	○ Single households ○ High proportion of working women ○ Demographic change/older people ○ Trust ○ Reliability ○ Free delivery ○ Consumer reviews/consumer generated content	(Moriuchi and Takahashi, 2018, 2016)
South Korea	○ Single households ○ Double Income families with no time ○ Personalized recommendations based on excellent data collection and distribution ○ Fast delivery ○ High competition ○ High service quality	(Kim, 2020; Park and Thangam, 2019; Retail in Asia, 2017; Roh and Park, 2019)
UK	○ Reliability ○ Convenience ○ Customer service quality ○ Enjoyment ○ Return/refund responsiveness and order cancellation ○ Website efficacy ○ Price ○ Lack of physical evaluation hinders the adoption ○ Store brand ○ Time constraints ○ Living distance to the supermarket	(Brand et al., 2020; Hamad and Schmitz, 2019; Melis et al., 2016; Singh, 2019)

Recent studies examining success factors of online grocery retailing in the UK mention the *seamless*, *enjoyable* and *convenient experience* including *reliability* and *good service quality* (e.g. refund and cancellation service) as most influential elements for the re-purchase decision and further recommendation to the social environment (Brand et al., 2020, 2020; Hamad and Schmitz, 2019; Singh, 2019). Consumers' *price-orientation* is a further significant motive for online

grocery purchases, whereas *experiential-orientation*, the need of consumers to interact with and experience the products, has a negative influence on online grocery shopping, as physical evaluation is not possible (Hamad and Schmitz, 2019). In the adoption process, British consumers tend to select the online store that is provided by the chain they visit in-store. Time constraints and living far from the supermarket are influencing factors (Brand et al., 2020; Melis et al., 2016). Researchers have measured the levels of influence on the various factors on five customer behavior segments: *Intensive Urbanities, Online Omnivores, Uncaring Multitude, Willing but struggling* and *Resisting and responsible*. Easy navigation on devices is, for example, more important for the *Willing but struggling* segment than for the *Online Omnivores* (Brand et al., 2020).

In South Korea, the success of online grocery retailing is driven by societal developments as well as market change and technological progress. The *growing number of single households* in South Korea has been observed as a factor promoting online grocery shopping. 35% of the total population in the country live in one-person households. Online grocery shopping is further fueled by *double-income households* that are *time-pressured* and have no time to visit a grocery store (Park and Thangam, 2019). Furthermore, in South Korea, online grocery retailers have become *infomediaries*, specialized in collecting and distributing information. In exchange for personal information, they provide the customer with price and product information and, if sufficient information is available, they provide product information with personalized product recommendations. With this, customers are directed into their distribution channels while the retailers are provided with more and more behavioral data (Kim, 2020). In the course of market competition, retailers have been forced to *increase the number of transactions* and improve *overall service*, which in turn has led to an even higher adoption rate of online grocery shopping (Park and Thangam, 2019; Retail in Asia, 2017).

Similar to the South Korean market, Japan's online grocery market is driven by societal changes causing shifts in deeply rooted behavioral habits like grocery shopping. With an *increased number of smaller households*, a *higher proportion of working women* and, caused by the *demographic development*, a growing number of old people, online grocery shopping has become very popular in Japan (Moriuchi and Takahashi, 2016). Data selected by online surveys stressed the importance of *e-satisfaction* and *e-trust*, while both factors are significantly influenced by the *perceived experience* of the customer. *Product ratings by other customers* are also stated as an important aspect of the purchasing decision in online contexts, whereas the willingness to provide a product review is driven by repeated *online grocery shopping satisfaction* (Moriuchi and Takahashi, 2018).

Beyond the cultural differences, I observe that online grocery shopping behavior is mainly analyzed using quantitative research. Qualitative research regarding online grocery shopping behavior is almost non-existent (Blitstein et al., 2020; Elms et al., 2016; Martín et al., 2019). This not only causes a limited range of methodological approaches to explore online grocery shopping, but it also results in little knowledge of certain facets of consumer behavior and the reasons behind the quantitatively explored factors and determinants (Elms et al., 2016; Robinson et al., 2007).

There are a few exceptions to the lack of qualitative studies on online grocery shopping. One study gathered with qualitative data from two online grocery shoppers in the UK who were observed eighteen months using a variety of methods such as face-to-face interviews, accompanied shopping trips, and shopping diaries. As a result, the researchers developed an understanding of some influences impacting where and when consumers shop for groceries online (Elms et al., 2016). Some factors that promoted online grocery shopping were situational, such as the death of one subject's husband, while others were personal, such as social anxiety. The researchers discussed the positive effect of click-and-collect services on the popularity of online grocery shopping in the UK as well as the need to increase staff to pick and hand over products ordered online. A further study is concerned with the understanding of the nature of last-mile logistical challenges for online grocery retailers in South Africa. For that study, qualitative data via interviews and focus groups was collected. The study found four last-mile logistical challenges in the South African omnichannel grocery market: reliability and fulfillment, cold chain requirements, physical distribution, and reverse logistics (Weber and Badenhorst-Weiss, 2018).

Still another qualitative study explored online grocery shopping motivations and online grocery shopping experience using four focus groups of online grocery customers in the UK. The researchers found that life events can be a catalyst for starting online grocery shopping. A perceived lack of service quality led to a reduction in intention to shop online. It was also outlined that online grocery shopping serves as a complementary mode of grocery shopping (Robinson et al., 2007). A two-step research process combining qualitative and quantitative investigations of situational factors in the process of online grocery shopping adoption was undertaken through the application of focus groups in the UK and quantitative evaluation using customer surveys. The results demonstrate the importance of situational factors as triggers to initial online grocery shopping (Hand et al., 2009).

However, scientific and qualitative research on the factors and needs describing the behavioral intention of German customers to shop groceries online did not exist, to the best of my knowledge, before my own work. Purchasing groceries is rooted in daily behavioral routines, habits, and

family relations (Elms et al., 2016). Therefore, it seems logical to directly observe them using qualitative approaches. Given the cultural differences of German online grocery shopping behavior, the lack of qualitative research on German online grocery customer experiences, and the need outlined in Paper 1 to further explore online grocery acceptance, this research aims at filling the outlined gaps. I therefore, conduct two studies and qualitatively observe online grocery shopping experiences and the resulting behavior of German customers.

7.2.2 Customer Experiences and Successful Online Business Models

The topic of customer experiences is widely researched and has been expanded upon in recent years. Especially through the advent of modern technologies that generate massive numbers of touchpoints with the customer – through offline stores and multiple online channels, including e-commerce and social media (Verhoef et al., 2015) – the complexity of managing the customer experience has increased (Edelman and Singer, 2015).

There are multiple definitions of customer experience in the literature. One of the most popular definition originates from Schmitt (1999). He distinguishes five different types of experiences that customers can have in relation to a company, a product, or a service: sensory experiences (sense), affective experiences (feel), creative cognitive experiences (think), physical experiences, behaviors and lifestyles (act) and social-identity experiences (relate) (Lemon and Verhoef, 2016; Schmitt, 1999). Grewal, Levy, and Kumar (2009) state that the customer experience includes "every point of contact at which the customer interacts with the business, product, or service" (Grewal et al., 2009, p. 1). Accordingly, the customer experience is influenced in multiple ways, such as by the supply chain, the prices, and the promotions, and can be shaped by macro-factors like the well-being of the society or financial or behavioral crises (Grewal et al., 2009; Lemon and Verhoef, 2016). De Keyser et al. (2015) assert that customer experience comprises the following dimensions: cognitive, physical, emotional, sensorial, spiritual, and social. Those dimensions come into play during direct and indirect interactions between buyers and sellers (De Keyser et al., 2015).

All these formulations have in common that they address the entire shopping experience perceived by the customer when interacting with a firm. Most of these formulations describe customer experience as a multi-dimensional or multi-layered construct including cognitive, affective, sensorial, emotional, physical, social and spiritual elements (Barari et al., 2020; Bleier et al., 2019; De Keyser et al., 2015; Grewal et al., 2009; Kumar and Anjaly, 2017; Lemon and Verhoef, 2016; Micu et al., 2019; Pine and Gilmore, 1999; Schmitt, 1999; Verhoef et al., 2015, 2009).

In the course of the development of customer experience research, a research stream on online customer experiences emerged. In this stream, customer experiences are often theorized as a psychological construct of cognition and affect (Micu et al., 2019); the cognitive (informativeness) and affective (entertainment) dimensions are frequently explicitly examined and conceptualized (Bleier et al., 2019). Some work in this stream focuses on the cognitive concept of "flow" (Hoffman and Novak, 2009; Novak et al., 2003, 2000), "a cognitive state in which the individual is completely absorbed in an activity to the extent that they are mentally immersed and oblivious to time or other things around them" (Rose et al., 2012, p. 310).

Some other research on online customer experience also includes social elements (Wang et al., 2007). Bleier et al. (2019) conceptualize online customer experience as consisting of the four dimensions entertainment (affective), informativeness (cognitive), social presence (social), and sensory appeal (sensory), leaving out the physical dimension (Bleier et al., 2019). Rose et al. (2012) define the online customer experience as "more than the component party of a website but rather […] the cumulative outcome of consistent exposure to the e-retailer's offer online" (Rose et al., 2012, p. 308).

It is noticeable that customer experience concepts within online contexts mainly concentrate on human-to-computer or virtual interactions (Lallemand et al., 2015). Physical interactions after the purchase, such as receiving the delivery and product, are generally left out or not examined in detail (Cao et al., 2018; Jain et al., 2017; Kumar and Anjaly, 2017), so there is limited research on the impact of post-purchase experience on customer behavior and behavioral intentions. Especially in the context of online grocery shopping, the delivery process and the physical evaluation are vital factors influencing the customer's experience and, thus, the customer's intention to make another purchase or refrain from doing so.

For my research, I understand the online customer experience as a multi-dimensional construct and define it as "the internal and subjective response customers have to any direct or indirect contact with a company" (Meyer and Schwager, 2007, p. 118). Elaborating on this definition, I include not only informativeness, entertainment, social presence and sensory appeal, but also the post-purchase experience, including the delivery and physical evaluation of the product. The experience is thereby not only defined by elements that the retailer can control (e.g. interface, product price, quality), but also by factors outside of the retailer's control (e.g. influences from others). In sum, I describe online customer experiences as the holistic and total experience including the information search, and the post-purchase experience (Verhoef et al., 2009).

The Influence of Customer Experiences on Business Model Success

Pine and Gilmore (1998) and Schmitt (1999) were among the first researchers to assert the importance of positive customer experiences for the success of business models (Lemon and Verhoef, 2016; Pine and Gilmore, 1999; Schmitt, 1999). A business models is „the design or architecture of value creation, delivery, and capture mechanisms [a business] employs" (Teece, 2010, p. 172). A business model defines the way value is delivered to the customers, customers are enticed to pay for value, and the customers' payments are turned into profit (Amit and Zott, 2001; Foss and Saebi, 2017; Teece, 2010). The creation of customer value is key for the success of a business (Amit and Zott, 2001; Edelman and Singer, 2015; Heinonen et al., 2019; Norton and Pine, 2013).

In the context of retail, the value offered by the business is experienced by the customer before, during, and after the purchasing process (Heinonen et al., 2019). Hence, customer experience is an important driver in the concept of value creation and has a powerful impact on business success. Customer experiences can be either competitive advantages or disadvantages (De Keyser et al., 2015; Keiningham et al., 2019; Lemon and Verhoef, 2016; Pine and Gilmore, 1999). If the customer experience is perceived as poor, this impression is also transferred to the perceived value, which in turn results in less success the company.

As qualitative research on the specifics of online grocery shopping behavior of German customers is scarce (see Section 7.2.1) and the reasons for consumers' acceptance or rejection of online grocery shopping in Germany are not well understood, a qualitative research approach is appropriate for this exploratory study. For this, I combine two approaches: *listening to the customer* (Dahan and Hauser, 2002) and *asking the customer* (Goffin et al., 2010; Piller et al., 2011). Through listening to and asking the customer about the perceived experience, the results indicate what customers like or dislike about the value offered (Teece, 2010). Those insights can guide the restructuring of products, services, and/or business models, and subsequently provide better customer experience, ultimately leading to more success for the business. It has to be examined how customers integrate services and products to their daily lives and how firms can improve the relevance of these products and services for customers. Only if this is understood will the customer experience and, thus, the business be successful (De Keyser et al., 2015).

7.2.3 The Research Diary Method

The research diary method is a self-reporting instrument that is used to systematically explore ongoing experiences within everyday situations (Bolger et al., 2003; Kunz, 2018; Ohly et al., 2010). Diaries can include social, psychological, and physiological dimensions and processes, as

well as specific context (Bolger et al., 2003). Diaries make it possible to collect data daily or even more frequently, and are "useful to capture the short-term dynamics of experiences within and between individuals" (Ohly et al., 2010, p. 80).

One's mood, one's level of performance, and one's judgements vary from day to day. Diary studies facilitate the capture and analysis of such fluctuating phenomena (Ohly et al., 2010; Sonnentag and Niessen, 2008; van Eerde et al., 2005). Because they capture impressions in near-real time, another benefit of research diaries is that they avoid the so-called "recall problem," also called "retrospective bias," which can threaten the validity of survey measures (Burton and Nesbit, 2015; Ohly et al., 2010; Reis and Gable, 2000; Siemieniako, 2016). When researchers try to understand behavior, they ask respondents why and how they behaved. Because of the passage of time, the answers are often inaccurate and incomplete (Burton and Nesbit, 2015). Moreover, when capturing data from retrospective self-reports, it has been shown that recent experiences are recalled more strongly than more distant ones. Adding to this, with uncertainty concerning the memory of already experienced situations individuals tend to summarize experiences that repeated over time (Burton and Nesbit, 2015; Stone et al., 1999). Especially when capturing daily habitual behaviors in stable contexts, the retrospective bias will be stronger, since the change and implementation of those habitual situations are strongly influenced by minimal and fast thoughts (Burton and Nesbit, 2015; Wood et al., 2002).

Diary studies enable the observation, examination, and evaluation of behavior and experiences in their natural, spontaneous context at the moment when the behavior, experiences, and thoughts occur (Bolger et al., 2003; Burton and Nesbit, 2015; Ohly et al., 2010). Since the self-report of the participant is undertaken shortly after the moment the experience or the event of behavior occurs, the likelihood of distorted reproduction of the experiences and behaviors are minimized (Bolger et al., 2003; Burton and Nesbit, 2015).

The diary data collection can take different forms according to their recording methodology:

1. Experience-sampling methodology, also called "signal-contingent," where participants make diary entries immediately in response to a certain acoustic signal (Bolger et al., 2003; Burton and Nesbit, 2015; Ohly et al., 2010),
2. Event-sampling methodology, also called "event-contingent," where participants self-report in their diary each time a particular and pre-defined event occurs (Bolger et al., 2003; Burton and Nesbit, 2015; Ohly et al., 2010), and
3. Interval contingent methodology, in which participants are assigned to make a self-report in the diary in more or less regular intervals (Bolger et al., 2003; Burton and Nesbit, 2015).

All three design methodologies can be performed based on variable or fixed time schedules. In a variable schedule, the participants assess their experiences at a random point in time, whereas in a fixed schedule the participants are given specific times when the self-report is to be made. Each design has advantages and disadvantages. A drawback of the variable schedule in comparison to the fixed schedule is the fact that the task of writing the journal can become disturbing when participants have to follow random time signals, whereas the burden with a fixed schedule is easier, since the participant can predict the workload in advance. The design approaches are not exclusive, meaning that they can be combined, and their combination may strengthen the study design (Bolger et al., 2003).

Diary studies can be applied with different technologies, which not only have been developed through recent information technology innovations but also depend on the study goals and desired outcomes (Green et al., 2006). In literature, three different diary technology types are distinguished: paper and pencil diaries, electronic data collection diaries, and audio tape and video diaries (also called “plastic diaries”) (Bolger et al., 2003; Green et al., 2006; Kunz, 2018; Ohly et al., 2010).

Paper and pencil diaries are the most commonly used type. They were been deployed as early as 1942 (Stonborough, 1942). The participants are equipped with booklets, notebooks, or a collection of questionnaires and are instructed on how to complete and return the diaries (Bolger et al., 2003; Kunz, 2018; Ohly et al., 2010). The major advantage of this methodology is that no preconditions like internet access or computer skills have to be met. This approach is suitable in any situation. There is evidence that this approach does not manage to avoid retrospective bias entirely, but because the data is collected daily, this bias is diminished (Bolger et al., 2003; Ohly et al., 2010). Diaries using an event-based or signaling-based approach help to further reduce the bias because the experiences are written down shortly after the event occurred. Furthermore, paper and pencil diaries encourage the participant to creatively use the record not only purely textually but also in highlighting certain aspects by using different colors or even through drawings, which can deepen the statement and support the interpretation and analysis of the researcher (Kunz, 2018).

The development of electronic data collection in research diaries began in early 2000 (Barrett and Barrett, 2001). In these studies, handheld computers, and, nowadays particularly smart-phones, are deployed and equipped with custom-designed questionnaire applications (Bolger et al., 2003; Ohly et al., 2010). Those diary study designs enable sending acoustic signals. At the same time, it can be tracked that compliance with the protocol of the study, namely making an entry directly after the event or acoustic signal occurs, is maintained. Digital diary studies facilitate the

processing of the data since that data is already in a digital format. A downside of this design is that the use is restricted to those participants who have access to the internet at any given time that the study settings require, as well as understanding of the technology (Ohly et al., 2010).

Diary procedures are especially popular in organizational, psychological and work research (Jones et al., 2007; Ohly et al., 2010; Sonnentag and Niessen, 2008), social research (Robinson and Godbey, 2010; Siemieniako, 2016; Tschan et al., 2005), medicine (Lovett and Peres, 2018) and consumption research (Kunz, 2018). Therefore, they constitute an established, tried, and tested methodology in other disciplines that have proven to bring results (Elliott et al., 2005; Siemieniako, 2016). Still, the knowledge that qualitative diaries add to understanding unexplored dimensions of consumer behavior has not been established in social marketing and innovation research (Siemieniako, 2016).

The reasons to adopt the methodology of research diaries for this work are diverse. First, research diaries are effective at collecting qualitative behavioral data in their natural context. They support the prevention of retrospective bias, as which can trouble more traditional approaches such as interviews. Second, diaries allow access to the participants' own interpretations concerning the reasons for their behavior as well as the potential to understand their behavioral changes over time (Bolger et al., 2003; Siemieniako, 2016). They can extract the situational subjective perspective including the environmental influences on the object of investigation (Kunz, 2018).

Third, diaries are particularly effective for research on phenomena that are difficult or impossible to observe from the outside. This includes "cognitive processes, emotions, motives, concealed actions, omitted actions, and socially restricted activities" (Rodriguez et al., 2002, p. 3). Considering the identified knowledge gap, it can be assumed that these processes have not yet been understood and that the collection of subjective and explicit information about German online grocery purchasing behavior is challenging. Since research diaries have not yet been established in consumer behavior and innovation management research, this method has never been applied to online grocery shopping behavior in Germany. Thus, it has never been used to meet the challenges of collecting the required information. I aim to show that the use of research diaries can provide insights into what online grocery shopping consumers believe triggers them to adopt online grocery shopping.

Fourth, research diaries are very suitable for observing behavior that is routinely performed in such a way that it is extremely difficult or even impossible to remember in detail (Kunz, 2018). Grocery shopping is a behavior that follows deeply rooted behavioral habits and patterns. The deliberations for the selection of products or retailers mostly happen in silence or are based on behavioral patterns that have been established over the years. Because diaries can be used to

overcome this problem of memory (Alaszewski, 2006), they are suitable to "seeing the world from the social actors' point of view" (Alaszewski, 2006, p. 36) and therewith enable the understanding of underlying mechanisms and motivations of customers to shop (or to refrain from shopping) for groceries online.

7.3 Research Setting

7.3.1 Method and Sampling

I follow a qualitative research design comprising three phases: (1) the case sampling, (2) the data gathering using two research diary studies, and (3) the coding and analysis procedure. Taking the discussed advantages of research diaries into account, the use of a multiple customer diary study approach seems most suitable to contribute to the research question (see Section 7.2.3).

As in every type of study, when using research diaries, the sample size is characterized by two perspectives, the generalizability of the results and the statistical power. In conducting research diaries, two further perspectives come into play: the balance between a large number of participants and a large number of days. Concerning a high number of participants, it can be expected that some participants will drop out during the study, while with a large number of days, there is a risk that participants will lose interest; in either case, the quality of the data will deteriorate. Reports have shown that a sample size smaller than 30 may lead to biased results (Ohly et al., 2010; Scherbaum and Ferreter, 2009). For my research, I conducted two diary studies and one pre-study with a total of 44 participants based on a paper-pencil approach, exceeding the minimum limit of 30 participants.

Participants must be particularly motivated to engage in diary studies, as it is of utmost importance for the results that shared thoughts and experiences be of high data quality over the entire study period. In literature, it is debated upon whether monetary incentives motivate participants or whether they lead to fake answers (Green et al., 2006; Ohly et al., 2010). For my research, I decided to forego financial incentives. The participant acquisition aimed to reach as diverse a field of participants as possible in terms of age, gender, and place of residence. Due to the importance of compliance with the diary study, I decided to involve only participants who were interested in engaging in such research.

For the first study, conducted in an experimental setting limited to the city of Aachen, Germany (see Section 7.3.2), I acquired 18 participants: 10 women and 8 men, with an age distribution from 24 to 59 years old (see Table 1). The second study was conducted with 16 participants: 8 women and 8 men from 24 to 68 years old who were regionally distributed across Germany.

In Study 1, the age group 26-30 is overrepresented, while this is the case for the age group 31-35 in Study 2. Study 1 provides particular results for a central and urban place of residence, while in Study 2, 43.7% of participants live in some suburban area (see Table 24).

Table 24: Age, Gender and Residence Distribution of the Participants

			Age						
			20-25	**26-30**	**31-35**	**36-40**	**41-45**	**>50**	**Total**
Study 1	**Gender**	*Female*	1	4	2	1	1	1	10
		Male	0	6	1	0	0	1	8
		Total	**1**	**10**	**3**	**1**	**1**	**2**	**18**
	Residence	*Urban*	1	10	3	1	1	2	18
		Suburban	0	0	0	0	0	0	0
		Rural	0	0	0	0	0	0	0
		Total	**1**	**10**	**3**	**1**	**1**	**2**	**18**
Study 2	**Gender**	*Female*	0	1	7	0	0	1	9
		Male	1	1	4	0	0	1	7
		Total	**1**	**2**	**11**	**0**	**0**	**2**	**16**
	Residence	*Urban*	0	1	7	0	0	0	8
		Suburban	1	1	3	0	0	1	6
		Rural	0	0	1	0	0	1	2
		Total	**1**	**2**	**7**	**0**	**0**	**2**	**16**

7.3.2 Studies

The pre-study I performed (Güsken et al., 2019) as a proof of concept included 10 participants and tested whether the research diary approach could provide data that contributed to the research question. Since this test was successful, the two studies were carried out.

I developed a paper-pencil based research diary in the form of a printed booklet that was used for both studies. The diary combines the event-sampling methodology with a variable schedule. While most of the questions are concerned with the occurrence of an event, such as order placement or the delivery of the products, some of the questions are unconnected to any particular event and are meant to be answered between the order placements and deliveries as well as at the end of the study. The diaries contain open qualitative and quantitative questions that give insight

into the study participants through their entire online grocery purchasing process, from their purchase planning through the purchase, the delivery, as well as the evaluation of the purchase, and the reflection of the process. In addition to information via e-mail, personal conversations, telephone calls, and voice mail, a study manual was distributed, explaining the timeframe of the study, the usage of the diaries, and how to return them. With this, the participants were instructed to design their grocery shopping as they would normally in their daily lives. The research diaries were carried out with German customers and were therefore in the German language.

Study 1

The first study has two purposes. First, it seeks a preliminary understanding of the experience of online grocery shopping from a customer's point of view. Second, it seeks influences on the behavioral intention to use online grocery shopping that are not biased by the result of product evaluation. As I wanted to develop an understanding of additional factors and their strength of influence on the behavioral intention, and, subsequently, to avoid results biased by the evaluation of the purchased products, I refrained from studying delivery and evaluation of the products purchased. The exclusion of the product evaluation can only be achieved through a laboratory experiment in which the variables and process steps can be controlled.

For the laboratory experiment an online grocery shopping application prototype was developed that mimics current online shopping environments (see Appendix A), combining a total of 309 products – including bakery products, butcher shop products, delicatessen foods, alcohol, coffee, organic and fresh foods – that were chosen from eleven regional retailers of the city of Aachen in Germany. The offered products were chosen from the retailers itself. They include the bestselling products of each store and are available at the same prices in online and offline channels. Due to the diversity of the retailers, despite the small assortment, it was possible to cover all standard items of a grocery purchase. The goal of the first study, to explore customer needs that are not influenced by the actual quality of the products, is not compromised by this proceeding. All participants were instructed that they are not actually purchasing groceries, and thus, none of the placed orders would be delivered. Nevertheless, this study aims at simulating the entire purchasing process. Therefore, a delivery process without fresh grocery products was conducted. A courier delivered a small incentive (pen, shopping bag, etc.) instead. A study period of three days was chosen to observe the customers in their daily shopping habits while keeping the effort of the participants to a minimum.

Study 2

The first study provided a general understanding of influencing factors and customer needs in online grocery shopping contexts which exist alongside the need for physical evaluation. The second study aims at enriching these results with real-life experiences using online grocery business models operating in the German market. It was designed to observe the customer experience of the holistic shopping process, including the assessment of the product quality and freshness, and was conducted in a real-life online grocery context.

The participants chose the online supermarket by themselves. To observe the customers in their weekly shopping habits, the timeframe of the second study was four weeks. The last part of the second study took place during the outbreak and fast development of the SARS-CoV-2 virus in Germany. The study was, nevertheless, carried out and completed as planned. Coronavirus-specific results are discussed in Section 7.4.2.

For the second study, I used most of the same research diary questions from first study and added some other questions. Some were regarding the evaluation of physical products and the resulting trustworthiness of online grocery shopping. I also tracked the choice of the online grocery platform, delivery service, and type of access (website or app-based) through which the purchases were made. As these conditions were given in the first study, it was not necessary to query them. The data collected in the first study did not reveal information on technology playfulness, so, for the second study, I added some questions that aimed at gaining information concerning this factor.

The first study did not gather information concerning prior experiences in online grocery shopping or influences from the social environment (i.e. subjective norm). As recent research posits that these factors influence the behavioral intention to use online grocery shopping, I added some open questions in this regard to the diary of the second study. The questions embedded in the diaries for both studies are shown in Table 25.

Table 25: Questions and Tasks in Research Diaries for Study 1 and 2

Part of the research diary	*Questions/Tasks*
At the beginning	o My way of dealing with, and my attitude towards, digital devices and new technologies is that I generally perceive them as (e.g. easy or difficult, intuitive, playful, exhausting etc., because…)**
	o Which four factors do I consider to be decisive for choosing online grocery shopping (ranked by relevance)?
	o I have bought groceries online before. If yes: This is how often I buy groceries online: **
	o People from my close environment buy groceries online and recommended it to me. Why?**
	o On a scale of 1-10, I perceive the online shopping of groceries as trustworthy. Because…**
Before each order	o Please mark your current state of mind with a cross on the following scale (from relaxed to stressed) (this question was additionally asked right after the order placement)
	o My location is… (e.g.: at home; in the train; in the office) and with me is (e.g.: I am alone; my partner, my kids, etc.)
During the order	o How important are groceries in general to me?
	o I have chosen the following online supermarket, because…**
	o Below, you can enter your thoughts and notes during the purchase process:
After the order and delivery	o How did the delivery of the groceries work out (e.g. reliable, pleasant)? Did I feel stressed or restricted? Could I integrate the delivery smoothly into my everyday life?
	o How I feel about the quality of the products I bought?
	o Compared to shopping for groceries in an offline supermarket, buying online was like….**
	o I notice that I find online products appealing when…**
At the end of the diary	o Remember the question on page X, in which you were asked to name four decisive factors for functioning online grocery retail and sort them according to their relevance? Please reassess the order of the factors by sticking the adhesive dots behind these factors.
	o How similar are my purchases in product selection and -quantities to my actual food purchases?*
	o How do I feel when I think about buying fresh groceries over the internet compared to the local supermarket? Do I think the goods are fresher, less fresh or equally fresh?*
	o Does the possibility to buy groceries online improve or facilitate my personal grocery shopping? Why?**
	o I find the option to buy groceries online relevant/irrelevant to my own grocery supply, because...**
	o I will/will not buy groceries online in the future, because...**
	o I have some more thoughts/suggestions/ideas about my experience with online grocery shopping...**
	o I dropped out of the study because… (if someone wanted to leave the study)**

** only asked in the first study*

*** only asked in the second study*

7.3.3 Coding and Analysis Procedure

The analyses of the two studies were conducted separately but followed analogous procedures. To gain insight into how behavioral intentions to use online grocery shopping are structured, I initially used a deductive logic, following the qualitative content analysis of Kuckartz (2018). For the qualitative content analysis and its coding process, I used MAXQDA software. The main themes of the data correspond to the acceptance factors examined in my proposed framework from Paper 1 and serve as the main coding categories for the initial code family. Subsequently, I built topic-related subcategories. I derived 20 main categories and 48 subcategories for both studies in total, represented in Table 26. The final codebook including the detailed definitions of the codes is given in Appendix B.

Table 26: Coded Categories and Abbreviations for the Research Diaries

Main Category	*Subcategory*	*Abbreviation*
Behavioral Intention		BI
	*Yes/No***	BI yes/no
Computer Anxiety**		CANX
Computer Playfulness**		CPLAY
	Negative/Positive	CPLAY negative/positive
Corona**		CORONA
Enjoyment**		ENJ
	Yes/No	ENJ yes/no
E-Shopping Quality		eTailQ
	Customer Service (Negative/Positive)	CS negative/positive
	Website Design (Negative/Positive)	WD negative/positive
	Fulfillment Reliability (Negative/Positive)	FR negative/positive
	*Security/Privacy***	SP
	*Customer Service Usage (Yes/No) ** *	CSUS yes/no
Job Relevance		REL
	*Negative**/Positive*	REL negative/positive
Other		OT
	Fears	FEA
	*Missing Delivery Area Coverage***	MDAC
Perceived Ease of Use		PEU
	Ease of Use (Negative/Positive)	EU negative/positive
	*Information Transaction (Negative/Positive)***	IT negative/positive
	Dysfunctionality (Negative/Positive)	DisFu negative/positive
	Requirements	REQ
Perceived Usefulness		PU
	*Sustainable City**	SC
	Opportunities	OPP
	*Improvement (Yes/No) ** *	IMP yes/no
Previous Experience**		EXP
	Yes/No	EXP yes/no
*only coded in first study		
**only coded in second study		

Table 26: Coded Categories and Abbreviations (Continued)

Main Category	*Subcategory*	*Abbreviation*
Price		PRI
	Delivery Costs	DELC
	*Product Price***	PPRI
	*Minimum Order Value***	MOV
Probability of Purchase*		PROPU
	Yes/No	PROPU yes/no
Product Freshness		PF
	*Product Specific**	PSPEC
	Delivery	DEL
	*Freshness Assurance**	FASSUR
	*Not Expected as Fresh**	NEXF
	*Expected as Fresh**	EXF
	*Fresher***	FER
	*Equally Fresh***	EQF
	*Less Fresh***	LF
	*Skeptical***	SCEP
Product Involvement		PI
	*High***	HI
	*Medium***	MED
	*Low***	LO
Product Quality		PQ
	*General Statement**	GESTA
	*Perceived Quality**	PERQ
	*High***	HI
	*Low***	LO
Retailer Choice**		RETC
	Service and Offering	SOF
	Retailer Known	RETK
	Only Possible Retailer	OPRET
	Previous Experience with Retailer	EXPRET
	Based on Recommendation	BREC
Subjective Norm**		SN
	REC Yes/No	REC yes/no
Sustainability**		SUST
Trust		TRU
	Products	P
	Retailer	RET
	Personal Reference to the Vendor	PREF
*only coded in first study		
**only coded in second study		

To reach a more comprehensive inside view, I additionally analyzed the data using an inductive approach, applying individual within-case and cross -case analyses (Eisenhardt, 1989; Langley and Abdallah, 2015). To enable a precise insight into the material, the deductive and inductive approaches were iterative and comprised several phases that were carried out by two researchers to lessen the possibility of bias.

I was able to collect observations regarding grocery purchasing behavior in times of COVID-19. The study was conducted in March 2020. Between the 20th and the 25th of March, Germany-wide stay at-home restrictions were implemented by German policymakers. As a result, there was an increase in diary entries during this period, which dealt in particular with the effect of the coronavirus on purchasing behavior, including the fact that participants' online purchases actually declined because the retailer's systems were overloaded. I collected these entries separately in the code-category "Corona" and subsequently evaluated them following an inductive approach. The findings of this particular circumstance and their connections with the other findings of the study are presented separately in Chapter 7.4.2.

7.4 Findings

7.4.1 Study 1

In the course of the study, 72.2% (13 out of 18) of the participants developed a potential behavioral intention to use online grocery shopping in the future. These intentions depend on the fulfillment of various conditions that are examined in the following.

The flexibility of the delivery, the product assortment, the user-friendliness of the interface, the product freshness, and the quality were the most important factors for the respondents' intention to adopt the practice of online grocery shopping. In one of the first diary questions, the participants were asked to write down the four[12] most important factors (descending by importance) regarding the choice to use online grocery shopping. The ranking was to be reassessed at the end of the diary. The weighting of the factors did not change throughout the study. The following factors rank in the first two positions:

- delivery process (36.6% of the denominations of the first two positions),
- sufficient product assortment (23.3%),
- ease of use of the online grocery shopping interface (20%),
- product freshness (13.3%), and
- product quality (6.6%).

Most factors include interdependencies and impacts on other factors. For example, product freshness and quality are closely linked to the perception of familiarity with and trust in the retailer. The product search function, a component of usability, is linked to product information including the products' ingredients, origins, weights, and prices, as well as the presentation of

[12] I asked about the four most important factors in order to give the participants the freedom to indicate more than the usual three factors. Some of the participants added a fifth factor or left out the fourth.

product images. The detailed information and presentation are closely linked to the trustworthiness of the retailer.

Ease of Use

The numerical code allocation reveals that 23% of all coded experiences are associated with functionality [*PEU – DisFu*], ease of use [*PEU – EU*], and interface design factors [*eTailQ – WD*] (see Figure 15).

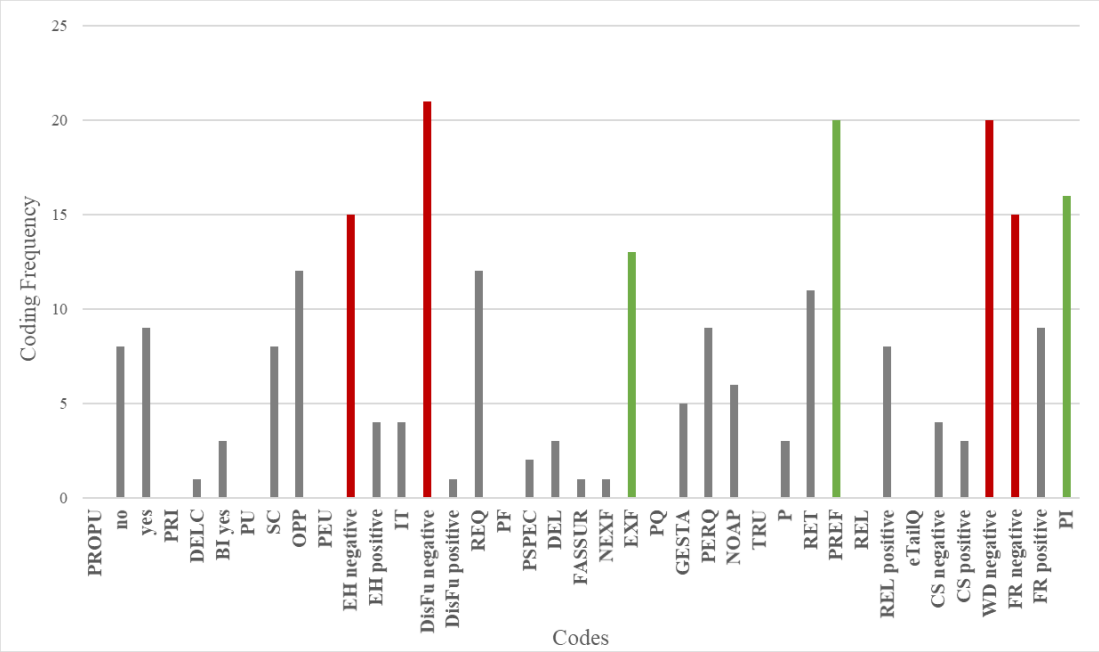


Figure 15: Overview of the Code Frequencies Diary Study 1 *(red columns describe particular negative experiences and green columns describe particular positive experiences that are discussed in this paper)*

Initially, I observed negative experiences with the use of the application demanding habituation time and experience to fulfill the ordering process successfully. However, the perception of usability improved substantially over the course of the study.

> *"Using the app needs getting used to!" [PEU – EH negative]"A little confusing at first, but then clearly arranged." [PEU – EH positive]*

A negative influence on the future behavioral intention to use online grocery shopping is the poor functionality of the product search engines. Time-consuming product selection results in negative perceptions about the usage experience.

> *"Shop selection or product selection still too cumbersome, time-consuming." [eTailQ-WD negative]*

> *"Took longer than expected due to searching for products → should go faster if you know in advance what you want & what is available." [PEU – EU negative]*

Beyond this, the usability of the application is connected to perceptions of product quality and the trustworthiness of the retailer. Product images are used for valuation proposes regarding product quality and freshness, while product information such as the origin, ingredients, weight and price of the product serves as a basis to evaluate the trustworthiness of the retailer.

Summarizing the factors that influence usability, I observe that the perception of usability improves over time, reducing people's urges to reject the application. The quality of the search engine is important for the perception of an easy shopping experience. Difficult shopping experiences yield a lower behavioral intention for further usage. Furthermore, the ability to select personalized quantities of meat, cheese, and vegetables is a functionality that has high impact on future intentions. The fact that this functionality was absent displeased the participants. Generic product images were good enough for the participants to have a favorable opinion of the product quality and freshness. The trustworthiness of the retailer increases with the quantity of information given regarding the product (e.g. origin, ingredients, weight), whereas product information without product images does not improve trust.

Delivery

Over the course of the study, the participants' assessments of the usefulness of online grocery shopping improved. Advantages such as time savings and flexible delivery that were not immediately obvious at the beginning of the study were valued more positively with increasing experience. The degree of flexibility proved to be a core factor influencing usage intention, as it influences the degree to which online grocery shopping can be integrated into the user's daily life. Flexibility includes the flexible delivery address (workplace or home), as well as flexible delivery times (day and time of the day). In addition, the option to collect the products in the supermarket (click-and-collect) boosted respondents' usage intentions.

The behavioral intention to use online grocery shopping decreased substantially if the delivery was late, was canceled or modified, or contained damaged products.

> *"A partial order was canceled due to missing products, there was no message about it, that was annoying." [eTail Q – FR negative]*
>
> *"The order is confirmed by e-mail. But nothing is delivered - my family thinks I am nuts." [eTail Q – FR negative]*

Product Assortment, Freshness, and Quality

A sufficient product assortment is a further key factor for the building of a behavioral intention to use online grocery shopping. This result is due to the research design of only 309 products an anticipated result. Nevertheless, the study outlines the desired composition of products.

According to the shared experiences, product assortment should include basic foods and drugstore items as well as fresh, regional, unpackaged, organic, and fair-trade products.

> *"However, it would be important to me that there is actually a large and good range of products that I can rely on. Otherwise I would have to make personal purchases in the respective shops and would possibly neglect the platform." [eTailQ – WD negative]*

The intention to repeatedly purchase groceries online is, of course, strongly influenced by the perception of the freshness of the products. Even though participants tended to say they expected that products would be fresh when they arrived (see Figure 1 [EXF]), paradoxically, they remained skeptical that this would, in fact, be the case, since they could not pick the products themselves. Furthermore, the freshness of the products is a trust-building measure. Negative experience with the freshness of groceries leads to the customer's refusal to buy online groceries from this specific retailer again, even if the usability of the interface creates a positive customer experience.

Retailer

7.8% of the experiences shared revolve around familiarity with the retailer [PREF]. Familiarity with the retailer has a strong influence on the evaluation of its trustworthiness as well as the product freshness and quality offered. Positive experiences result in the expectation of further positive experiences.

> *"If I trust the retailers (e.g. because I know them) it makes no difference to me whether I buy online or offline. I find the products to be equally fresh when they are delivered directly from the retailer." [TRU – PREF]*

> *"The quality is great; I have been buying the products for years in the shops that now offer them online." [TRU – PREF]*

Even if participants had no personal experiences with a particular retailer before, some considered the retailer trustworthy if they already know the brand or the name.

> *"I find grocery shopping online trustworthy, especially if I know the retailer. This generally applies to large chains, such as Rewe" [TRU – RET]*

> *[I find online grocery shopping trustworthy…] "yes, very, because I know the local shops/dealers personally, unlike other online platforms." [TRU- PREF]*

This result can be seen in relation to the study conditions. The study setting may have led to a disproportionately high overestimation of the importance of regional retail, where most retailers are already known. Nevertheless, participation in this study was marked by a strong desire to support regional retail and that should, therefore, be seen as an important influencing factor. The support of local retail is seen as a sustainability promotion measure by the participants, which goes hand in hand with the desire for environmentally friendly delivery and short delivery routes.

> *"Often the most obvious choice at the moment is online shopping with long transport routes. If as many retailers/products as possible are included, regional shopping offers a great opportunity to reduce emissions both in terms of the goods and the customer." [PU - SC]*

> *"The trend is towards the use of local products. Fast delivery with fresh goods. Positive ecological footprint. Support for small businesses. Promotion of honest work." [PU - SC]*

I observe that the trustworthiness of online retailers suffers if orders are canceled, products cannot be delivered, information about the order process is missing, or the order is not as fresh as the customer wants. From a customer's perspective, retailers are responsible not only for the product assortment and the online representation but also for the delivery. That the delivery is carried out by an independent third party is not perceived by the customer. Every delivery issue is directly attributed to the retailer and has an impact, positive and negative, on the evaluation of the retailer's trustworthiness. In turn, this evaluation determines whether a behavioral intention is formed or not.

Overview of the Customer Needs

Summarizing the observations from the first study, I derived 31 customer needs, categorized by whether their fulfillment by the service led to positive, negative, or mixed/hybrid experiences for the respondents (see Table 27). Based on the analysis, I classified the needs further as met, partially met, and unmet.

I find that familiarity with the retailer is a core factor in the adoption of online grocery shopping. This includes not only awareness of the brand but, in many cases, personal and individual knowledge of the retailer. The delivery is perceived as part of the retailer's job, even though it is performed by an independent delivery partner. Delivery issues are directly reflected in the valuation of the retailer and in the future intention to use it again. Sustainability and regionality are becoming increasingly important factors supporting the usage intention. The study further indicates that generic product pictures are sufficient for online product presentation, while additional product information supports the trustworthiness of the retailer. Regarding usability functionalities, the study finds that the opportunity of personalized quantity selections positively influences behavioral intentions.

Table 27: Overview of the Derived Needs of Dairy-Study 1

#	*Needs*	*Experiences*	*Perceived as met or unmet by participants?*
	Delivery		
1	Clarity of the delivery options	Negative	Unmet
2	Flexibility of delivery	Positive	Met
3	Friendly customer service at product handover	Positive	Met
4	No partial deliveries	Hybrid	Partially met
5	Opportunity to book a time frame	Hybrid	Partially met
6	Reliability of delivery time	Negative	Unmet
7	Self-pickup service (click-and-collect) available	Hybrid	Unmet
8	Short-term delivery/same-day delivery	Positive	Met
9	Time of delivery via short message, e-mail or a tracking function/available information on delivery status	Hybrid	Partially met
10	Transparency of delivery costs		No assessment possible due to study setting
11	Undamaged delivery	Hybrid	Partially met
	Products		
12	Availability of products	Hybrid	Partially met
13	Choice of individual quantities	Negative	Unmet
14	Delivery/transport that guarantees delivery of fresh products		No assessment possible due to study setting
15	Existing product images	Negative	Unmet
16	High product freshness	Neutral	No assessment possible due to study setting
17	High product quality		No assessment possible due to study setting
18	Options to self-select the products	Negative	Unmet
19	Positive cost-benefit relationship concerning product prices	Hybrid	Met
20	Product prices are the same as offline	Hybrid	Met
21	Sufficient product information	Negative	Unmet
22	Wide product assortment	Negative	Unmet
	Usability		
23	Clear payment method	Hybrid	Partially met
24	Clear structured application	Negative	Unmet
25	Ease of use of the ordering interface	Negative	Unmet
26	Information about the ordering process	Hybrid	Unmet
27	Overview of orders (e-mail)	Negative	Unmet
	Sustainability		
28	Environmentally friendly delivery	Positive	Met
29	Support of local retailer	Positive	Met
	Retailer		
30	Being a grocery retailing specialist	Positive	Met
31	Retailer's, name or brand is familiar to the customer	Positive	Met

7.4.2 Study 2

The results of Study 2 indicate that throughout the study, 37.5% of the participants developed a positive intention to use online grocery shopping in the future. All of these participants live in regions with sufficient delivery coverage, the choice of different retailers, and various delivery options. 18.75% of all participants expressed no future intention to use online grocery shopping. The reasons included the lack of spontaneity, the complexity of integrating online grocery shopping into their daily lives, and their rejection of online shopping in general. These participants live in rural areas as well as urban city centers. 43.75% of all participants described reasons for and against online grocery shopping in the future and can, therefore, be regarded as undecided.

43.75% of the participants had had experiences with online grocery shopping before. Of these, 71.42% had purchased online groceries more than once. 50% of all participants have people in their close environment who have shopped online groceries before. Of these, 6 participants (75%) confirm a further intention to use online grocery shopping. Due to the low number of participants, only cautious assumptions can be drawn from these statistics. Nevertheless, the personal environment – conceptualized as the subjective norm – seems to have an impact on the actual use of online grocery shopping. Positive prior experiences make it even more likely that the participant will use the service again.

At the beginning of the study, I asked for the most important factors regarding online grocery shopping and participants cited the following:

- delivery process (22.5%),
- ease of use of the ordering interface (22.5%),
- product quality (19.3%),
- product freshness (12.9%),
- convenience (12.9%), and
- assortment (9,6%).

At the end of the study I asked the participants to re-evaluate their rankings for these most important factors. The results indicate that there was a shift in the priority of the factors over the period of the study. Ease of use (25%) and product quality (20.8%) increased in importance, while product freshness (12.5%) and convenience (12.5%) retained their importance. Less importance was attached to the delivery process (16.6%) as well as the product assortment (which is not found among the most highly ranked factors at the end of the study). Product price (12.5%) has moved in among the two most important factors explicitly named by the participants. Possible interdependencies, reasons for the shift in the evaluation, and hidden needs concerning the adoption of online grocery shopping are displayed in the following.

Ease of Use

Online grocery shopping was mostly performed by the participants on desktop devices rather than mobile ones. The strongest reasons for this were (a) the feeling of uncertainty in the usability of online grocery shopping, (b) first time usage, or (c) the refusal to download an app (as one participant wrote, "I had to download the Picnic app and then order. It's too exhausting for me, especially since I don't know if they deliver here. Rejected!!!"). Participants from the age group over 50 use the desktop version more frequently as they feel more secure with a bigger screen which allows for a better overview. This is also in line with the observed stress response, as their stress levels increase over the course of the study if they faced usability problems.[13] "Annoying!" wrote one participant. "1000 clicks and it still didn't go as easily as I'd hoped."

The study implies that the offering both a desktop version and a mobile application is beneficial. In some cases, a supermarket was even chosen because an app was available. "I want to do everything over the phone," wrote a participant. However, regarding usability, participants using mobile phone applications were more likely to complain that an overview was missing.

> *"If you select another market or want to continue your search later, the shopping cart will be updated. Also, things whose price changes are updated (=deleted) - this is a bit annoying and could be solved better." [PEU – EU/negative]*
>
> *"The overview for the delivery date selection is poorly chosen, because you cannot simply see the free appointments." [PEU – IT/negative]*

Delivery

There are three predominant product handover options in the online grocery industry:

- delivery by a distribution structure organized or owned by the supermarket,
- pickup service (click-and-collect) at the supermarket, and
- delivery via mail (traditional postal services).

50% of all orders were distributed by a distribution structure organized or owned by the supermarket. In 39.2 % of all orders, the pickup service was used and 10.7% were delivered via postal services.

The analysis of the delivery structure revealed that in Germany, there is currently no comprehensive coverage. Concerning the place of residence, the results show that the delivery coverage in rural areas and sometimes even in urban suburbs is sparse or non-existent. This implies that people in peripheral regions are either deprived of the option to shop for fresh

[13] Difficulty dealing with the structure and functions of a website leads to stress, which I was able to track with the self-assessment of the stress level before and after the order placement (see Appendix C).

groceries online or have to resort to supermarkets that offer postal services. This situation generates serious dissatisfaction and hinders the formation of an intention to use.

> *"The delivery radius is also currently still very limited. In North Rhine-Westphalia, I can't order groceries online from my parents', parents-in-law's or grandparents' homes and nobody really lives in the village." [OT – MDAC]*
>
> *"It annoys me that Edeka and Real do not have online grocery delivery service here, although we do have these shops here." [OT – MDAC]*
>
> *"The offer is not yet developed in such a way that one can purchase groceries online in Germany safely & consistently." [eTailQ – FR/negative]*

The downsides of the postal service usage are various. The customer cannot select a delivery window, which strongly interferes with everyday-life integration. Furthermore, fresh groceries to be delivered by post must be provided with special cooling packaging, which most of the times not only produce massive amounts of waste but also cause extra delivery fees, which must be covered by the customer.

> *"Delivery expensive. 'Freshness guarantee' for €5.90? Not with me! All refrigerated products out (of the shopping cart) again!" [PRI-DELC]*
>
> *"Furthermore myTime.de charges an additional fee of €5 for fresh groceries, so orders of small quantities are not profitable." [PRI-DELC]*
>
> *"No. [I have no intention of using it] Because there is no reliable supply here in the region. During my visits to NRW this possibility is missing completely" [PU-IMP]*

In contrast, large and mid-sized cities not only have good delivery coverage but also have the option to choose between delivery and pickup, which satisfies the participants and greatly enhances their intention to use online grocery shopping repeatedly. In this connection, the information concerning the time of delivery via short message, email, or a tracking function in the provided app was perceived as especially positive. The service provided during the delivery of the products is also a determining factor for the intention. A joint inspection of the products by the consumer and the person performing the delivery is desirable so that damaged or missing goods can be identified and returned immediately.

> *"Delivery was limited to a period of one hour. Also went great and I could track everything. Everything in paper and compostable packaging :-)." [eTailQ – FR/positive]*
>
> *"Delivery took place directly at the beginning of the specified time window. The delivery was fast and uncomplicated and the whole process was pleasant for me. All I had to do was to pick up the groceries at the front door. For me, there was no restriction in my daily routine." [eTailQ – FR/positive]*
>
> *"Despite my refusal to accept the product at the door, articles were charged." [eTailQ – FR/negative]*

I find that the product assortment depends on the choice of delivery option, which leads to both dissatisfaction and confusion. It seems that the product assortment is somewhat larger if the customer chooses pickup.

> *"For self-pickup huge choice, but only three markets to choose from (nearest 30km) or there is only package or self-pickup, no delivery service!" [OT – MDAC]*

As the study progresses, the perception of sustainability becomes increasingly important. This is especially because with increasing experience, negatively perceived aspects such as packaging waste become more apparent. At the beginning of the study, climate-neutral delivery such as the delivery by bikes or electric cars that are powered, ultimately, by renewable energies, was mainly discussed as a factor positively influencing the behavioral intention. Throughout the study, the accumulation of packaging waste was perceived as negative. This negative experience improved through environmentally friendly packaging and/or recycling possibilities.

> *"Climate-neutral delivery by e-car (important due to environmental balance)." [SUST]*
>
> *"A negative point: All the plastic bags!!! I would never do it like this." [SUST]*

Products

Some participants expressed that the product freshness is better than in offline purchasing, while some participants had a pronounced skepticism towards the freshness of the product. This was mainly caused by mistrust in the product selection process by the retailer as well as the suspicion that the required low temperature of the cold chain would not be maintained. Despite the skepticism of some participants, fruit and vegetables were the most widely acquired groceries in the study, while meat was preferentially purchased from regional retailers or offline supermarkets.

> *"There is no guarantee that fresh groceries will remain fresh or that they will be delivered despite poor quality (as a risk)." [PF – SCEP]*
>
> *"No possibility, especially with fresh fruit and vegetables, to choose goods yourself." [PF – SCEP]*
>
> *"Only with critical products (e.g. cheese, ...) I would look more closely/be careful, because I do not trust the suppliers 100% that the cold chains are switched on properly." [TRU – P]*

The indication of product availability is seen as a major advantage over the offline supermarket. When products are out of stock, participants wanted to be notified when they were again available.

Choice of Online Supermarket

The product assortment has a strong impact on the choice of which online supermarket to use. Additionally, the retailer choice is influenced by the delivery coverage to the desired place of residence, the preferred delivery option, and the prevalence of the desired interface (i.e. whether it is available for a mobile and/or a desktop device). The study indicates that previous experiences with the retailer are a decisive factor for the online retailer choice. If a user has a good experience with a retailer, the user will choose that retailer again. A change to other providers is perceived as a hurdle, since the customer usually has an account with the first retailer and has had good experiences there.

In general, trust in online grocery shopping rose throughout this study (see Appendix C). However, trust declines drastically if the product freshness or the product quality is perceived as poor.

> *"I order from a supermarket/online retailer I like and generally trust." [TRU – RET]*
>
> *"[Quality] significantly worse in some cases → these few cases lead to massive loss of trust." [TRU – RET]*
>
> *"No, because online groceries are currently out of the question for me → quality management still too bad in my opinion." [IMP – no]*

Spontaneity and Inspiration vs. Plannability and Standard

Two types of shopping patterns or types can be deduced: the *spontaneous shopper* pattern and the *purchase planner* pattern. While the spontaneous shopper enjoys to be inspired by products, and by the opportunity for playfulness, for serendipity, for the delight of making unplanned discoveries, as well as sensory impressions, the purchase planner regularly makes a standard purchase in a short amount of time and likes to plan the purchase in advance.

31.25% of all participants could be allocated to the purchase planning shopper type. At the end of the study, all participants of this type *had a positive behavioral intention* to use online grocery shopping in the future. 25% of the participants could be assigned to the spontaneous shopping type. 75% of the spontaneous shoppers had *no behavioral usage intention* to shop for groceries online.

Not all of the participants acted according to these two defined types; some showed characteristics of both. However, I discover that if participants are the planning type, but sensory impressions are very important to them, the behavioral usage intention is negative. I therefore, conclude that a lack of spontaneity missing sensory impressions lead to a negative behavioral intention to use online grocery shopping.

> *"I plan my shopping at short notice and also like to go spontaneously to the supermarket." [REL – negative]*
>
> *"I prefer to buy products that are subject to changing interests/desires 'spontaneously' in the supermarket. Two weeks' delivery time is too long for me." [BI – no]*
>
> *"It integrates well into my everyday life. I can order my previous order again and I can plan very well." [PU – IMP/yes]*
>
> *"However, I see the chances for me in the time saving, the possibility of planning, and the possibility to choose and look at my products in peace." [REL – positive]*

Online Grocery Shopping as an Addition

The study participants did not perceive online grocery shopping as a complete replacement for offline shopping. Rather, it was a way to complement regular supermarket shopping. While some participants found online grocery shopping a suitable approach to cover their standard shopping needs, other participants considered it suitable only for the purchase of specific products.

> *"In some parts, it is a good addition to shopping by yourself offline and for some things, it is a considerable gain in comfort. I have found the process to be reliable and have retained a positive impression." [BI – yes]*
>
> *"For me, it is a positive add-on because of the already mentioned advantages (I do not have to carry the products myself)." [REL – positive]*
>
> *"Standard purchases can be completed more quickly, as time is saved by simply clicking through the digital supermarket."* [PU – IMP/yes]

Overview of the Derived Customer Needs

Summarizing the observations from positive and negative customer experiences in Study 2, I derive 37 customer needs (see Table 28).

Concluding the two studies, I derived two shopping types. I find that only one shopping type, the planning shopper, is likely to form a behavioral intention. I observe that trust of online grocery shopping increases with the number of purchases and that, in contrast to what other recent studies have found, fresh produce – fruits and vegetables – is willingly bought online. However, since fresh foods such as meat are still considered less trustworthy in online contexts, a further distinction must be made here. Additionally, some online supermarkets offer slightly different ranges of products depending on whether they are bought at the store, picked up, delivered by a delivery service, and/or sent by post. Some customers have found this arrangement inconvenient.

The results of the second study clearly indicate that the delivery coverage in Germany is one of the greatest issues in terms of online grocery acceptance. People living in suburban and rural areas

are particularly interested in online grocery shopping, since they have to drive long distances to get to the supermarket, but the service is often unavailable to them due to the coverage restrictions.

I also observe that regarding the access to online grocery business models, the offering of desktop versions and mobile phone applications is needed. The availability of clearly organized desktop versions aims to include potential customers over 50, who are, especially against the background of the demographic change, a valuable costumer group.

Table 28: Overview of the Derived Needs of Diary-Study 2

#	*Needs*	*Experiences*	*Perceived as met or unmet by participants?*
	Delivery		
1	Adequate delivery fees	Hybrid	Partially met
2	Delivery staff takes back damaged or unwanted products	Negative	Unmet
3	Delivery time information	Hybrid	Partially met
4	Friendly customer service at product handover	Hybrid	Partially Met
5	Joint inspection of the products at product handover	Positive	Partially met
6	Reliability of delivery time	Positive	Met
7	Self-pickup service (click-and-collect)	Positive	Partially met
8	Sufficient delivery coverage in metropolitan area	Positive	Met
9	Sufficient delivery coverage in rural area	Negative	Unmet
10	Sufficient delivery coverage in urban suburbs	Hybrid	Partially met
11	Time of delivery via short message, e-mail or a tracking function/ delivery status	Positive	Partially met
12	Undamaged delivery	Positive	Met
	Products		
13	Availability of products	Hybrid	Partially met
14	Basic groceries	Positive	Met
15	Existing product images	Positive	Met
16	Getting inspired by products	Negative	Unmet
17	High product freshness	Positive	Met
18	High product quality	Positive	Met
19	Highly specific groceries	Positive	Partially met
20	Positive cost-benefit relationship concerning product prices	Hybrid	Partially met
21	Product portfolio for all delivery options is the same	Hybrid	Partially met
22	Reasonable minimum order value	Hybrid	Partially met
23	Sufficient product information	Positive	Partially met
24	Wide product assortment	Hybrid	Partially met

Table 28: Overview of the Derived Needs of Study 2 (Continued)

#	*Needs*	*Experiences*	*Perceived as met or unmet by participants?*
	Usability		
25	Both mobile application & desktop website available	Negative	Unmet
26	Canceling and editing the order after checkout	Positive	Partially met
27	Clear structured interface	Hybrid	Partially met
28	Ease of use of the ordering interface	Hybrid	Partially met
29	Easy order date selection	Negative	Unmet
30	Inspirational Shopping Environment	Negative	Unmet
31	Intuitive sorting of the products	Hybrid	Partially met
32	Order placement without an account and only as a guest	Positive	Partially met
33	Possibility to build standard shopping carts	Positive	Partially met
	Sustainability		
34	Environmentally friendly delivery	Positive	Partially met
35	Environmentally friendly packaging	Positive	Partially met
	Retailer		
36	Retailer, brand, or name is familiar to the customer	Positive	Partially met
37	Transparency of the data use/data security	Negative	Unmet

Coronavirus crisis-driven Developments

During the last part of my second study, comments concerning the COVID-19 situation were documented in the diaries. All comments regarding COVID-19 were coded as "Corona" in the code family (see Table 26). To understand crisis-driven effects on particular needs and the behavioral intention to use online grocery shopping, this data was analyzed separately using qualitative content analysis. I followed an inductive approach and categorized the observed behavior thematically in five crisis-driven categories: *Delivery*, *Product Assortment*, *Physical Distancing*, *Reliability,* and *Crash of the Business Model* and assigned the observed customer behaviors as well as the business operation effects to them (see Figure 16). I found that the categories have interdependencies among each other as well as positive and negative influences on the behavioral intention to use online grocery shopping, which is presented in the following.

Negatively connoted crisis-driven effects regarding delivery are *long delivery times* (up to six weeks) and *no available delivery slots*. Both negative effects led some participants to stop shopping for groceries online. A positive experience concerning the delivery was that, due to regulations requiring many people to work from home during the coronavirus crisis, the *deliveries were easily received by the customers*. However, this positive effect is overshadowed by the long delivery times as well as no free delivery slots, which led to the fact that some orders could not even be placed and therefore no reception was needed.

"Now in the crisis, the delivery times are so long that you can only order 'unimportant' things. In the meantime, I was in the supermarket anyway, so I could have bought everything there – without shipping costs." [CORONA]

"Several times (daily) tried to get a delivery date and finally gave up when all dates until 6.4.2020 were already taken..." [CORONA]

"But since we worked in our home office, the reception was absolutely problem-free." [CORONA]

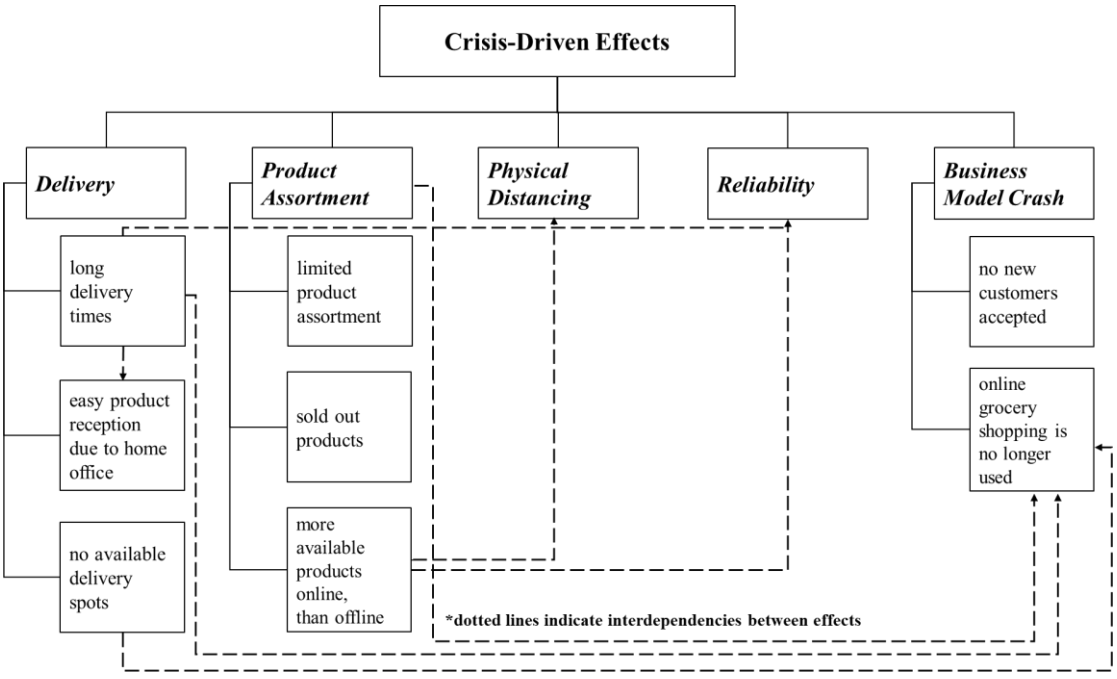


Figure 16: Coronavirus Crisis-Driven Effects on Online Grocery Shopping

As it was before, the product assortment is a decisive factor in the COVID-19 crisis. Arising from this situation, three factors affected the customer experience. Two of them were experienced as negative: *limited product assortment* and *majority of products are sold* out. One was experienced as positive: *products that are sold out offline are available online.*

Because of the limited product assortment, as well as the fact that many products were sold out, some participants stopped purchasing groceries online.

"Due to coronavirus, there were groceries that I usually buy that were not available. The offers that were available didn't appeal to me." [CORONA]

"Already with the second purchase the strongly limited product offer was a reason for frustration, because then you already know that you have to go to the supermarket additionally. For me, the usefulness of online food shopping depends very much on the possibility to choose the delivery date that suits me best. This was currently no longer possible at all. In the current situation it seems like a struggle if you have to get an available

> *delivery time window, so much of the comfort and sense of online shopping is lost." [CORONA]*

However, three observed effects led to an increasing behavioral intention to use online grocery shopping. (1) Physical distancing behavior results in the minimization of trips to the supermarkets. Ordering groceries online even allows people to avoid supermarket trips at all. (2) In cases of pickup service some online businesses provide the option to check product availability. This makes it possible to check for product availability before the trip to the supermarket. This in turn leads to a feeling of reliability, and the online option is perceived as an advantage, especially because, during the sudden outbreak of the SARS-CoV-2 virus, many products were sold out because people were stockpiling them. (3) Some products, such as toilet paper, were easier to obtain online than offline.

> *"Pleasant, because there is no contact with people (due to COVID-19) and the possibility to use regional organic products" [CORONA]*
>
> *"Stress-free, no queuing & contact with people." [CORONA]*
>
> *"We were looking for toilet paper because of coronavirus and myTime.de was the only dealer who still had it in stock." [CORONA]*
>
> *"Available pickup service. Big product assortment against the background of the coronavirus pandemic." [CORONA]*
>
> *"Especially in this time of COVID-19, very good and reliable" [CORONA]*

The physical distancing behavior as a positive influencing situational factor was outweighed by the incapacity of the online grocery system. There were long delivery times and limited product assortments. For most of the retailers, customers could only order food if they had an account, and some of these retailers stopped accepting new accounts. While the restricted product assortment has also been perceived as a problem in offline shopping, the un-availability of delivery dates as well as long delivery times has made online grocery shopping a very frustrating service during the COVID-19 pandemic. 56% of the participants stated in the last part of the study that despite their effort to further use online grocery shopping, they were not able to obtain a delivery time slot and that the product assortment was restricted to that point that there was no benefit from shopping groceries online anymore. So they stopped purchasing groceries over the internet. Hence, the set-up of the existing business model during the coronavirus crisis resulted in most participants turning away from the model, while 44% of the participants continued the usage throughout the study period. Two of these remaining participants developed a positive attitude towards online grocery shopping. However, these two participants were already experienced online grocery shoppers before the study.

Summarizing the additional needs deriving from the crisis, I find that there is a newly developed need for shopping with physical distancing opportunities. Beyond this, the product availability has developed as an additional need as many products were sold out offline because people stockpiled them. Both needs have led to a positive inclination of the usage intention for online grocery shopping.

7.5 Discussion

7.5.1 Implications for Theory

This investigation into customer behavior in online grocery shopping began with the premise that better knowledge of customer experience supports the understanding of why online grocery businesses are currently not very successful in Germany. The research question in this regard is how customer experiences influence the behavioral intention to use online grocery shopping and what elements of an online grocery shopping interface drive or influence these experiences. Previous literature concluded that understanding the customers' needs by working out the "need-information" can facilitate the beneficial design and redesign of business models (Piller et al., 2011; Von Hippel, 2005) especially in volatile and rapidly changing markets (Keiningham et al., 2019). In highly dynamic times, how customers act plays an important role in business performance, as customers are the ones who convert the value created by companies into monetary assets (Foss and Saebi, 2017; Heinonen et al., 2019; Keiningham et al., 2019). In the context of my studies, need information is information on how to satisfy conscious or unconscious customer needs regarding online grocery shopping. My findings support previous notions and show that customer experiences express need information for the development of services and business models. As customer-centricity is a key success factor for business models, it is paramount that online grocery business model managers understand customer behavior to achieve long-term business success.

This work expands the existing body of knowledge on international online grocery shopping acceptance and cross-country differences by enriching the body of knowledge with customer behavior specific to Germany. Comparing my findings on Germany to those of other studies on countries succeeding in the online grocery market, I find five considerable differences. First, South Korea and Japan demonstrate market changes based on the aging of the population and double-income families that Germany still has to face. The demographic change has the power to promote online grocery shopping in Germany equally, while the increase of single households and double-income families will not forcibly lead to a change in behavior. I am drawing these conclusions since I found that German customers are very skeptical regarding the product

freshness, and that this is one of the main reasons for their reluctance to adopt online grocery shopping. Consequently, this skepticism can lead customers to continue to shop for groceries offline.

The importance of product freshness is expressed by my participants' differentiation between freshness and quality and also by their desire for complete information. While product quality has been reported as high and sufficient from my participants, the product freshness has been explicitly reported as a factor of uncertainty. In the USA, customers link the trust in the quality and freshness of the products to the supermarket brand (Blitstein et al., 2020; Shi and Zhang, 2014). In China, these factors are linked to the brand of the product (Van Ewijk et al., 2020). My findings demonstrate that German consumers' trust is linked to their personal knowledge of, and familiarity with, the exact store that the products are coming from, and even with the retailers, the people, who are selling the products.

A third Germany-specific factor restricts the success of online grocery shopping: the insufficient delivery coverage. In South Korea, as competition has increased, retailers have expanded the availability of various delivery options (Park and Thangam, 2019). French retailers have faced the coverage issue by providing nationwide pickup stations (Hübner et al., 2016; Wollenburg et al., 2018). In the results of my two studies, I find that the shortage of click-and-collect options in Germany are a key factor hindering online grocery shopping adoption in Germany. A fourth differing factor is the consideration of sustainability. Both studies show that sustainability plays an essential role in online grocery shopping adoption. In the literature that engages with the success factors of online grocery shopping in the UK, France, South Korea, or Japan, sustainability does not appear as an influencing factor in regard to the likelihood of adoption.

Fifth, the structure and orientation of German online grocery business models differs fundamentally from South Korean business models. While in Germany, the online grocery store is still a copy of the traditional in-store supermarket, in South Korea, the grocery provider is more an infomediary than solely an online grocery retailer, collecting behavioral data on what products particular customers shop for and selling this data to other companies for marketing purposes (Lee et al., 2015; Park and Thangam, 2019).

It is a common understanding that market research needs to be undertaken to address customers better. Still, research on online grocery markets, online grocery business models, and online grocery customer behavior, especially in Germany, is rare. There is little qualitative research on online grocery customer behavior (Blitstein et al., 2020; Martín et al., 2019). With this study, I not only contribute to qualitative online grocery shopping literature, but my results also

complement current research. The comparison of the needs that came to light in this research with the acceptance factors in Paper 1 as well as in recent literature yields 21 additional factors influencing the intention to use online grocery shopping. These factors are not reflected in the proposed framework in Paper 1, nor have they appeared in the online grocery shopping literature so far; they can be seen as behavioral characteristics of German online grocery customers (see Table 29). Through this, I expand the body of knowledge on customer needs in online grocery contexts and thus provide a basis to re-evaluate and re-design the concept of online grocery business models in Germany.

Table 29: Additional Factors Influencing the Usage Intention

#	*Derived Needs from Study 1 and 2*	*Perceived as met or unmet by participants of Study 1?*	*Perceived as met or unmet by participants of Study 2?*
1	Both mobile application & desktop interface available	--	Unmet
2	Canceling and editing the order after checkout	--	Partially met
3	Choice of individual quantities	Unmet	--
4	Clarity of the delivery options	Unmet	--
5	Delivery staff takes back damaged or unwanted products	--	Unmet
6	Environmentally friendly delivery	Met	Partially met
7	Environmentally friendly packaging	--	Partially met
8	Familiarity with the retailer	Met	Partially met
9	Information about the ordering process	Unmet	--
10	Inspirational shopping environment	--	Unmet
11	Joint inspection of the products at product handover	--	Partially met
12	No partial deliveries	Unmet	--
13	Opportunity to book a time frame	Partially met	--
14	Order placement without an account and only as a guest	--	Partially met
15	Product portfolio for all delivery options is the same	--	Partially met
16	Reasonable minimum order value	--	Partially met
17	Sufficient delivery coverage in metropolitan area	--	Met
18	Sufficient delivery coverage in rural area	--	Unmet
19	Sufficient delivery coverage in urban suburbs	--	Unmet
20	Support of local/regional retailer/food production	Met	--
21	Time of delivery via short message, e-mail or a tracking function/available information on delivery status	Partially met	Partially met

Bleier et al. (2019) conceptualized four dimensions describing the customer experience in online settings: entertainment (affective), informativeness (cognitive), social presence (social), and sensory appeal (sensory), leaving out the dimension of the post-purchase experience. In e-commerce literature, research about the post-purchase experiences is limited, even though it has been pointed out that the post-purchase experience has a significant influence on the repurchase intentions and behavioral attitude of customers (Cao et al., 2018; Jain et al., 2017; Kumar and Anjaly, 2017; Kuo and Wu, 2012). Furthermore, the growing trend of so-called “unboxing” videos on YouTube, where a consumer films his or her process of unwrapping and reacting to an

online purchase, has been of interest for researchers (Kim et al., 2018; Thorsén, 2018). Unboxing videos show the moment of opening the online delivery package and, regardless of the nature of the products, communicate the emotions triggered at this moment (Mowlabocus, 2018). The unboxing trend underlines the importance of product packaging in the post-purchase experience, especially for repeating purchases from a vendor (Khan et al., 2018; Malbon, 2013).

Here, I complement theory supporting the notion that there is a fifth dimension in the context of online grocery shopping, the physical dimension during the post-purchase experience. I find that this dimension is particularly relevant in the context of online grocery shopping. By looking at the delivery fulfillment and its corresponding customer service, as well as the post-purchase evaluation of product quality and freshness, my research extends the knowledge about post-purchase-related activities and its influences on the behavioral intention to use online grocery shopping. I have found that in online grocery contexts, one post-purchase element is the convenient delivery process, which should interfere as little as possible with daily life. The freshness of the delivered products is another highly sensitive factor and is central to future usage intentions. If perished products are delivered, the consumer might avoid using the supplier or even reject the entire concept of online grocery shopping. My analysis thus emphasizes the need to include a physical dimension in the beneficial customer experience research.

A widely used concept in explaining customer behavior and intentions is that of hedonic versus utilitarian motivation (Babin et al., 1994; Childers et al., 2001; Kumar and Anjaly, 2017). While the hedonic customer is motivated by the "pure enjoyment and fun of the shopping experience" (Childers et al., 2001, p. 514), the utilitarian customer is thoughtful, plans ahead, and informs him- or herself about the products before shopping. My findings support this concept by proposing two corresponding online grocery shopping types, the spontaneous shopper and the planning shopper. While the spontaneous type loves to shop for the enjoyment of purchasing products and the pleasure of inspiration, the planning type seeks to ensure that groceries are bought as efficiently as possible. I furthermore contribute by showing that the planning shopper is more likely to build a behavioral usage intention to online grocery shopping than is the spontaneous and inspirational shopping type. It seems that the current online grocery shopping environment appeals almost exclusively to the planning type of customer. However, this hypothesis has to be explored in further research by analyzing the structures of current online grocery business models.

The shopping types reveal concrete met and unmet needs in the online grocery context and thus enrich the body of research in the area of customer behavior and customer motivation. Rohm and Swaminathan (2004) define four online shopping typologies in their study: the convenience shopper, the variety seeker, the balanced buyer, and the store-oriented shopper. The two shopping

types derived in the present research show characteristics of all four typologies. The spontaneous shopper has the most intersection with the variety seeker and the store oriented shopper, while the planning shopper is similar to the convenience shopper (Rohm and Swaminathan, 2004).

With this study, I partially support the findings of Hand et al. (2009), who propose that the intention to shop for groceries online does not only originate from the individual, but also is influenced by situational factors, such as when the shopper needs to take care of someone and can't go out, or when the train station is far away, or even – as is the case during the coronavirus crisis – when social distancing becomes desirable. I find that online grocery shopping is, in most cases, not used as the only option, but rather in combination with offline grocery shopping (Hand et al., 2009). Moreover, I find that the place of residence has a huge impact on the behavioral intention to use online grocery shopping, since the place of residence determines if customers even have the opportunity to shop for groceries online in Germany.

My research also contributes methodologically. I applied the methodology of research diaries, which have been very popular in medicine and psychological research contexts but have rarely been used in e-commerce and innovation research. I show that research diaries are a fruitful qualitative researching method to explore customer experiences and behavioral intentions to use new business models, and thus demonstrate that research diaries expand the repertoire of qualitative and innovative consumer research in a promising way.

This work provides unique insights into crisis-driven customer online grocery shopping behavior as well as the corresponding effects on online grocery business models. From a behavioral perspective, I show that the coronavirus crisis and physical distancing behavior have changed the deep-seated behavioral habit of grocery shopping, to the extent that online grocery shopping is now perceived by many more consumers as an interesting alternative to offline supermarkets. From a business model perspective, my results indicate, especially with the finding that online grocery business models are, in terms of popularity and usefulness in this situation, among the winners of the crisis. This finding goes hand in hand with recent research by Knowles et. al (2020), who found that the current economic environment caused by the coronavirus crisis "offers an unprecedented opportunity for these smaller companies to compete against their more established rivals" (Knowles et al., 2020, p. 1). Beyond this, Kuckertz et al. (2020) seek to identify crisis-driven challenges for young businesses and startups. By engaging in qualitative research, they identified eight dimensions of entrepreneurial crisis management. However, none of these dimensions was concerned with customer growth that is too fast or too strong for the business to handle, while my research indicates that rapid increases in the number of customers in difficult situations can challenge young companies and even lead to their collapse.

Lastly, I point out that in the onslaught of the coronavirus situation, online grocery business models were not able to handle the dramatic consumer increase, resulting in the understanding that online grocery business models were not quickly scalable. Online grocery retailers not only discouraged new customers but also partially failed to provide comprehensive service to existing customers. My observations show that the challenge of the scalability of the online grocery business model in the face of quickly increasing customer demand mostly involves the scalability of the delivery infrastructure. Several dimensions of delivery infrastructure are involved here: the type of handover options (distribution structure organized or owned by the supermarket, pickup service, or delivery via mail), the delivery coverage (Germany-wide vs. metropolitan areas), and the product type (fresh vs. stockpiled products). All these dimensions are directly related to customer satisfaction and usage intention. However, if these business models recover and/or are adapted in response to the crisis, new and existing consumers can be adequately satisfied again. The coronavirus situation will subsequently serve as a favorable situational factor for the growth of this industry. How long-lasting the effect is can only be assessed by further research and observation of the market (Dannenberg et al., 2020).

7.5.2 Implications for Practice

My findings provide a detailed theoretical description of how customers behave in online grocery shopping contexts. I derived a total of 52 customer needs in this context and shed light on their impact on the behavioral intention to use online grocery shopping. To support the dissemination of these results into practice, I consolidated the positive and negative experienced needs in a recommendation matrix (see Figure 17). The matrix provides numerous managerial implications concerning the customer experiences that were observed with online grocery shopping. The matrix presents the dimensions of opportunities and threats for online grocery business models in connection to the positive and negative experiences. I find two kinds of opportunities that have high potential for building usage intention and two kinds of threats that can hinder the building of usage intention when they are not turned into positive experiences. All dimensions are rooted in positive or negative observed customer experiences.

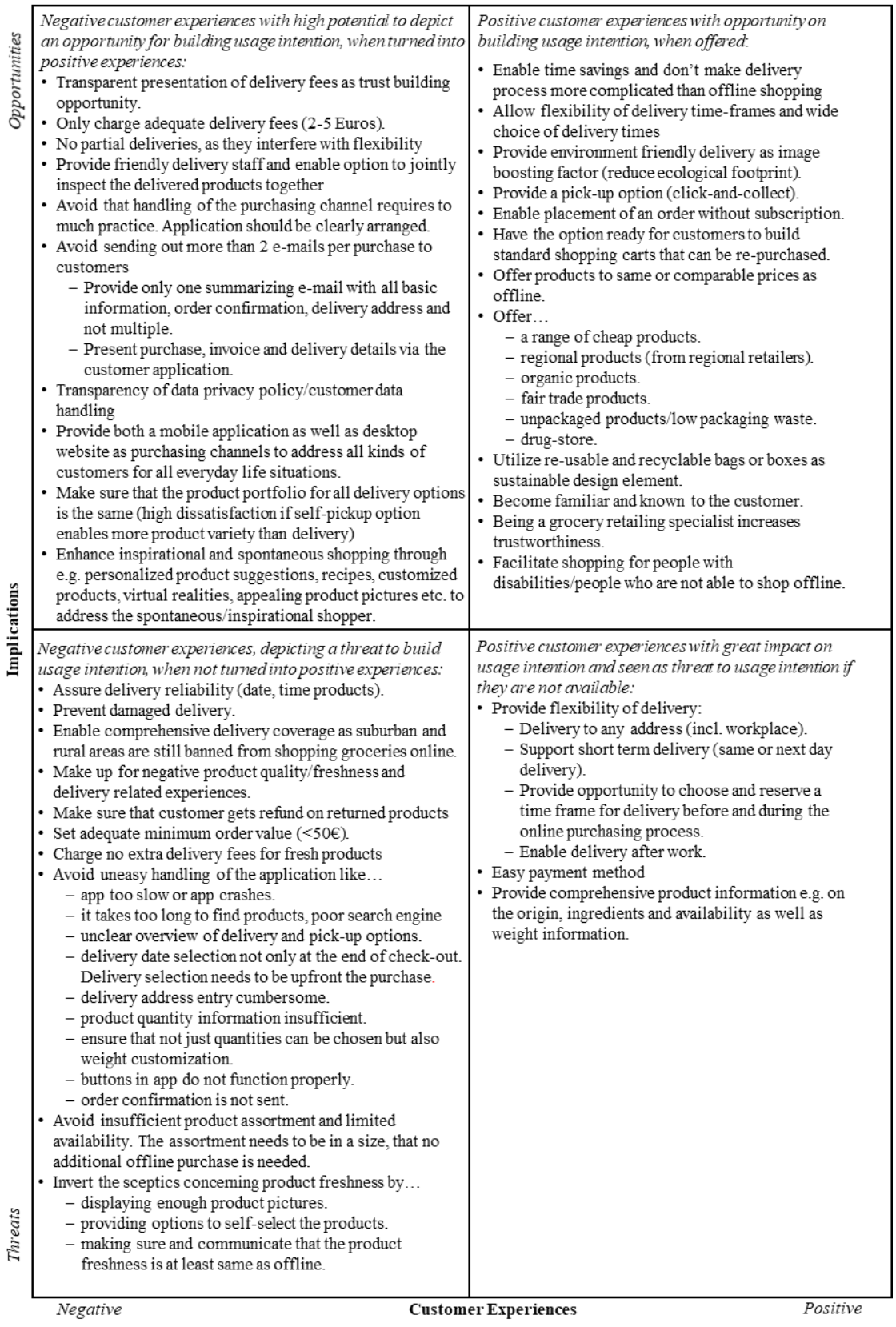


Figure 17: Recommendation Matrix for Online Grocery Business Model Providers

Moreover, I derived two online grocery shopping types that have to be addressed in different ways. For the spontaneous shopper, it is important to perceive products through the senses and to be inspired by them. Since impressions from senses other than sight are not present in online grocery contexts, it is particularly important to strengthen the visual impression as well as to use shoppers' imaginations to stimulate their other senses – for example, through providing recipes, as one participant suggested. Recipes can address the customer directly, based on his or her preferences. And, again, the quality of the product images plays a major role. A generic high-quality image of an apple is perceived more positively than a low-quality image of the actual apple. Thus, the design of the website and the products it presents have a central function to appeal to the customer repeatedly. It would be useful to provide spontaneous buyers, with the opportunity to place an order through a guest account. Particularly for one-off or short-term purchases, this would be a way of including a clientele that does not often shop online but would like to engage in it from time to time. For the planning customer, in turn, it is important to offer options such as a standard shopping basket and/or benefits of a user account, perhaps even a bonus system. In this way, retailers could succeed in retaining their planning customers in the long term.

7.5.3 Limitations and Implications for Future Research

As with any qualitative approach, several issues related to the research settings suggest avenues for further research. One particular concern of the application of diary studies is that the researcher has to make sure that the participants fully understand the research settings and the study rules. To collect reliable and valid data over a timeframe from days and weeks, the researcher has to ensure the commitment and dedication of the participants, which is mostly not needed in other studies, due to their shorter duration (Bolger et al., 2003). I chose the participants of the study carefully and selected those who showed a strong interest in participating. I did this by using various techniques such as personal conversations, telephone discussions, e-mail exchanges, and voice message explanations. Still, some participants did not send back the diaries. It was not possible, based on the provided data, to know how much effort the participants put in their diaries. Since little is known about this circumstance, further researchers employing the diary method should think about integrating a quality control process throughout or after the study phase. However, care must be taken to ensure that no bias is created through this process.

Although a basic grocery selection was offered in the first study, 309 products represent only a small part of a standard supermarket assortment. The product assortment of the laboratory setting in the first study did not follow a coordinated retailer assortment policy. It rather aimed at providing the basic products and functionalities of an online supermarket. As such, I knew in advance that the participants' evaluations would be influenced by the relatively small product

selection; further research should include larger product assortments. However, as the results of the second study enable real-life experiences and the evaluation of real-life supermarket product assortments, this limitation is compensated for.

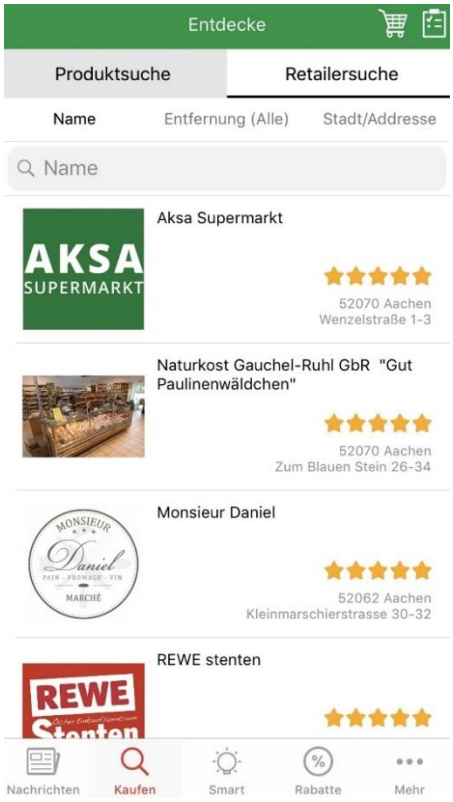
The research study design proved to be successful for the examination of the research question at hand, but could be improved technologically with more funding. For instance, it would be possible to directly integrate the diary into the online shopping application from Study 1, to receive even deeper and more direct insights. I would not recommend a separate diary app if another application is the core of the observation, because the participant would have to jump between two applications, increasing the effort and reducing the desire to finish the study. A partnership with a particular online supermarket application and the direct integration of the diary would increase the depth of the results, though it also could easily lead to bias, because people tend to overrate the quality of a store, brand, or product when the study is conducted under the auspices of the owners or providers of that store, brand, or product.

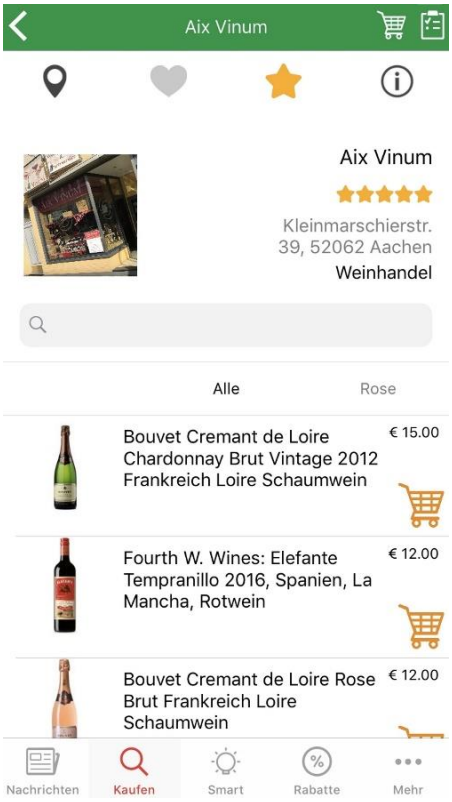
Furthermore, the generalizability of research diary results is not guaranteed for every research setting and therefore needs to be further elaborated in future research. As with every qualitative study, the data sample is necessarily small. Considering the 34 participants (44 including those in the pre-study), there is much more room to learn about the influence of behavioral intention on customer behavior. Especially as the coronavirus crisis changes economic environments, the generalizability of the results is to be treated with caution. Although the extracted needs and requirements are still valid, the results collected showed that the crisis may have a long-lasting positive impact on behavioral intention to use online shopping, even if the economic situation stabilizes again and social distancing becomes unnecessary. Still, research diaries provide insights into customer behavior and can provide insights for the customer-centric business model development in similar situations.

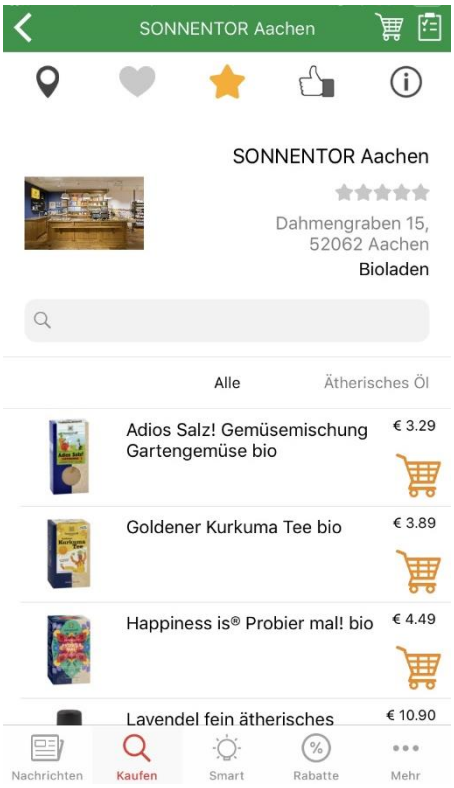
Since the crisis-specific results are more a coincidental product than an intended research setting, the study design and especially the study questions are not focused on the crisis. Nevertheless, I was able to deduce some *ad hoc* crisis-driven behavioral effects. A different method of analysis than the one chosen might add some more depth to the analysis. Initially, it could be beneficial to split the data also timewise into “corona-free” and “corona-infected” data. Crisis-related coding categories in the deductive part of the content analysis might be fruitful as well. To explore how the customer behavior has changed in the long term, a further ethnographical study is suitable to confirm or disprove the SARS-CoV-2 virus as an influential situational factor and reveal how online grocery shopping business models are coping with the increasing demand for online grocery services in the long run.

Appendix

APPENDIX A – SCREENSHOTS MOBILE APPLICATION STUDY 1







APPENDIX B: FINAL CODEBOOK

Behavioral Intention	**BI**
Description of the Content	Includes the intention to continue (or first time) grocery shopping online.
Application	**BI** is coded when the following aspects are mentioned: o Provided that the necessary resources are available, groceries are purchased online o The participant's plan to conduct grocery shopping online in the next few months o Participant does not want to conduct online grocery shopping →general statements on the intention to use online grocery shopping
BI *Yes* *No*	**BI (yes/no)** is coded when participant comments on a future behavioral intention to use online grocery shopping.

Computer Anxiety **Fear or anxiety in the use of computers or digital devices**	**CANX**
Description of the Content	Includes the description of the feeling of security when using digital devices (PC, mobile phone, tablet). Is defined as an individual's concern or even fear when he or she is confronted with computer use.
Application	**CANX** is coded when the following aspects are mentioned: o Digital devices do not scare at all o Working with a digital terminal is causing nervousness o Feeling unwell due to the usage of digital devices o Digital devices are stressing → basic statements on fear/security in using computers

Computer Playfulness **Playfulness with digital devices**	**CPLAY**
Description of the Content	Includes the playful use of digital devices (PC, mobile phone, tablet). Is defined as the individual tendency to handle a new technology spontaneously, intuitively, playfully, creatively.
Application	**CPLAY** is coded when the following aspects (or similar perceptions in dealing with digital devices) are mentioned: o Intuitive o Inventive o Playful o Unimaginative →basic comments on playfulness with digital terminals

Enjoyment **Enjoyment of online grocery shopping**	**ENJ**
Description of the Content	Includes the (expected) positive feeling when shopping for groceries online. Describes the extent to which an individual finds the use of a new technology/system fun, enjoyable, entertaining, regardless of the consequences of using the system.

Application	**ENJ** is coded when the following aspects are mentioned: o Fun o Good Feeling o Boredom o Involvement in the purchasing process o Exciting o Pleasant o Impractical o Interesting → general statements about the feeling when shopping online for groceries

E-Shopping Quality **Quality of online shopping experience**	**eTailQ**
Description of the Content	Includes the perceived quality of online shopping (of groceries and experiences).
Fulfillment reliability (FR)	**FR** is coded when the following points are made: o I get what I ordered o Delivered groceries comply with information presented on the website o Orders are delivered at the promised time → generally positive comments on the perceived quality of online grocery shopping
	o I am not getting what I ordered o Delivered groceries do not comply with information presented on the website o Orders are not delivered at the promised time → generally negative comments on the perceived quality of online grocery shopping
Website design (WD)	**WD** is coded when the following aspects are mentioned: o Website (WS) or application (App) offers a good/sufficient range of products o WS or App provides detailed information about the groceries offered o WS or App is authentic o Shopper does not feel that the WS or App is a waste of time o The transaction is quick and easy via the WS or App → generally positive comments on the design/information content of the WS or App
	o Website (WS) or application (App) offers no good/sufficient range of products o WS or App does not provide detailed information about the groceries offered o WS or App is not authentic o Shopper feels that the WS or App is a waste of time o The transaction is not quick and easy via the WS or App → generally negative comments on the design/information content of the WS or App
Security/Privacy (SP)	**SP** is coded when the following aspects are mentioned: o Privacy is protected o WS and/or App has appropriate security measures, e.g. to protect credit cards or personal data o Positive feeling of security for transactions via WS or App → generally positive comments on the feeling of data protection/data security
	o Privacy is not protected o WS and/or App has no appropriate security measures, e.g. to protect credit cards or personal data o No/Negative feeling of security for transactions via WS or App → generally, negative comments on the feeling of data protection/data security

Customer Service (CS)	**CS** is coded when the following aspects are mentioned: o If there is a problem, the WS/App/Retailer offers a serious problem solution o The WS/App/retailer is ready and willing to respond to consumer needs o Requests will be answered immediately →generally positive comments on the service quality of purchasing
	o If there is a problem, the WS/App/Retailer offers no serious problem solution o The WS/App/retailer is not ready and willing to respond to consumer needs o Requests will be not answered immediately → generally negative comments on the service quality of purchasing
Customer Service Usage (CSUS)	**CS** is used o Yes o No

Job Relevance **Relevance of Online Grocery Shopping**	**REL**
Description of the Content	Includes the relevance of online grocery shopping for the person and their grocery supply. It is defined as the extent to which the new technology contributes to the task (grocery shopping).
Application	**REL** is coded when the following aspects are mentioned: o For one's grocery supply, the possibility of grocery shopping online is important o For one's grocery supply, the possibility of grocery shopping online is relevant o For one's grocery supply, the possibility of grocery shopping online is suitable → generally positive comments on the relevance of online food shopping
	o For one's grocery supply, the possibility of grocery shopping online is not important o For one's grocery supply, the possibility of grocery shopping online is not relevant o For one's grocery supply, the possibility of grocery shopping online is not suitable → generally negative comments on the relevance of online food shopping

Other	**OT**
Suggestion (SUGG)	**SUGG** is coded when the following aspects are mentioned: o Wishes or suggestions for online grocery shopping are mentioned o Wishes or suggestions for the WS or App are mentioned o Wishes or suggestions for the ordering process are mentioned → general statements concerning wishes or suggestions regarding online grocery shopping or the app used for it
General Comments Ordering Process (GCOP)	**GCOP** is coded when the following aspects are mentioned: o Ancillary information concerning the ordering process is mentioned o General comments concerning context information are mentioned → general statements, which are mentioned in addition concerning the ordering process

Fears (FEA)	**FEA** is coded when the following aspects are mentioned: o Problems, obstacles, and fears concerning the establishment of online grocery shopping are mentioned → general statements on concerns about online grocery shopping
Missing Delivery Area Coverage (MDAC)	**MDAC** is coded when there is no delivery coverage in the area of residence

Perceived Ease of Use	**PEU**
Description of the Content	Includes the perceived usability/difficulty of using the WS or app when shopping groceries online. It describes whether grocery shopping online is perceived as easy.
Application	**PEU** is coded when the following aspects are mentioned: o The use of the WS or app, which was already used for online grocery shopping, was clear and understandable o Dealing with the WS or app already used for online grocery shopping did not require much mental effort o It is easy to buy groceries online o It's easy to get the WS or app to do what you want when shopping online → generally positive comments on the perceived usability of the WS or app when shopping groceries online → generally negative comments on the perceived usability of the WS or app when shopping groceries online
Function/Dysfunction (DisFU)	**DisFu** is coded when the following aspects are mentioned: o The WS or app is structured and clearly arranged o The WS or app is consistent in itself o The WS or app works perfectly, so that online grocery shopping is technically easy → generally positive statements on the structure of the app
	o The WS or app is not well structured and unclearly arranged o The WS or app is not consistent in itself o The WS or app works insufficiently, so that online grocery shopping is technically uneasy → generally negative statements on the structure of the app
Requirements (REQ)	**REQ** is coded when the following aspects are mentioned: o The technical function of the WS or app meets the requirements of the user, so that online food purchases are easy to make o The WS or app is structured in such a way that the user does not need any additional technical functions to make a simple online grocery purchase → generally positive statements about personal requirements with regard to the structure of the app
	o The technical function of the WS or app does not meet the requirements of the user, so that online food purchases are uneasy to make o The WS or app is structured in such a way that the user does need additional technical functions to make a simple online grocery purchase → generally negative statements about personal requirements with regard to the structure of the app
Information Transaction (IT)	**IT** is coded when the following aspects are mentioned: o Information relevant to the ordering process is/ or is not available, such as delivery time, costs etc. → generally positive statements regarding information on the transaction process → generally negative statements regarding information on the transaction process

Ease of Use (EU)	**EU** is coded when the following aspects are mentioned: o The use of the WS or app is easy to understand o The WS or app is easy to use o The operation of the WS or app is intuitive o The navigation within the WS or app is conclusive o The design of the WS or app serves to successfully complete the ordering process → generally positive comments on the comprehensibility of the app
	o The use of the WS or app is not easy to understand o The WS or app is not easy to use o The operation of the WS or app is not intuitive o The navigation within the WS or app is not conclusive o The design of the WS or app does not serve to successfully complete the ordering process → generally negative comments on the comprehensibility of the app

Perceived Usefulness	**PU**
Description of the Content	Includes the perceived usefulness of online grocery shopping. The extent to which an individual believes that the new system will improve the performance or outcome of online grocery shopping.
Sustainable City (SC)	**SC** is coded when the following aspects are mentioned: o Online grocery shopping enables a city to make its trade more sustainable o Online grocery shopping can improve the regional trade of a city → general statements on aspects of a sustainable city
Opportunities (OPP)	**OPP** is coded when the following aspects are mentioned: o Online grocery shopping is considered to have added value o Positive characteristics are attributed to online grocery shopping → general statements on the opportunities of online grocery shopping
Improvement (IMP) *Yes* *No*	**IMP (yes/no)** is coded if or if not the participant perceives online grocery shopping as an improvement for her*his grocery shopping habit.

Previous Experience	**EXP**
Description of the Content	Includes whether you already have experience in grocery shopping online and how often this behavior has been shown before.
Application	**EXP** is coded when the following aspects are mentioned: o Number of online grocery purchases/month o Number of hours spent shopping for groceries online/month o Frequency of online grocery shopping → basic statements whether groceries have already been purchased and how often
Previous Experience (PEXP)	How much experience has one had before the study?

Price	**PRI**
Product Price (PPRI)	**PPRI** is coded when the following aspects are mentioned: o The prices of the products offered are reasonable o The prices of the products offered are not reasonable → generally positive and negative comments on product prices

Delivery Costs (DELC)	**DELC** is coded when the following aspects are mentioned: o The delivery costs of the orders are reasonable o The delivery costs of the orders are too expensive → generally positive and negative comments on the delivery costs
Minimum Order Value (MOV)	**MOV** is coded when general comments on the minimum order value are made

Probability of Purchase	**PROPU**
Description of the Content	Includes the probability of also purchasing the products in real purchase (not only in an experimental setting).
Positive	is coded when the following aspects are mentioned: o The probability is high that the products are also purchased in real terms → general statements on potential online grocery shopping
Negative	is coded when the following aspects are mentioned: o The probability is low that the products are also purchased in real terms

Product Freshness	**PF**
Description of the Content	Includes the freshness of the products compared online and offline.
Application	**PF** is coded when the following aspects are mentioned: o Freshness of Groceries o Freshness of bakery products o Freshness of meat and fish o Freshness of vegetables and fruits o Freshness of dairy products o Freshness of stock products → generally positive statements on the product freshness of the groceries purchased AND → generally negative statements on the product freshness of the groceries purchased
Product-Specific (PSPEC)	**PSPEC** is coded when the following aspects are mentioned: o Participant makes a statement about product freshness with regard to certain product groups
Delivery (DEL)	**DEL** is coded when the following aspects are mentioned: o Person refers to the transport of fresh groceries in the statement about product freshness
Freshness Assurance (FASSUR)	**FASSUR** is coded when the following aspects are mentioned: o Participant states that there should be a guarantee for the delivered products in terms of product freshness
Expected as Fresh (EXF)	**EXF** is coded when the following aspects are mentioned: o Participant assumes that the products from the online shop are fresh
Not Expected as Fresh (NEXF)	**NEXF** is coded when the following aspects are mentioned: o Participant assumes that the products from the online shop are less fresh
Fresher (FER) *Equally fresh (EQF)* *Less Fresh (LF)* *Skeptical (SCEP)*	o **FER** is coded when products are experienced as fresher compared to offline purchases o **EQF** is coded when products are experienced as equally fresh compared to offline purchases o **LF** is coded when products are experienced as less fresh compared to offline purchases o **SCEP** is coded when participants make any statement on being skeptical concerning the product freshness

Product Involvement **Commitment to groceries**	**PI**
Description of the Content	Includes the interest in or attachment to groceries, possibly also varying according to product groups. Is defined as the degree to which individuals devote their time to evaluate or find out the true advantages and disadvantages of a product.
Application	**PI** is coded when the following aspects are mentioned: Groceries are o Important o Relevant o Mean a lot to me Fundamental positive statements regarding the interest/significance of groceries. Possibly also differing according to product groups, especially fresh and stock.
	o Unimportant o Irrelevant o Mean nothing to me → Fundamental negative statements regarding the interest/significance of groceries.
	o Low o Medium o High Involvement

Product Quality	**PQ**
Description of the Content	Includes the perceived product quality of groceries purchased online.
Application	**PQ** is coded when the following aspects are mentioned: o Prestigious groceries are offered o An excellent assortment of groceries is offered o Groceries offered online are among the best o A wide range of products is available online o Groceries purchased online are at least of the same quality as those purchased offline → generally positive statements on the product quality of the groceries purchased
	o No prestigious groceries are offered o No excellent assortment of groceries is offered o Groceries offered online are not among the best o A wide range of products is available online o Groceries purchased online are not of the same quality as those purchased offline → generally negative statements on the product quality of the groceries purchased
No Assessment Possible (NOAP)	**NOAP** is coded when the following aspects are mentioned: o It is not possible to assess the quality of the products of the online grocery retail trade
General Statement (GESTA)	**GESTA** is coded when the following aspects are mentioned: o Participant makes a general statement about the quality of products offered/purchased online
Perceived Quality (PERQ)	**PERQ** is coded when the following aspects are mentioned: o Participant makes a statement about the expected quality of the products offered/purchased online
	High (HI) *Low (LO)*

Retailer Choice	**RETC**
Description of the Content	Includes an explanation of why the selected retailer is preferred/selected for online grocery shopping.
Application	RETC is coded by the following characteristics: o *Service & Offer (SOF)* o *Retailer is known (RETK)* o *Only possible retailer (OPRET) (no other retailer available for this area)* o *Already experience with retailer (EXPRET)* o *Based on Recommendations (BREC)*

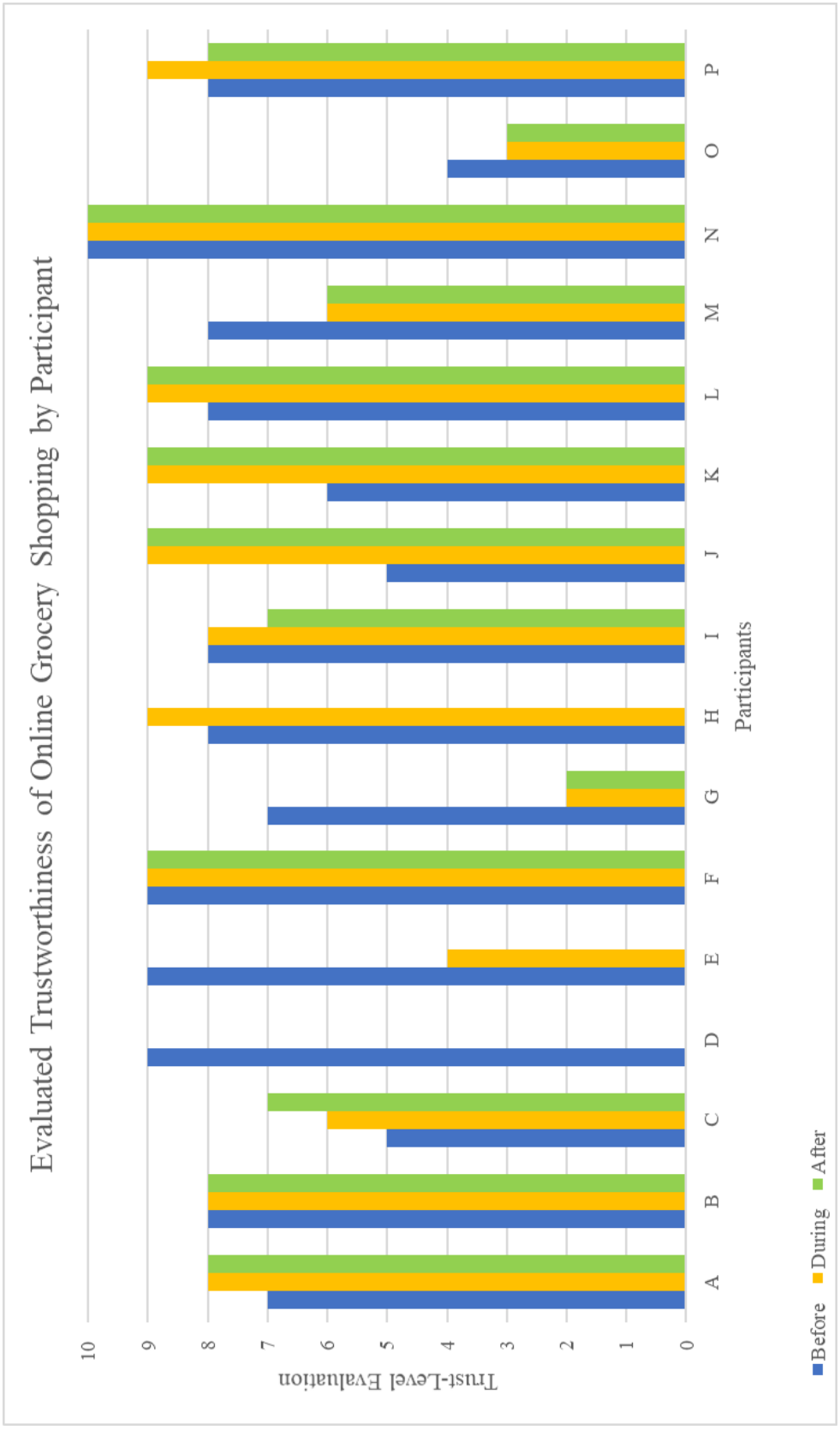
Subjective Norm	**SN**
Description of the Content	Includes the respondent's perception of whether people in their environment who influence the respondent's behavior are expected to buy groceries online.
Application	**SN** is coded when the following aspects are mentioned: o People who are important to the observed person recommend buying groceries online o People in the close environment that can influence the behavior of the observed person, recommend to buy groceries online o A general feeling that grocery shopping online is encouraged → general statements on the perception, the opinion of the social environment regarding online grocery shopping
Recommended (REC)	Online Grocery Shopping is Recommended o Yes o No

Sustainability	**SUST**
Description of the Content	Includes the perceived sustainability regarding online grocery shopping.
Application	**SUST** is coded when the following aspects are mentioned: o Participant makes a statement about the delivery transport is (not) sustainable (e.g. use of an e-car) o Participant makes a statement about the delivery packaging is (not) sustainable o Participant makes a statement about the product packaging is (not) sustainable o Participant makes a statement about (no) avoidance of plastic packaging → general statements concerning sustainability regarding online grocery shopping

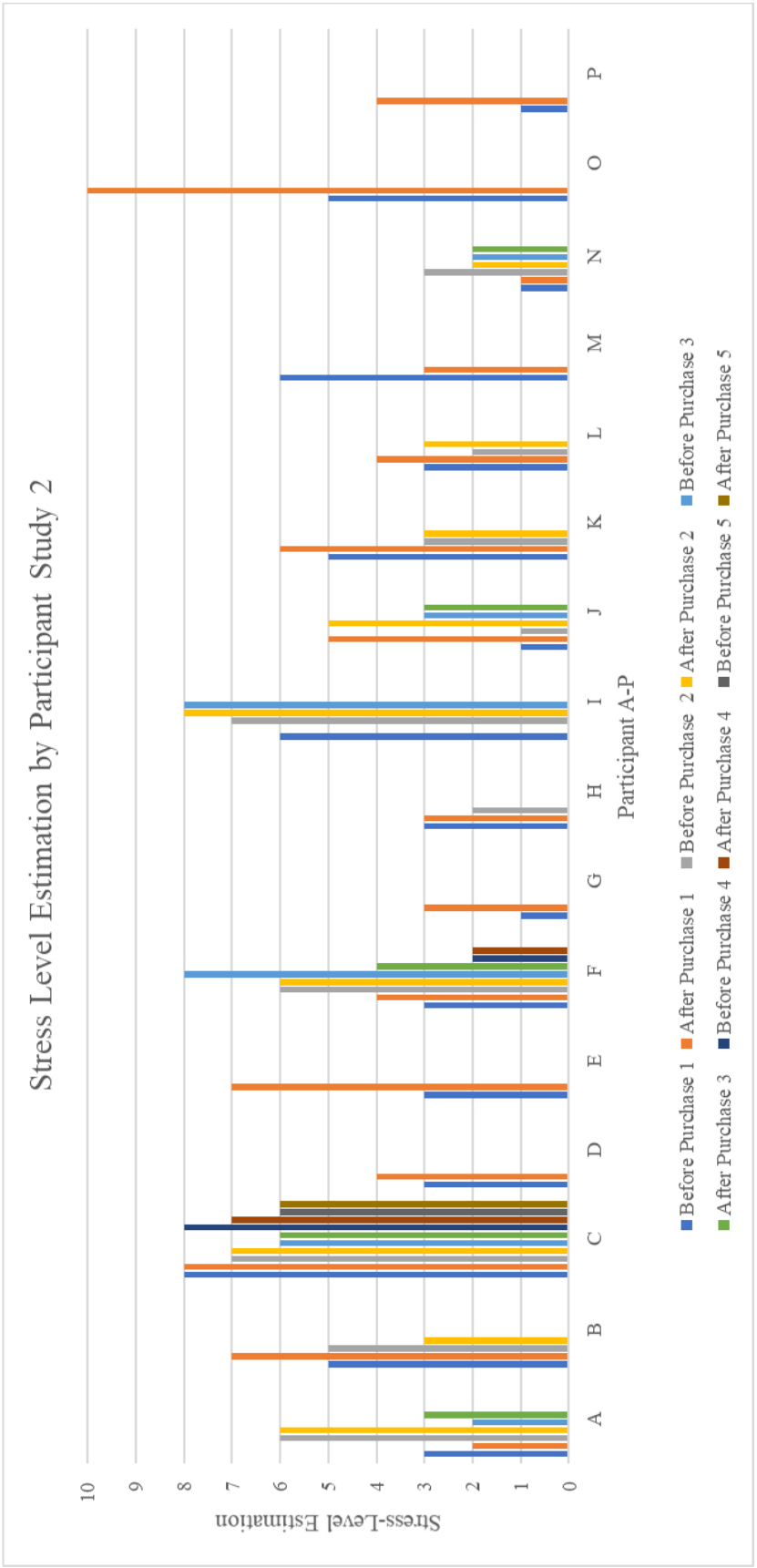
Trust in online grocery shopping	**TRU**
Description of the Content	Includes trust in the online grocery retailer based on experience and expectations. Is influenced by experience (the more positive experiences, the more trust, and vice versa).
Application	**TRU** is coded when the following aspects are mentioned. Online grocery retailers are… o Honest o Appreciate consumers o Are not opportunistic o Offer a good service o Are reliable o Are trustworthy o Know the market → generally positive statements on trust towards the online grocery retailer based on experience and expectations
	Online grocery retailers are… o Not honest o Don't appreciate consumers o Are opportunistic o Are not offering a good service o Are not reliable o Are not trustworthy o Don't know the market → generally negative statements on trust towards the online grocery retailer based on experience and expectations
Retailer (RET)	**RET** is coded when the following aspects are mentioned: o Participant makes a general statement about whether s*he trusts the online grocery retailer → basic statements on trust in relation to online grocers
Personal Reference to the Retailer (PREF)	**PREF** is coded when the following aspects are mentioned: o Participant trusts online grocer because s*he already knows this retailer and is positively inclined o Participant trusts online grocer because s*he already purchased groceries from it (maybe offline) and has had positive experiences → general statements on trust concerning previous experience with grocery retailers
Product (P)	**P** is coded when the following aspects are mentioned: o Person refers to trust concerning a specific product group → general statements on trust concerning different product groups

APPENDIX C: SUPPLEMENTARY STATISTICS STUDY 2

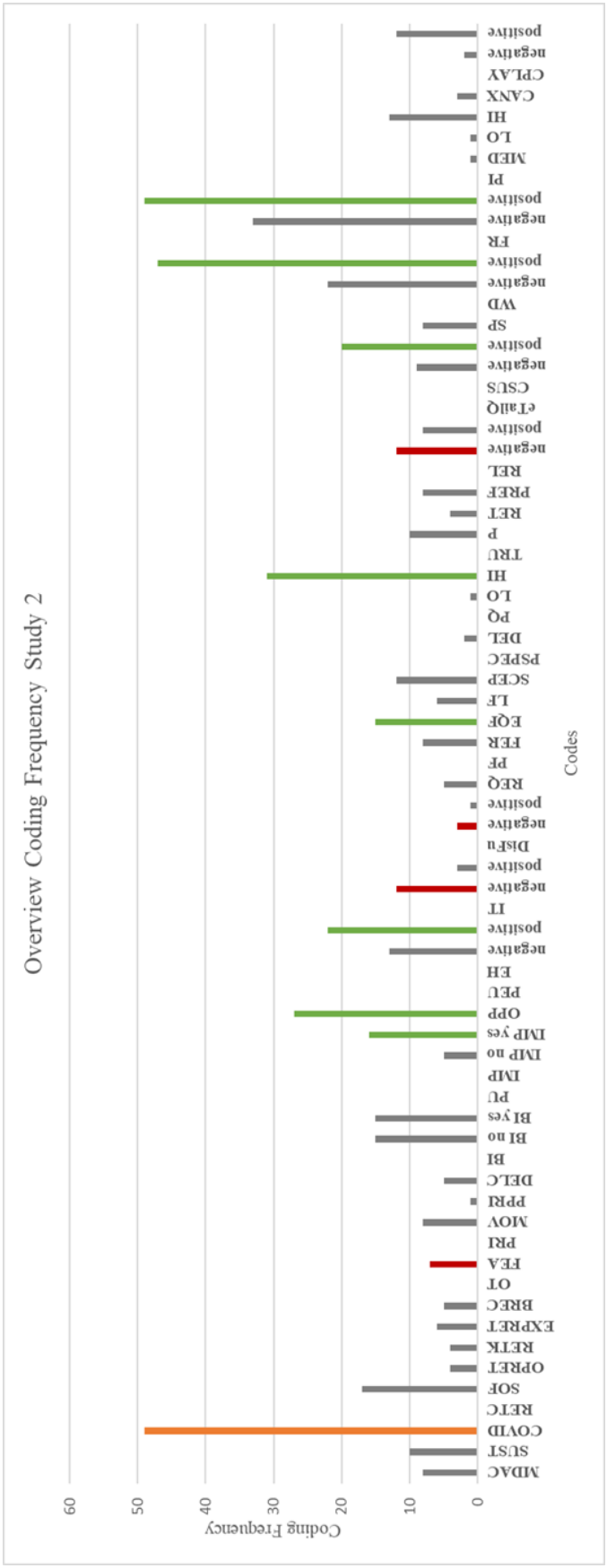
1. Evaluated Trustworthiness by Participant Study 2



2. Stress Level Estimation by Participant Study 2



3. Coding Frequencies Overview and Separately Study 2



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Paper 3: Business Model Innovation in the Online Grocery Sector – Extracting and Structuring Business Model Patterns

Abstract

The online grocery sector is considered to have great economic potential, but the expected growth, especially in Germany, has not materialized. Recent research has shown that there is a gap between what customers need and what current online grocery business models provide. To investigate how online grocery business models can successfully deliver value to their customers, this paper examines the structure of current business models using the business model patterns approach. I systematically analyze 40 currently operating online grocery business models in the German market and extract 60 business model patterns. As the SARS-CoV-2 outbreak appeared during the period of this research, I derive 19 additional crisis-driven business model patterns. To structure the data, I develop a taxonomy of online grocery business model patterns and a morphological box scheme. This makes it possible for practitioners to find the pertinent patterns to systematically innovate with their business models. Finally, in light of the unfulfilled requirements explored in recent research, my study details the business model dimensions that need to be adjusted for businesses to reach long and short-term success.

Keywords: Business Model Patterns, Business Model Innovation, Taxonomy, Crisis-Driven Business Model Innovation, Crisis-Driven Business Model Patterns, COVID-19

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8.1 Introduction

In recent years, online grocery markets have received increasing interest from international academic research, in part because this sector is said to have great economic potential (Martín et al., 2019). An increase in the significance of the market as well as the potential for substantial growth in the next five to ten years is often predicted (Gassmann, 2020; IFH, 2020; Schobelt, 2020). This prediction is justified based on an observable change of customer behavior and by the assumption that online grocery services will become more convenient and desirable in the future. Disadvantages like insufficient delivery flexibility and deficit coverage of the delivery area will be overcome.

However, irrespective of the huge capacity for economic growth and the obvious advantage in convenience for customers, online grocery shopping in Germany lags behind expectations (Handelsverband Deutschland, 2019). In Paper 2, I investigated how online grocery shopping is perceived from the point of view of the consumer, and I noted that the lack of business success is, to a large extent, due to the fact that consumers' needs are not being fulfilled. The results indicate that the structures of current online grocery business models are not able to add enough value to the market or to the customer. In this regard, questions arise about how the unfulfilled needs can be satisfied by online grocery services and how online grocery channels and their corresponding business models can be designed to successfully satisfy all needs.

A business model defines the way an "enterprise delivers value to customers, entices customers to pay for value and converts those payments to profit" (Teece, 2010, p. 172). Without a well-developed business model, the value delivery and capture are more likely to fail, regardless of the quality of the service or product offered (Chesbrough, 2010, 2007; Remane et al., 2017; Teece, 2010). Customer-centric business models are especially necessary for businesses operating online. The fast-changing nature of customers' expectations demonstrates that business model success depends on the evolving context and should be adjusted constantly in interaction with that context (Chesbrough, 2010; Lüttgens and Diener, 2016; Teece, 2010).

In the last two decades, practitioners have engaged in, and researchers have studied, large-scale business model innovation across a variety of fields (Foss and Saebi, 2017). It has become common knowledge that for long-term success, it is not good enough to rely on a business model that is established once and then frozen in place. It has become clear that good business model designs are highly situational and need to be scrutinized, adapted, and innovated with changing business conditions, rising product development costs, shorter life cycles, and increasing

customer requirements (Brenk et al., 2019; Kieser and Kubicek, 1977; Piller et al., 2016; Remane et al., 2017; Teece, 2010).

Given the importance of business models, this work addresses the research question: *How can successful online grocery business models be built that satisfy unmet customer needs?* A first step to approach this research question is to analyze and describe current business models operating in the German market. The goal of the present paper is to develop an overview of the various design elements of current German online grocery business models.

For this purpose, I change perspectives from the customer's point of view to that of the business. I apply the concept of business model patterns to understand the logic and the structures of various online grocery business models. A business model pattern is a problem-solution combination described in a systematic but generic way that can be used repeatedly among various situations (Lüdeke-Freund et al., 2018). The underlying idea for this concept is the finding that more than 90% of all business model innovations are combinations of pre-existing ideas, concepts, and business model design factors (Gassmann et al., 2013; Remane et al., 2017).

This work analyses the business models of 40 currently operating German online grocery retailers and extracts a total of 79 online grocery business model patterns, of which 60 are regular and 19 crisis-driven. 39 of these patterns are identical with generic business model patterns presented in previous research (Clemons, 2009; Gassmann et al., 2013; Johnson and Lafley, 2010; Kiørboe, 2015; Linder and Cantrell, 2000; Lüdeke-Freund et al., 2018; Planing, 2015; Rappa, 2010; Remane et al., 2017; Weill and Vitale, 2001). 30 patterns are versions of generic patterns that are specific to the (online) grocery industry or are rooted in this area. 10 are unique to online grocery. To make them easier to understand and more accessible to practitioners, I describe all the patterns comprehensively, thematically classify them within a taxonomy, and present them in a morphological box scheme. I add a proposal for how these elements may be practically applied to business model innovation.

19 of the derived patterns describe immediate crisis-driven business model changes in the wake of the fast outbreak of SARS-CoV-2 and the subsequent developments. Online grocery shopping retailers have experienced a significant increase in the number of new customers. To investigate how online grocery retailers cope with this situation, this research also concentrates on COVID-19-conditional characteristics in the structures of the business models.

This paper makes multiple contributions to research and practice. It serves as a basis to support the short- and long-term success of systematic business model innovation. The combination of the business model pattern descriptions with the morphological box scheme and the taxonomy I

developed can enable managerial decision-makers to identify the optimal starting point of business model innovation after learning from the various online grocery business model patterns. Focusing on some of the unmet customer needs that are explored in Paper 2, the present work indicates that existing patterns have to be re-combined and extended with patterns from other markets. Finally, it contributes to the literature on crisis-driven business innovation by providing insights from a business model perspective.

The paper proceeds as follows. Section 8.2 delves into relevant literature in business model innovation, business model patterns, and their classifications. In Section 8.3, a five-step approach for the analysis of present online grocery business models, its corresponding pattern extraction, and the taxonomy development process are introduced. Based on this, I present and describe the 79 derived business model patterns and their corresponding taxonomy, and I illustrate them all in a morphological box scheme. I then propose a practical application process of these instruments in Section 8.4. This paper concludes with implications for practice and theory as well as the limitations of this study and further research avenues in Section 8.5.

8.2 Theoretical Background

The Business Model

The term *Business Model* (BM) has been used in scientific literature for more than 55 years (Wirtz et al., 2016). Still, there is no universally accepted definition of this term (Foss and Saebi, 2018; Lambert, 2015). In the early years of its development, it was used quite unspecifically, but with the advent of technology-oriented BM research (Amit and Zott, 2001), organization theory-oriented considerations (Linder and Cantrell, 2000), and strategy-oriented reflection (Afuah and Tucci, 2003), the various conceptions of the term slowly converged into the notion that a business model is "the design or architecture of the value creation, delivery and capture mechanisms" (Teece, 2010, p. 172) of a company (Foss and Saebi, 2017; Massa et al., 2017; Weking et al., 2018) and that the "task of a business model is to provide an overview of how a company generates value in a profitable manner" (Baden-Fuller and Morgan, 2010, p. 21; Lüttgens and Diener, 2016).

Much research on BMs lacks an explicit definition, which is a failing (Foss and Saebi, 2018). In the present research, I define the concept *business model* as the way value is created, provided to the customer, and converted into profit (Baden-Fuller and Morgan, 2010; Lüttgens and Diener, 2016; Magretta, 2002; Remane et al., 2017; Teece, 2010). Furthermore, I describe a BM as consisting of four elements: *Customer*, *Value Proposition*, *Value Chain*, and *Revenue Model* (Gassmann et al., 2013).

In BM literature, the research can be divided into three streams (Foss and Saebi, 2017). In the first, BMs are considered as the foundation for the enterprise's classification. It focuses on the BM construct itself and is "employed to understand and classify value drivers of BMs" (Foss and Saebi, 2017, p. 202). In the second stream, the BM is seen as an indication of the diversity of business performance, especially as some BMs outperform others (Foss and Saebi, 2017; Zott and Amit, 2010). In the third, the BM is seen as an unit of innovation (Foss and Saebi, 2017; Piller et al., 2016; Zott et al., 2011). This work is part of the third stream.

Business Model Innovation

Business Model Innovation (BMI) is re-thinking and further developing the basis of all corporate and entrepreneurial thinking and acting: the business model. (Piller et al., 2016). The continuous adjustment of the BM is therefore crucial for remaining competitive and ensuring the survival of the business (Amit and Zott, 2015; Magretta, 2002; Martins et al., 2015; Weking et al., 2018). Many companies fail when they try to adapt or innovate their BM (Chesbrough, 2006; Christensen et al., 2016; Weking et al., 2018). BMI is a highly complex task and practitioners often fail to identify the most suitable BM for their organizations (Chesbrough, 2010). To understand and solve this problem, BMI research has grown substantially over the last years (Foss and Saebi, 2017).

Several tools to support BMI have been developed, including the *Business Mapping Framework* (Pynnönen et al., 2012), the *Lean Startup* method (Ries, 2020), and *Business Model Road-Mapping* (De Reuver et al., 2013). The two most widespread BMI approaches are the *Business Model Canvas* (Osterwalder and Pigneur, 2010) and the *Business Model Patterns* (Amshoff et al., 2015; Gassmann et al., 2013; Osterwalder et al., 2020; Weking et al., 2018). To analyze the structure of business models currently operating in the German market, this work is based on the Business Model Patterns approach.

Business Model Patterns

In research, there are multiple definitions of *pattern* (see Table 30). Most of them derive from that of Christopher Alexander, who used the term in the field of architecture (Alexander, 1977), defining it as a universally applicable solution to recurring problems. Various research disciplines derive and use patterns from data, including software design (Kerth and Cunningham, 1997), human-computer interaction (Tidwell, 2010), and business models (Gassmann et al., 2013; Johnson and Lafley, 2010). In all disciplines, there is a common understanding that patterns assist in reducing complexity in the design and structure of the object of investigation and enable more efficiency in a problem-solving process (Amshoff et al., 2015; Cloutier and Verma, 2006).

Table 30: Exemplary Business Model Pattern Definitions

Autor(s)	*Definition*
Abdelkafi et al. (2013), p.14	"In other words, a pattern describes the relationship between a certain context or environment, a recurring problem and the core of its solution."
Alexander (1977), p.1216	"A pattern describes a problem which occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice."
Amshoff et al. (2015), p.3	"The basic idea of the pattern concept is reusing solutions that are documented generally and abstractly in order to make them accessible and applicable to others."
Lüttgens and Diener (2016), p.21	"Another dedicated tool is that of collections of business model patterns i.e. commonly used and proven configurations of specific business model components."

Business model patterns (BMPs) constitute a useful tool with which to investigate BMI. The core of this approach is the learning and detection of repetitive and successful behavior from other businesses in the same or different contexts (Amshoff et al., 2015; Weking et al., 2018). BMPs can be described as repeating BM configurations, with a BM being a combination of several BMPs. During BMI, patterns can, through the application and recombination of new elements, be used to improve, enhance and innovate the BM (Gassmann et al., 2013; Lüttgens and Diener, 2016; Remane et al., 2017).

Many BMP collections can be found in the literature. According to Amshoff et al. (2015) and Remane et al. (2017) the various BMPs affect different hierarchical levels of a BM. These researchers differentiate among three degrees of pattern granularity, from the largest-scale and least granular to the smallest-scale and most granular: (1) business model frameworks, (2) prototypical patterns, and (3) solution patterns.

(1) *Business model frameworks* are recurring forms of representation, classification, and documentation for the analysis and structure of a BM and its elements. Prominent examples of BM frameworks include the *Business Model Canvas* (Osterwalder and Pigneur, 2010) and the *Business Model Navigator* (Gassmann et al., 2013).

(2) *Prototypical patterns* affect the BM as a whole and describe the general configuration of a BM. Corresponding prototypical pattern collections are either focused on specific types of BMs, such as e-businesses (Hartman et al., 2000; Wirtz et al., 2010), or provide a general understanding of a BM (Andrew et al., 2007; Chatterjee, 2013).

(3) *Solution patterns* have an impact on specific business building blocks, or even single elements of a BM.

BMPs help reduce complexity when characterizing or structuring a BM (Weking et al., 2018). As BMPs describe and affect different elements of a BM, an overview or framework is necessary for orientation and transfer into practice (Amshoff et al., 2015). That is why BMP overviews often are presented through so-called classifications or taxonomies.

Classification of Business Model Patterns

This work aims to understand and describe existing online grocery BMs in order to address the research question of *how to successfully design customer-satisfying online grocery BMs*. This understanding is approached through analyzing currently operating business models and segmenting them into different BMPs. A comprehensive and topical overview of the extracted patterns contributes to the understanding of the structure of online grocery business models. It enables the comparison between different BMs and captures the BM logic of multiple companies. To develop a structured overview of the patterns, I develop an online grocery BM classification.

This classification lays the foundation for discussing forces, influences, and relationships within the research focus (Lambert, 2015; Lüdeke-Freund et al., 2018, 2019a). Furthermore, the taxonomy is helpful from a practical point of view. The generalized representation of the information makes it accessible and transferable (Lüdeke-Freund et al., 2018). Thus, the overview is capable of motivating and inspiring practitioners to re-design and improve their BMs by combining and re-thinking existing online grocery BMPs (Gassmann et al., 2013; Remane et al., 2017), and thus addresses the overreaching research question.

In general, a classification or taxonomy is "concerned with systems for grouping objects of interest in a domain based on common characteristics" (Nickerson et al., 2013, p. 338). It is a way of ordering and organizing "objects into groups or classes on the basis of their similarity" (Lambert, 2015, p. 50). The roots of classification are located in biology. Nowadays classifications have also become accepted in a variety of other sciences, including behavioral and social sciences (Abraham and Michie, 2008; Levasseur et al., 2010), computer science (Fuller et al., 2007), and business models (Lambert and Davidson, 2013; Remane et al., 2017).

Various methodological approaches can be used to develop a classification or taxonomy, for example, case-study-based approaches following qualitative research principles, or literature-based approaches following a morphological analysis or Modified-Delphi card sorting (Lüdeke-Freund et al., 2019a). One methodology that provides clear starting and ending conditions for the development of a taxonomy, independently of the chosen approach, is Nickerson's (2013) procedure. It is one of the most popular methodological approaches in classifying BMs and BMPs and has been successfully applied in recent BMP research (Eickhoff et al., 2017; Remane et al., 2017; Weking et al., 2018).

8.3 Methodology

For the analysis of BMs in the German online grocery sector, I use a five-step approach (see Figure 18) following Amshoff et al. (2015) and Remane et al. (2017). The approach begins with the identification of relevant online grocery BMs in Germany, followed by in-depth research concerning their structure and contents. In the next step, I reduce and filter the collected and researched BM information, enabling the extraction of patterns. Finally, this research develops and proposes a taxonomy of the structure of German online grocery BMPs.

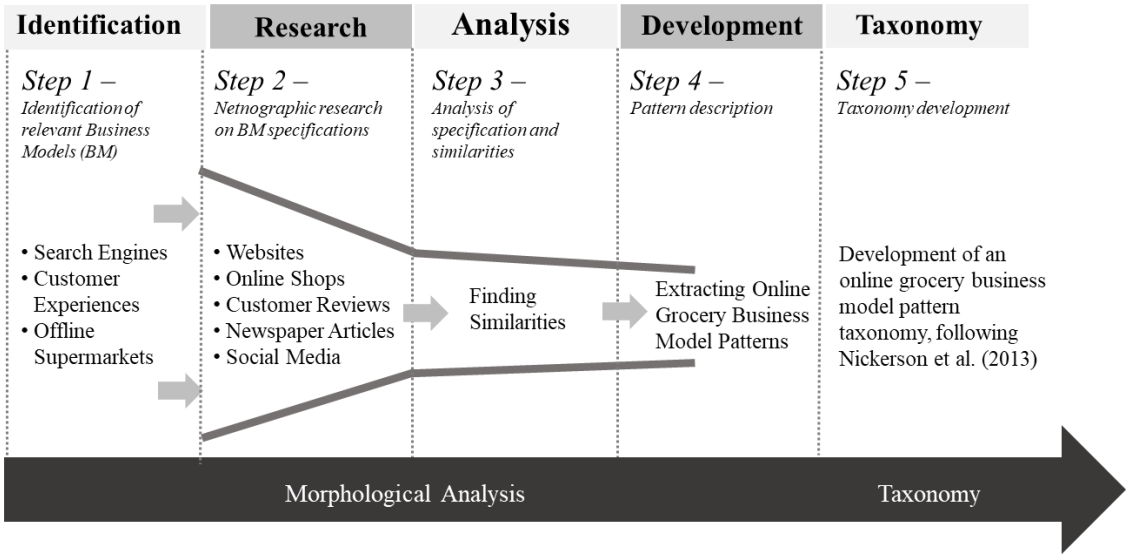

Figure 18: Five-Step Approach for the Online Grocery Business Model Analysis

Step 1: Identifying Online Grocery Business Models in Germany

First, I conducted online market research by applying an in-depth search engine research technique on online grocery shopping retailers in Germany. I collected experiences from online grocery shoppers and performed an analysis of offline supermarkets in Germany and their possible online grocery offerings to identify currently operating online grocery businesses. This procedure allowed me to find pure online grocery players, offline supermarkets with online offerings, organic farmers with online offerings, and small-scale local grocery retailers. I identified a total of 40 businesses. An overview of the analyzed BMs is given in Table 31.

Table 31: Overview of German Online Grocery Business Models

No.	*Online Supermarkets*	*Links*	*Status*
1	Alles-vegetarisch	https://www.alles-vegetarisch.de/	Operational
2	Amazon Fresh	https://www.amazon.de/	Operational
3	amorebio	http://amorebio.de/	Operational
4	Bauerntüte	https://bauerntuete.de/	Operational
5	biobiene-shop24.de	https://www.biobiene-shop24.de/	Operational
6	Biokiste	https://bioland-gauchel.de/de/biokiste	Registration closed for new customers during coronavirus crisis
7	Bofrost.de	https://www.bofrost.de/	Operational
8	Bring24	https://www.bring24.com/	Operational
9	Bringmeister	https://www.bringmeister.de/	Operational
10	bringmirBio	https://bringmirbio.de/startseite	Operational
11	com4buy	https://www.com4buy.de/	Operational
12	dm-online	https://www.dm.de/	Operational
13	EDEKA24	https://www.edeka24.de/	Operational
14	Eismann	https://shop.eismann.de/	Operational
15	etepetete	https://etepetete-bio.de	Operational
16	fittaste	https://fittaste.com /	Operational
17	food.de	https://food.de/	Operational
18	getnow	https://www.getnow.com/	Operational
19	Hagen Grote	https://www.hagengrote.de/	Operational
20	HelloFresh	https://www.hellofresh.de	Operational
21	Kreutzers Gourmet	https://kreutzers.eu/	Operational
22	Lebensmittel.de	https://www.lebensmittel.de/	Closed
23	Lieferladen.de	https://www.lieferladen.de/shopselector.html	Operational
24	Lieferzettel.com	https://lieferzettel.com/	Operational
25	LILA-SE	https://www.lila-se-shop.de/	Operational
26	Lozuka Siegen	https://siegen.lozuka.de/	Operational
27	Mozzaik	https://www.mozzaik.shop/	Operational
28	myenso	https://www.myenso.de/login	Operational
29	myTime	https://www.mytime.de/	Operational
30	myWürstchen	https://www.mywuerstchen.de/	Self-pickup only
31	Netto Online	https://www.netto-online.de/	Operational
32	Oekokiste.de	https://www.oekokiste.de/	Registration closed for new customers during coronavirus crisis
33	Otto Gourmet	https://www.otto-gourmet.de/	Operational
34	Picnic	https://www.picnic.app/de/	Operational
35	real	https://www.real.de/	Operational
36	Rewe Online	https://www.rewe.de/service/online-einkaufen/	Operational
37	Rossmann	https://www.rossmann.de/de/	Operational
38	sir-plus	https://sirplus.de/	Operational
39	Supermarkt24h	https://supermarkt24h.de/	Operational
40	XXL-Supermarkt.de	https://www.xxl-supermarkt.de/	Operational

Step 2: Analyzing the Identified Business Models

In a second step, I analyzed the identified BMs, thoroughly reviewing and examining their official websites, online shops, customers reviews, and newspaper articles and social media. For this, I used a morphological procedure. I organized the BM information I collected into individual characteristics and subsequently assigned them to the BM elements they influenced.[14] As some observed characteristics influence several BM elements, I documented each characteristic separately depending on its business model elements. A predefined matrix supported this process. The matrix shows the BM elements on the vertical axis and the characteristics on the horizontal axis. A template of this matrix is given in Appendix A.

As this step was completed, SARS-CoV-2 erupted in Germany. Due to contact restrictions and the impending danger of infection, online grocery BMs were flooded with customers. To satisfy the exploding increase in demand and simultaneously cope with contamination risks during the delivery of products, online grocery retailers had to adapt their BMs. I conducted a second round of analysis just like the first, as described above, analyzing the adapted BMs to investigate these crisis-driven effects.

Step 3: Finding Similar Characteristics

In a third step, all empirically-observed features, regular and crisis-driven, were listed in one overview. If the same characteristic was found repeatedly in different BMs, it was only listed once. The resulting list contained 116 regular and 29 crisis-driven BM characteristics. For traceability, and to recognize repeating characteristics, the count of occurrences of the characteristics as well as the affiliation to the four BM elements were documented accordingly.

Step 4: Extracting Online Grocery Business Model Patterns

In Step Four, I further reduced the number of characteristics by combining and merging duplicates and very similar features. This resulted in 96 regular and 25 crisis-driven characteristics. As patterns are defined as proven problem-solution combinations (Lüdeke-Freund et al., 2019; Remane et al., 2017), I hereafter thematically clustered and aggregated the characteristics that describe similar solutions for similar problems. This sorting formed the basis for the pattern descriptions. To describe the patterns, I initially created headlines for each topical cluster. Subsequently, I combined each cluster into one pattern and described each pattern as clearly as possible, based on Alexandrian pattern description (Alexander, 1977; Lüdeke-Freund et al., 2018;

[14] For this proceeding, I use the four BM elements of *Customer*, *Value Proposition*, *Value Chain* and *Revenue Model*. Following Gassmann et al. (2013), these four factors define the composition of a BM. This work is also based on this definition, which was introduced in Section 8.2.

Remane et al., 2017). I included the body of the problem, the observed background, as well as how the pattern solves the problem. I added context to the problem by enriching the description with online grocery BM examples collected and documented in Step Three.

I compared the 79 extracted patterns (see Section 8.4.1) to existing BMP collections and taxonomies in literature and reviewed which patterns are new and specific to the online grocery sector. This step revealed three categories of patterns. (1) *Generic business model patterns:* 39 of the extracted patterns are identical to business model patterns that have been derived independently of a particular industry and have been discussed in previous literature (Gassmann et al., 2013; Remane et al., 2017). (2) *Industry-specific generic business model patterns:* 30 of the extracted patterns are online-grocery-specific versions of existing generic business model patterns. They are slightly different from their roots but are adaption of the original patterns. (3) *Online-grocery-specific patterns:* 10 of the extracted patterns seem unique to the (online) grocery sector or are rooted in this field. An overview of sources of the generic patterns and their illustrations is given in Appendix B.

Step 5: Structuring Patterns by the Impact on Online Grocery Business Models

Although this research aims to provide insights into the structure of current online grocery BMs, it is not only about describing patterns. To provide a manageable and transparent online grocery BM structure overview, this work also addresses how to thematically classify the extracted online grocery BMPs. A structured overview can serve as a basis for successful BMI as it points out the variety of the BMPs applied in the German market. It also allows us to organize the extracted patterns and illustrations thematically and enables easier navigation through the extracted online grocery BMPs. Based on these advantages, I thematically classified the extracted patterns and illustrations into a structural and framework-based online grocery BMP classification, a so-called taxonomy (Nickerson et al., 2013; Remane et al., 2017).

I used the proposed BMP taxonomy by Remane et al. (2017) as the basis of the online grocery BMP classification. During the transfer of the taxonomy to this research setting, it became apparent that without adjustments, some of the online grocery patterns and illustrations cannot be incorporated. I refined the existing taxonomy by adding, exchanging, and modifying some of the initial dimensions and characteristics. To ensure that the revised version complies with the rules of a taxonomy, I followed the taxonomy-development approach from Nickerson et al. (2013). This approach allows for organizing and combining objects based on common characteristics in a structured way. It provides clear starting and ending conditions and is divided into seven steps (see Figure 19), which are successively expanded by an indefinite number of iterations, depending on when the ending conditions are met.

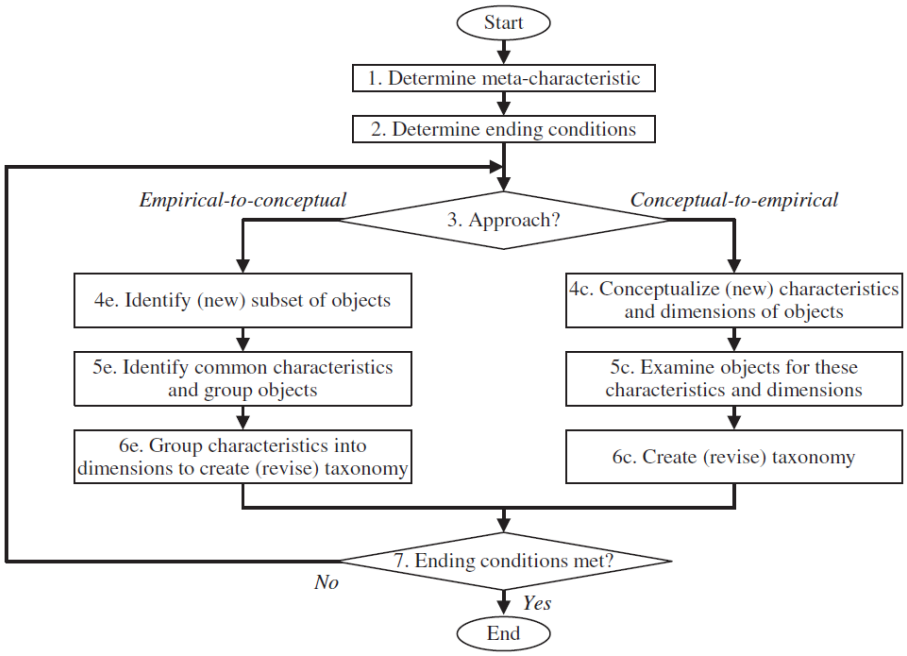

Figure 19: Taxonomy Development Method. Source: Nickerson et al., 2013, p.345

The first step is to define a meta-characteristic that serves as a basis for all other characteristics in the taxonomy; it should reflect the interests of the taxonomy users. Concerning the research goal, and in line with the taxonomy by Remane et al. (2917), I adapted the proposed meta-characteristic and defined it as *the impact of the business model patterns on different business model elements.* The business model elements I consider in this work are *Target Customer Segments*, *Value Propositio*n, *Value Chain,* and *Revenue Model*. These four elements have been defined by Gassmann et al. (2013) as the fundamental structure of a BM and serve as a basis for this research (see Section 8.2). In the second step of the taxonomy development, I adopted the proposed objective and subjective ending conditions by Nickerson et al. (2013) (see Table 32).

The iterations of the taxonomy development process can begin with either a conceptual or an empirical approach. In the conceptual approach, the dimensions originate from theory, while with the empirical approach, data that is collected through empirical research is classified based on common characteristics. One aspect is crucial for the iterations: each pattern can only be attributed once to a single characteristic for each dimension. This demands that occasionally one dimension is divided into two or more new dimensions, so that the patterns do not have more than one characteristic in the same dimension (Nickerson et al., 2013; Remane et al., 2017).

Table 32: Ending Conditions for the Taxonomy Development. Source: Nickerson et al., 2013, p.344

No.	*Ending Conditions*	*Comment*
	Objective Ending Conditions	
1	All objects or a representative sample of objects have been examined.	If all objects have not been examined, then the additional objects need to be studied.
2	No object was merged with a similar object or split into multiple objects in the last iteration.	If objects were merged or split, then we need to examine the impact of these changes and determine if changes need to be made in the dimensions or characteristics.
3	At least one object is classified under every characteristics of every dimension.	If at least one object is not found under a characteristic, then the taxonomy has a 'null' characteristic. We must either identify an object with the characteristic or remove the characteristic from the taxonomy.
4	No new dimensions or characteristics were added in the last iteration.	If new dimensions were found, then more characteristics of the dimensions may be identified. If new characteristics were found, then more dimensions may be identified that include these characteristics.
5	No dimensions or characteristics were merged or split in the last iteration.	If dimensions or characteristics were merged or split, then we need to examine the impact of these changes and determine if other dimensions or characteristics need to be merged or split.
6	Every dimension is unique and not repeated (i.e., there is no dimension duplication).	If dimensions are not unique, then there is redundancy/duplication among dimensions that needs to be eliminated.
7	Every characteristic is unique within its dimension (i.e., there is no characteristic duplication within a dimension).	If characteristics within a dimension are not unique, then there is redundancy/duplication in characteristics that needs to be eliminated. (This condition follows from mutual exclusivity of characteristics.).
8	Each cell (combination of characteristics) is unique and is not repeated (i.e., there is no cell duplication).	If cells are not unique, then there is redundancy/duplication in cells that needs to be eliminated.
	Subjective Ending Conditions	
1	Concise	Does the number of dimensions allow the taxonomy to be meaningful without being unwieldy or overwhelming?
2	Robust	Do the dimensions and characteristics provide for differentiation among objects sufficient to be of interest? Given the characteristics of sample objects, what can we say about the objects?
3	Comprehensive	Can all objects or a (random) sample of objects within the domain of interest be classified? Are all dimensions of the objects of interest identified?
4	Extendible	Can a new dimension or a new characteristic of an existing dimension be easily added?
5	Explanatory	What do the dimensions and characteristic explain about an object?

I started the **first iteration** with a conceptual-to-empirical approach (see Figure 20), as my initial dimensions are based on a theoretical foundation. Following the taxonomy of Remane et al. (2017) and the differentiation between prototypical and solution patterns (Amshoff et al., 2015), I defined the first dimension to be the hierarchical impact on the BM. For the definition of the further dimensions, I used the elements of the BM framework defined by Gassmann et al. (2013). These elements previously served as a basis in the analysis of the business model structures.

Based on the analysis of the BMs (see Steps 1 to 3), I linked each pattern to its BM element and consequently to its initial dimension. Following this, I sorted the patterns into nine topics, which can also be referred to as characteristics. After this first iteration, it became evident that different

patterns can be assigned to several characteristics of the same dimension. To achieve an overlap-free allocation, a further subdivision of the dimensions and characteristics was necessary.

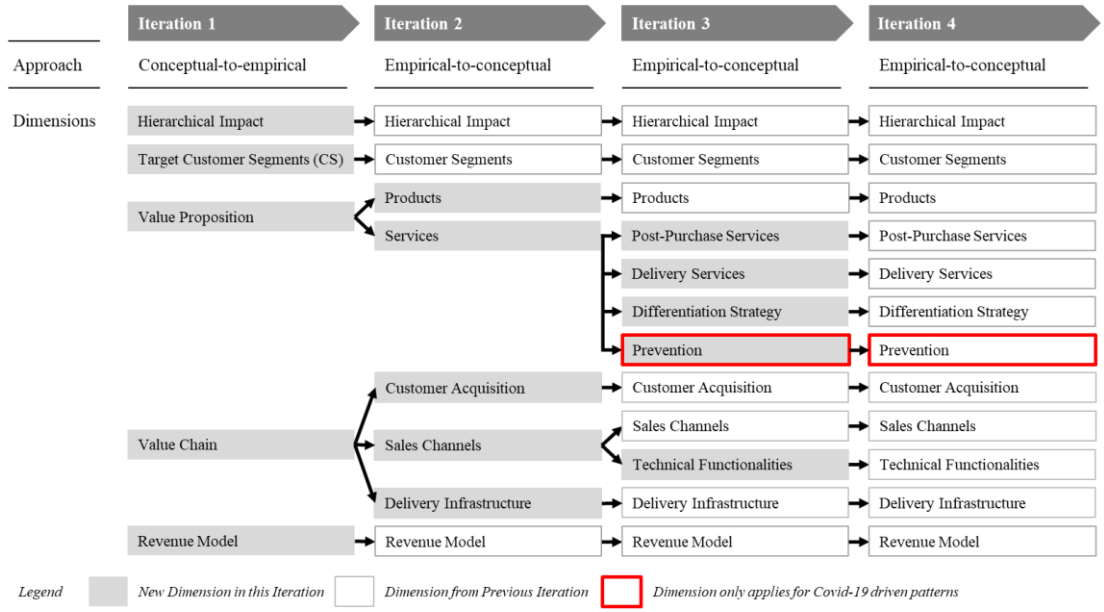

Figure 20: Development of the Online Grocery Business Model Pattern Taxonomy. Based on Remane et al., 2017, p. 13.

Since the further dimensions developed in the **second iteration** are based on the empirically extracted patterns, I switched from the conceptual to the empirical approach. I split the initial dimension *value proposition* into the dimensions *products* and *services* and divided the initial dimension *value chain* into *customer acquisition*, *sales channels*, and *delivery infrastructure*. Subsequently, I thematically classified and assigned corresponding characteristics with regard to the derived patterns. During this procedure, I recognized that the newly-derived dimensions *services* and *sales channels* were still not free from characteristic-related overlap. The dimension *services* (from the second iteration) includes intersecting characteristics such as *delivery services*, *post-purchase services*, and services that are used in line with a *differentiation strategy* (to differ from other companies and their services).

In the **third iteration**, I thus derived four new dimensions from the initial dimension *services*: *post-purchase services*, *delivery services*, *differentiation strategy*, and *prevention*. The dimension *prevention* arose mainly due to the extracted crisis-driven patterns. I discovered a further conflicting intersection for the dimension s*ales channel* (from the second iteration) by finding that some patterns describing sales channels differ according to their technical functionalities. Therefore, I appended a further dimension, *technical functionalities*. In this iteration, I finally derived conflict-free characteristics for all newly-developed dimensions regarding the extracted

patterns. Figure 21 shows the overview of the derived characteristics as they are allocated to the dimensions and in relation to the four iteration steps.

In the **fourth iteration** step, I did not add any further dimensions, as all the patterns could be integrated into the existing dimensions and characteristics without overlap or duplication. All objective and subjective ending conditions were met, and no further iterations were necessary. An overview of the final taxonomy, including all patterns assigned to each dimension, is given in Appendix C.

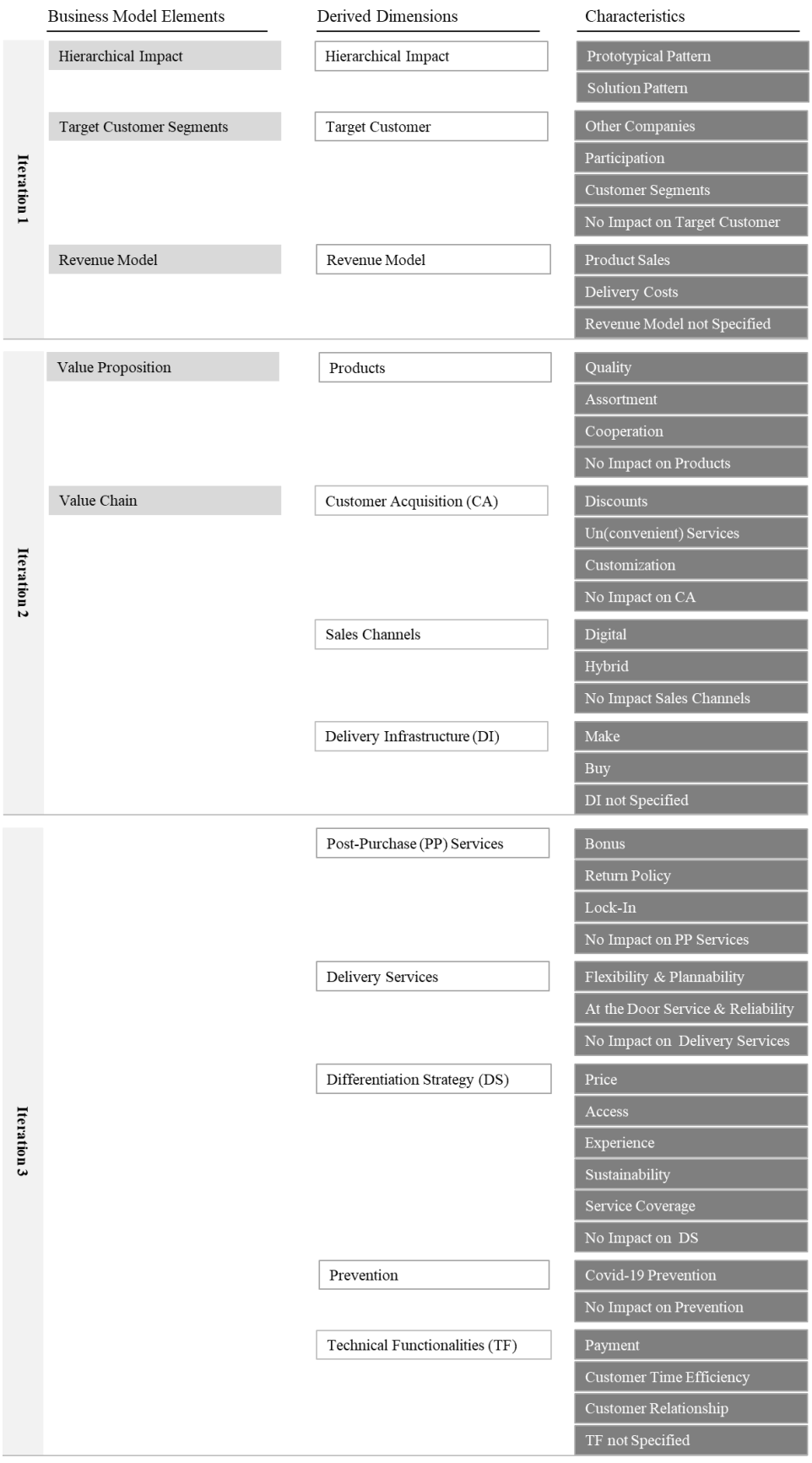

Figure 21: Derived Dimensions and Characteristics in Each Iteration Step

8.4 Results

8.4.1 Online Grocery Business Model Patterns

This work provides an overview of 79 online grocery BMPs comprising 60 regular and 19 crisis-driven patterns. This overview includes three types of patterns (1) *39 industry-independent generic business model patterns*, (2) *30 online-grocery-specific versions of generic patterns*, and (3) *10 online-grocery-specific patterns*. The generic patterns of Types 1 and 2 have been stated in previous research, while their online-grocery-specific versions as well as the patterns of Type 3 are newly derived.[15] Each pattern is described by the initial situation (problem) as well as the business behavior (solution) to manage the situation. To emphasize the various manifestations, the patterns include examples of how they are applied. In the following, the BMPs are presented separately, starting with the ones that I extracted before the coronavirus crisis during "regular" business operation. The type of pattern – whether an industry-independent generic business model pattern, an online-grocery-industry-specific version of a generic pattern, or a unique online-grocery business model pattern – is indicated by marking each pattern with one, two, or three stars (see Table 33).

With economic shutdowns and physical distancing behavior, the coronavirus pandemic is challenging for businesses worldwide. The specific challenge for online grocery businesses is that they are exposed to a massive influx of new users. While some businesses refused to accept new customers or even collapsed, others defied the crisis by using novel BM design factors. These factors are represented by the crisis-driven online grocery BMPs in Table 34.

[15]An overview of the sources regarding the patterns of Types 1 and 2 are given in Appendix B.

Table 33: List of Derived Online Grocery Business Model Patterns in Pre-Coronavirus Operation

No.	*Pattern Name*	*Description*	*Exemplary Applications of the Pattern and Provider*
1	Benefitting B2B*	To enlarge the target group, online grocery businesses offer specialized propositions, advantages, and pricing plans to business customers. Sometimes delivery fees are set high so that it is only worth ordering large quantities as a business customer.	*Office snack/supply baskets* (containing fruits, vegetables and other snacks and sometimes office supplies and drug store items) for employees, delivered weekly and with varying content: Lieferladen.de, bringmirbio, amorebio, myTime, Bringmeister *Direct supply of large quantities:* Bauerntüte, Supermarkt24h
2	Bottle Deposit Returns**	To retain customers and offer them an additional service, customers can return bottles for cash or store credit.	*Deposit bottles are taken back* at the same time the new purchase is handed over: Rewe Online, Picnic, myTime, food.de, getnow, real, Bring24
3	Bricks-and-Clicks*	Business has an online presence (clicks) and an offline (bricks-and-mortar) location to order products and use services.	Rewe Online, Bringmeister, Lieferzettel.com, Otto Gourmet, Biokiste, Kreutzers, EDEKA24, sir-plus, real, Netto Online, dm-online, Rossmann
4	Cash on Delivery**	Customer is entitled to pay in cash at the time of delivery (and not use any online payment method).	EDEKA24, Bringmeister, Bring24, XXL-Supermarkt, Otto Gourmet (7.90 € extra fee), myWürstchen, Eismann, Bofrost.de
5	Click-and-Collect*	To expand the service portfolio and the flexibility for the customer and to reduce costs of the delivery infrastructure, the business integrates both an offline and an online presence, in which a customer places an order online and then picks up the product in a physical retail store (sometimes with an extra charge for this service).	*Free service:* Rewe Online, EDEKA24, Netto Online (only for 4 branches), Biokiste (only for biobag and only on certain days), Otto Gourmet (only in Heinsberg), myWürstchen (only in one shop), Rossmann (minimum value order €20) *Extra charge:* real (only for some areas), dm-online (for guests extra charge of €2.95)
6	Co-Creation*	Some of the value creation is transferred to the customer in exchange for a lower price or subscription to services or products. Customers benefit from efficiency and time savings while putting in effort in a target-oriented manner.	Customer can suggest new products for the assortment or functionalities for the online shop: myenso, getnow
7	Connection to Home Automation**	Businesses enable a truly digital experience by providing a synced connection between the business and the customer's home automation system. The home automation system supports the purchasing process, improving usability and saving time. Subsequently, learning about the customer's needs is facilitated.	real, Amazon Fresh

*industry-independent generic business model patterns, **online-grocery-industry-specific versions of generic patterns, ***unique online-grocery business model patterns.

Table 33: List of Derived Online Grocery Business Model Patterns in Pre-Coronavirus Operation (Continued)

No.	*Pattern Name*	*Description*	*Exemplary Applications of the Pattern and Provider*
8	Cross-Selling*	To increase sales and revenue, businesses offer complementary kitchen products or drugstore items in addition to the grocery offerings.	*Kitchen supply:* Lozuka.Siegen, Amazon Fresh, Rewe Online, Netto-online, real, Bofrost.de, Eismann *Drugstore items*: Rossmann, dm-online, Amazon Fresh, Picnic, Rewe Online, Bringmeister, real, Netto Online
9	Customer Loyalty*	Existing customers are retained and rewarded by providing value beyond the actual product or service on the basis of incentive-based programs. The goal is to create and maintain loyalty by developing an emotional connection or simply rewarding it with special offers.	*Loyalty and bonus systems such as bonus collections or customer cards:* Mytime, Real, myEnso, alles-vegetarisch, kreutzers, Lieferladen, Eismann, Bofrost
10	Customization	Businesses build a technical functionality and product picking infrastructure so that the customer can customize a product or service tailored to specific preferences.	Lieferladen
11	Deal of the Day*	To stimulate sales and attract new customers and/or to archive sale-offs, a specific and targeted daily (or weekly) offering centered around a creative theme and encompassing a relevant range of products and services is offered.	Amazon Fresh, Netto Online, Mozzaik, amorebio, Bringmeister, Rewe Online, EDEKA24, getnow, real, Bring24, XXL-Supermarkt, Alles-vegetarisch, Lieferladen.de, Rossmann, Eismann, biobiene-shop24.de, Hagen Grote, Lozuka.Siegen, sir-plus
12	Delimited Coverage***	To provide consistent delivery of their products and services, businesses delimit their target group by covering only certain geographical areas ranging from partial coverage (mostly in large and medium-sized German cities) to Germany- or even EU-wide overall coverage.	*Coverage of only metropolitan areas:* Rewe Online, Amazon Fresh, Bringmeister, real, myenso *Coverage of only medium-sized cities:* Picnic, XXL-Supermarkt, food.de, Oekokiste.de *Coverage of only one area or city:* Lozuka.Siegen, Biokiste, Bring24, Lieferladen.de, Lieferzettel.com, myWürstchen *German-wide Coverage:* myTime, EDEKA24, bringmirbio, getnow, Netto Online, Bauerntüte, dm-online, Rossmann, Eismann, Bofrost.de, biobiene-shop24.de, LILA-SE, etepetete, sir-plus *EU-wide shipping:* Supermarkt24h, Mozzaik, Alles-vegetarisch, Kreutzers Gourmet, Otto Gourmet, Hagen Grote
13	Delivery Flat-Rate*	A fixed fee is charged initially, regardless of the overall actual usage of the delivery service. The customer can utilize unlimited delivery services while paying a uniform recurring fee at specified intervals of time.	Rewe Online, Amazon Fresh, Bauerntüte, Oekokiste.de (optional service option to pay per use)

*industry-independent generic business model patterns, **online-grocery-industry-specific versions of generic patterns, ***unique online-grocery business model patterns.

Table 33: List of Derived Online Grocery Business Model Patterns in Pre-Coronavirus Operation (Continued)

No.	*Pattern Name*	*Description*	*Exemplary Applications of the Pattern and Provider*
14	Direct Selling*	To avoid intermediate steps in the value chain and make greater profits on the products, products and services are offered by the manufacturer directly, rather than through an intermediary channel.	Biokiste, Kreutzer Gourmet, Otto Gourmet
15	Eco-friendly Delivery**	To assume ecological responsibilities and acquire new customers, businesses maintain an eco-friendly grocery delivery system with minimal carbon dioxide emissions and subsequently reduce toxic methods, ensuring a green supply chain and efficient delivery.	*Electronic fleet:* Picnic *Cargo-bikes:* Lieferzettel.com
16	Educator**	Creation and delivery of an additional service to acquire and retain new customers by offering purely online educational information centered around diet and nutrition.	myTime, Netto Online, Alles-vegetarisch, Bofrost.de, amorebio, biobiene-shop24.de
17	E-mall*	Business provider builds a digital platform for a collection of (offline) grocery retailers, enabling offline retailers to sell their goods online and customers to buy a wide range of products. The key process for the provider of the platform is the matching of needs.	Amazon Fresh, Lozuka.Siegen, Oekokiste.de
18	Experience Provider**	Creation and delivery of offline experiences such as cooking practices, recipe trials, cooking events/shows, etc., ultimately leading the customer to purchase products online offered by the business.	*Offline cooking events:* Otto Gourmet, Eismann, sir-plus
19	Expert Advice**	To acquire and retain customers as well as to differentiate themselves from competitors, businesses offer a live chat/email service with domain experts to allow for direct customer communication, messaging products, marketing, and customer service.	Otto Gourmet, getnow, Alles-vegetarisch, Lozuka.Siegen
20	Express Shopping*	Businesses seek to enhance customer experience and aid in achieving the objective of online shopping with a minimal number of steps involved and the lowest amount of time and effort.	Bringmeister
21	Extra Charges for Fresh Deliveries**	An additional sum is charged to the customer for fresh or frozen products. This type of delivery is sold as an extra service, as fresh and frozen products require special handling throughout the delivery chain.	myTime (€3-5), Supermarkt24h (€4.90-9.90), Alles-vegetarisch (€1.90)

*industry-independent generic business model patterns, **online-grocery-industry-specific versions of generic patterns, ***unique online-grocery business model patterns.

Table 33: List of Derived Online Grocery Business Model Patterns in Pre-Coronavirus Operation (Continued)

No.	*Pattern Name*	*Description*	*Exemplary Applications of the Pattern and Provider*
22	Find what you Came for**	A search engine filter functionality allows the customer to refine and clarify their product/service search results and exactly pinpoint their product/service of interest. This saves time for the customer and prevents dissatisfaction.	Amazon Fresh, Rewe Online, myTime, food.de, Alles-vegetarisch, Bringmeister
23	Flexible Scheduling***	Customers can use the option of adjustable and variable delivery time windows depending on their personal preferences. The delivery costs are calculated by the business based on peak hours, order value, length of the time window, etc.	*Selectable delivery window:* myTime, Amazon Fresh, Bringmeister, XXL-Supermarkt (but delivery takes 1-2 working days), Rewe Online, getnow, Lieferzettel.com *2-hour windows:* Rewe Online, food.de, Bringmeister, getnow (only for own delivery yervice), real, Bring24
24	Food Boxes/Only Bundled**	To increase quantities sold and allow for efficient delivery, businesses make purchasing simple by packaging related products together and provide them as a bundle.	Bauerntüte, Biokiste, Oekokiste, etepetete, sir-plus
25	Free Delivery*	To acquire a large number of customers and to increase the quantities sold, businesses charge the customer only for the delivered products and not for the associated delivery costs itself.	Picnic, Bofrost.de, XXL-Supermarkt, sir-plus (with subscription)
26	Freshness Guarantee***	To win new customers with trust concerns, businesses are giving the promise of ensuring the freshness of the products chosen for delivery. There might be an associated return/refund policy if this freshness requirement is not met.	Picnic, myTime, Bringmeister, bringmirbio, real, Kreutzers Gourmet, Lieferladen.de *Exemplary Freshness Statement:* "Our fresh products have a freshness guarantee. You will find a green symbol next to each product for which we give a freshness guarantee. The green symbol shows you exactly how long a product will remain fresh after you receive it." - Picnic
27	Hand it to the Pros**	Delivery service infrastructure is managed and supported by a third-party service provider, who is a field expert in grocery delivery.	real, Rewe Online (Liefery), Lieferzettel.com (cargo bike delivery)
28	Hybrid Access Point*	Provide the customer with the option of ordering products and services via multiple digital access points including desktop, web, and smartphone applications	Rewe Online, Amazon Fresh, myTime, real, bringmeister, Mozzaik, dm-online, Rossmann, Eismann, Bofrost.de
29	Late Night Delivery*	To acquire customers with late working hours, the business enables the delivery of products outside of the usual operating hours until late at night, usually associated with a surcharge.	Rewe Online (until 10pm), getnow (until 9pm), real (until 9pm), Bringmeister (until midnight)

*industry-independent generic business model patterns, **online-grocery-industry-specific versions of generic patterns, ***unique online-grocery business model patterns.

Table 33: List of Derived Online Grocery Business Model Patterns in Pre-Coronavirus Operation (Continued)

No.	*Pattern Name*	*Description*	*Exemplary Applications of the Pattern and Provider*
30	Leave it on the Doorstep**	To make the delivery service customer-convenient and time-efficient, businesses provide the option to the customer to choose a specific storage location for the delivered products, be it the customer's doorstep, a neighbors' home, or another location of the customer's choice.	Amazon Fresh, bringmirbio, bring24, dm-online, biokiste, Oekokiste.de
31	Mail Coach*	Delivery service infrastructure managed and supported by a renowned mailing service provider such as DHL/DPD/UPS, who is not an expert in the field of grocery delivery.	*For non-fresh foods outside the coverage of the own supply infrastructure:* Rewe Online, EDEKA24 (Bringmeister) *For all foods offered/no own delivery service:* XXL-Supermarkt, myTime, EDEKA24, Supermarkt24h, bringmirbio, getnow, Netto Online, Mozzaik, Bauerntüte, Alles-vegetarisch, dm-online, Kreutzers Gourmet, Otto Gourmet, Rossmann, Eismann, amorebio, biobiene-shop24.de, Hagen Grote, LILA-SE, sir-plus, etepetete
32	Make Sure it Works*	Customers have the option to choose a delivery time window before placing the order (not only during the checkout). Through this process, the customer can check if the desired delivery date is still available before engaging in the product selection process. With this, businesses avoid the possibility that the customer does not find a suitable time window after spending time and effort selecting products and then leaves the shop dissatisfied without purchasing.	getnow, Bringmeister, Amazon Fresh, Rewe Online
33	Membership*	Access to services and the ability to purchase products are only available for registered and authorized members. This enables the purchasing behavior to be tracked and the customer to be addressed more directly to increase sales.	Rewe Online, Mozzaik, Otto Gourmet, Oekokiste.de, amorebio, Eismann, sir-plus, Bringmeister, real
34	Milkman Model***	Businesses deliver along regular routes during fixed pre-defined time frames. This allows for predictable and cost-efficient delivery infrastructure. The customer can only receive the purchase on those pre-defined dates. Because these dates are reliable, it is possible to schedule the delivery into the day. However, flexibility is not possible.	Picnic, Amazon Fresh (but only for one region in Berlin), Biokiste, Lieferladen.de, etepetete

*industry-independent generic business model patterns, **online-grocery-industry-specific versions of generic patterns, ***unique online-grocery business model patterns.

Table 33: List of Derived Online Grocery Business Model Patterns in Pre-Coronavirus Operation (Continued)

No.	*Pattern Name*	*Description*	*Exemplary Applications of the Pattern and Provider*
35	Minimum Order Value*	For efficient and financially reasonable logistics, the business specifies a minimum value of the purchase order. To acquire the products and services of the business, the customer is obligated to place an order up until a minimum balance.	Rewe Online (€50), Picnic (€25), myTime (€30), EDEKA24 (€10), Bringmeister (€40), getnow (€30), real (€40), Bauerntüte (€25), dm-online (€25), Biokiste (€15), Lieferladen.de (€20), Eismann (€30)
36	New Customer Discounts*	To find and retain new customers, businesses provide reduced pricing, discounts, or other advantages to new customers using their services for the first time.	*Free delivery:* Rewe Online, Bringmeister (first three orders), getnow *Newsletter discount for new customers:* Hagen Grote, sir-plus, Alles-vegetarisch, Bringmeister
37	No Frills Payment*	Offer the customer one standardized payment method consistently.	Biokiste, etepetete
38	No Registration*	A customer can order products and services of a business as a guest user and provide their identification credentials each time they order. This personal information is not retained by the business for any purpose. This is seen especially by indecisive consumers as an argument for buying from this supplier.	Netto Online, EDEKA24
39	Own Delivery Service**	For quality assurance purposes, flexible deliveries for the customer, and cost savings, businesses operate an independent delivery service.	Rewe Online, Picnic, Amazon Fresh, food.de, Bringmeister, getnow (only for metopolitan areas, dhl for the rest), Bring24, XXL-Supermarkt,Mozzaik (only for certain cities), myenso, Bauerntüte (only for cologne), Biokiste, Lieferladen.de, Oekokiste.de, Eismann, Bofrost.de, amorebio (only for Baden Baden), Lozuka.Siegen
40	Parachute**	To retain customers, businesses provide a refund policy in case products do not meet the promised quality and freshness standards or expectations, or if the products are defective/not fresh.	*Return is free of charge*: Rewe Online, real, Bringmeister, Rossmann, Lozuka.Siegen *Refund in case of defect/wrong items:* Amazon Fresh, Supermarkt24h, Bringmeister *X days return policy:* Mozzaik, Alles-vegetarisch, Hagen Grote

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Table 33: List of Derived Online Grocery Business Model Patterns in Pre-Coronavirus Operation (Continued)

No.	*Pattern Name*	*Description*	*Exemplary Applications of the Pattern and Provider*
41	Parcel Tracking*	Customers can use the service to track the physical movement of a package from the time the order is placed until the actual delivery is made.	Picnic, Amazon Fresh (but only for one region in Berlin), Biokiste, Lieferladen.de, etepetete
42	Partnerships*	To expand the product range, businesses actively search for novel ways of working together with suppliers, customers, or complementors to extend their business models.	Partnerships *with wholesale traders*: getnow, Bring24, Picnic Partnerships *with farmers*: etepetete, Bauerntüte Partnerships *with regional retailers/manufacturers*: Lozuka.Siegen, Amazon Fresh Partnerships *with certain brands*: myenso
43	Pay How You Want*	Businesses offer a wide variety of payment methods and services to make checkout as easy as possible.	Supermarkt24h, Rossmann, Rewe Online, Alles-vegatarisch, LILA-SE, Bringmeister, EDEKA24, dm-online, Eismann, Bofrost.de
44	Pay per Use*	To bear the costs of the delivery infrastructure, they are partly shared with the final consumer. The customer pays each time to use the home delivery service. Each ordered delivery incurs one payment.	Rewe Online (€0-5.90), myTime (€4.99), EDEKA24 (€4.95), Supermarkt24h (€4.90-41), food.de (€5), bringmirbio (€4.38-6.95), getnow (€2.90-4.90), real (€0-7.90), Bring24 (€6.99), Netto Online (€4.95), XXL Supermarkt (€30), Mozzaik (€6.90 in Germany and €9.99 elsewhere in the EU), Lieferzettel.com (€5 plus €1 for each beverage crate), Alles-vegetarisch (€4.90 in Germany, €7.90 to the rest of the EU, €49.90 to China), Biokiste (€3.50, additional fee when drinking boxes are ordered and have to be carried), Kreutzers Gourmet (€10-22 in Germany, €15-30 worldwide), Otto Gourmet (€9.90-20.90), Lieferladen.de (€4.90-9.90)
45	Personalized Recommendations*	Businesses provide highly tailored recommendations and suggestions of relevant products and services based on customers' purchase history and search history, using algorithms / business intelligence, so that customers return and purchase a greater number of items.	Bringmeister, myenso, Amazon Fresh, Otto Gourmet
46	Planning Enthusiast***	Customers can place an order an exact, predefined number of days in advance of delivery. With this, planning customers are addressed.	Rewe Online (13 days), Bringmeister (3 weeks), getnow (4 days, only for in-house delivery service and not for DHL), real (5 days
47	Product Check at Handover***	Businesses maintain customer trust and quality standards by allowing the customer to physically examine the contents of the products at the delivery time and then accept it.	Rewe Online, Picnic, Amazon Fresh, Bringmeister

*industry-independent generic business model patterns, **online-grocery-industry-specific versions of generic patterns, ***unique online-grocery business model patterns.

Table 33: List of Derived Online Grocery Business Model Patterns in Pre-Coronavirus Operation (Continued)

No.	*Pattern Name*	*Description*	*Exemplary Applications of the Pattern and Provider*
48	Pure Player*	The business sells only online and has no bricks-and-mortar retail location.	myTime, getnow, Supermarkt24h, XXL-Supermarkt, Alles-vegetarisch, Picnic, Lieferladen.de, myenso, etepetete
49	Quality Selling*	To target customers with specific needs and attract customers with hard-to-find products, businesses provide a carefully designed environment with specialized high-quality products and premium prices.	Specialized products offered are: *Organic:* bringmirbio, Bauerntüte, Oekokiste.de, amorebio, biobiene-shop24.de *Vegan/Vegetarian:* Alles-vegetarisch, sir-plus *Meat and fish:* Kreutzers Gourmet, Otto Gourmet, myWürstchen *Deep frozen:* Eismann, Bofrost.de *Arabic:* Mozzaik
50	Same-day Delivery*	For spontaneous customers, the delivery of desired products is enabled on the same day of placing the order, sometimes for an extra fee	Rewe Online, Amazon Fresh, Bringmeister, real, Bring24, Lieferzettel.com, Lozuka.Siegen
51	Save the day*	Customers can use the option to choose an exact delivery day, usually Monday through Friday (but not a particular time that day).	Rossmann, Eismann, amorebio, biobiene-shop24.de, Hagen Grote, LILA-SE
52	Shopping Inspiration**	Inclusion of several elements to promote serendipitous discovery of new or standard products. Inspiration endeavors include, but are not limited to, a recipe database, a blog, a digital or paper-based newsletter service offered on a subscription basis, social media influences which support the sales process	*Recipe database:* myTime, food.de, Netto Online, Alles-vegetarisch, Biokiste, Kreutzers Gourmet, Otto Gourmet, Oekokiste.de, Eismann, Bofrost.de, Hagen Grote, etepetete *Blog:* food.de, myenso, Bauerntüte, Kreutzers Gourmet, Eismann, amorebio, Hagen Grote, etepetete *Newsletter:* real, Netto Online, bringmeister, Alles-vegetarisch, Otto Gourmet, Eismann, Hagen Grote, sir-plus *Printed catalogue:* Eismann, Hagen Grote
53	Solution Provider*	To facilitate the primary consumer relationship, businesses provide an exhaustive range of products, dependent on the characteristics of the delivery structure.	*Full assortment* (including fresh and frozen groceries): Rewe Online, Amazon Fresh, myTime, food.de, Bringmeister, Lozuka.de, Picnic, getnow *Full assortment but only packaged groceries:* **S**upermarkt24h, amorebio
54	Stock Up**	To increase quantities sold and allow for efficient delivery, without restrictions due to the transport of fresh groceries, businesses deliver only non-fresh foods that can be stockpiled, such as dry goods and canned foods, and communicate this fact in their marketing.	*Only non-fresh groceries:* Netto Online, real, EDEKA24, biobiene-shop24.de, LILA-SE, sir-plus, Mozzaik, Netto Online, Rossmann

*industry-independent generic business model patterns, **online-grocery-industry-specific versions of generic patterns, ***unique online-grocery business model patterns.

Table 33: List of Derived Online Grocery Business Model Patterns in Pre-Coronavirus Operation (Continued)

No.	*Pattern Name*	*Description*	*Exemplary Applications of the Pattern and Provider*
55	Subscription*	To ensure basic operation regardless of the quantity of products sold, businesses provide a subscription service to prospective customers so that only subscribed customers can purchase their products and services. This subscription usually entails a periodic payment.	Amazon Fresh (only available for prime or fresh members), Biokiste, Lieferladen.de, etepetete *As optional:* sir-plus, bringmirbio
56	The 2 Rs*	Used packaging materials flow back to the business and are then reused (after necessary transformations) or recycled in such a way that their base materials are recovered and most of their embodied value (energy, labor, capital) is retained.	Picnic, food.de, Bringmeister, Amazon Fresh, getnow, real, Lieferladen.de, etepetete, sir-plus
57	Time saver**	Shopping list functionality allows the customer to comprehensively list down all possible needs and desires, along with the user-friendly option to save the list for further purchases or re-buy the shopping cart that they purchased at an earlier point in time, enabling time savings for the customer in the shopping process.	Amazon Fresh, food.de, Bringmeister
58	Trash to Cash*	To conserve resources and address a special kind of clientele, businesses provide nearly expired foods or visually unappealing products.	*Visually unappealing* fruits and veggies: etepetete *Surplus groceries* that would normally be disposed of: sir-plus
59	Tryouts**	To acquire new and retain customers. Businesses offer basic trial and testing packages for free or at a reduced price. These packages may contain newly introduced products. Customers are stimulated to try out new products that they might not try out without a discount. In the long term, this can increase sales and enable cross-selling and up-selling.	(One-time) Welcome/*Tryout Box* without extra fees: Biokiste, myenso, Otto Gourmet, bringmirbio
60	Word of Mouth Benefits*	To acquire new and retain customers, businesses provide reduced pricing, discounts or other advantages to new and existing customers on the condition that the customers positively recommend and broadcast the businesses' products and services in their social circles favorably via social media.	*Free delivery for every successful recommendation:* food.de, Alles-vegetarisch *Bonus for every recommendation:* Rewe Online, Bofrost.de (only paid when acquired customer places the first purchase above 40€), Eismann

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Table 34: List of Derived Coronacrisis-Driven Online Grocery Business Model Patterns

No.	*Pattern Name*	*Description*	*Exemplary Applications of the Pattern and Provider*
1	Additional Delivery Slots***	To facilitate the increased influx of customers, businesses provide supplementary delivery slots in addition to the existing ones.	Picnic, Amazon Fresh, Lozuka Siegen
2	Alternative Products**	To retain customer loyalty, if products are not available, businesses offer an alternative to the actual product that was chosen by the customer. The alternative has features that coincide closely with the chosen product.	Bringmeister, Supermarkt24h
3	Contactless Delivery**	Businesses enable customized delivery mechanisms that negate the possibility of physical interaction between the business and the customer.	Picnic, Amazon Fresh, Bringmeister, getnow, real, Biokiste, Lieferladen.de, Eismann, Bofrost.de, Lozuka.Siegen
4	COVID-19 Educator**	Create and deliver online educational offerings centered around COVID-19 to reduce the spreading of the virus.	*Corona-website:* Amazon Fresh, Supermarkt24h, myenso, Bauerntüte, dm-online, Oekokiste.de, Rossmann, Eismann, Bofrost.de, Lozuka.Siegen *Live Corona updates:* getnow, Bofrost.de
5	Donations*	Businesses make monetary contributions to good causes in crisis-driven situations (possibly for marketing purposes).	Eismann (hospitals), Rossmann (culture)
6	Express Click-and-Collect**	Accelerated version of a Click-and-Collect model in which a quick offline collection of the product is made possible. The Click-and-Collect option is intended to help relieve overloaded delivery structures while maintaining the opportunity to sell the products in high quantity to a high number of customers.	dm-online

*industry-independent generic business model patterns, **online-grocery-industry-specific versions of generic patterns, ***unique online-grocery business model patterns.

Table 34: List of Derived Coronacrisis-Driven Online Grocery Business Model Patterns (Continued)

No.	*Pattern Name*	*Description*	*Exemplary Applications of the Pattern and Provider*
7	First Come First Serve**	The existing infrastructure cannot adequately serve the growing demand. Therefore, a fixed number of delivery time slots per day is specified, which can no longer be accessed once all of them are booked. The distribution of the slots is first come, first served.	Picnic, Amazon Fresh (96 hours in advance), getnow
8	Forced Scarcity**	To ensure product availability and satisfaction for all customers, and therefore retain customers, the purchasing-quantity per customer of certain products is limited so that more customers can profit from it, assuming high demand.	Rewe Online, Picnic, Amazon Fresh, bringmirbio, getnow, myenso, Rossmann, Bofrost.de
9	Highly Frequent Products Removed from Assortment***	To maintain operability and avoid customer dissatisfaction, products that the business frequently ran out of were removed from the delivery portfolio.	getnow, Biokiste, Rewe Online, Picnic, Amazon Fresh, myTime, EDEKA24
10	Introducing a Delivery Service**	Due to crisis-driven rising demands, businesses create an in-house delivery service while simultaneously using a third-party service provider to handle increased customer quantities and numbers of orders.	Bauerntüte
11	Modified Minimum Order Value*	Customer is obligated to place an order up to a higher-than-usual or lower-than-usual minimum balance in order to purchase products and services. The raised minimum order value is targeted to ensure a systematic regulation of the business's revenues and a stable delivery infrastructure. The reduced minimum order value is targeted to acquire new online customers who cannot leave the house due to COVID-19 restrictions.	*Raised minimum order value:* myenso *Reduced minimum order value:* dm-online
12	No Bottle Deposit Take Back**	To avoid the spread of coronavirus, customers are not eligible for returns on the deposit on bottles in any form.	Picnic, Amazon Fresh, Bringmeister, getnow
13	No Deals**	Absence of specific and targeted offerings altogether to keep the delivery infrastructure stable and to avoid unnecessary stockpiling.	Rosmann, dm-online

*industry-independent generic business model patterns, **online-grocery-industry-specific versions of generic patterns, ***unique online-grocery business model patterns.

Table 34: List of Derived Coronacrisis-Driven Online Grocery Business Model Patterns (Continued)

No.	*Pattern Name*	*Description*	*Exemplary Applications of the Pattern and Provider*
14	No new customers**	Businesses prioritize serving existing customers and turn away new customers in order to manage their operations and workload accordingly.	bringmirbio, Biokiste.de, Oekokiste.de
15	No Reuse**	No acceptance of reusable or recyclable packaging materials that are normally taken back, in order to reduce the person-to-person contacts.	Amazon Fresh, Bringmeister, Rewe Online
16	Online Experience Provider**	Creation and delivery of online experiences that are in line with SARS-CoV-2 contact restrictions and can be translated from offline into online experiences such as live cooking events/shows, kids' cooking clubs, etc. to provide additional value to the customer and maintain their loyalty.	*Live cooking events online:* Bofrost.de *Online cooking club for kids:* Eismann
17	Support Essential Workers**	Provision of extra delivery spots and exemption from delivery costs for essential workers in crisis-driven situations, to acquire new customers and retain them after the crisis.	*Extra delivery spots:* Picnic, getnow *Free delivery:* getnow
18	Survival Packages***	To enlarge product assortment and acquire new customers, a highly tailored and targeted assortment of products is bundled together as a single entity to cater to the crisis-driven demands.	Netto Online, Otto Gourmet, Rossmann, Eismann
19	Waiting List***	Creation of a waiting list to control the flow of reduced supply and increased consumer demand in the crisis, while satisfying customer needs.	Picnic, Biokiste, Oekokiste.de

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8.4.2 Structuring Online Grocery Business Model Patterns

To structure the 79 extracted online grocery BMPs and illustrations, I thematically grouped them by using a taxonomy development approach (see Step 5 in Section 8.3). The taxonomy scheme (see Appendix C) comprises twelve dimensions that thematically represent the respective influences on the superordinate BM elements. The dimensions are further described by their 42 contextual characteristics to which I assigned the 79 extracted online grocery BMPs. Each pattern is allocated to a single characteristic in each dimension. In their origin, the developed dimensions can be traced back to the four BM elements defined by Gassmann et al. (2013), which I used as the basis for the empirical BM research in Step 2 (see Section 8.2 and Section 8.3).

My taxonomy allows a clear thematic structuring of the extracted patterns, yet its complexity makes it difficult to immediately identify and understand the connection between the thematically grouped patterns and the structure of the BM. For a better overview of German online grocery BM and to help practitioners identify relevant BM design opportunities, I generated a multidimensional matrix that matches the different online grocery BM dimensions with their thematic characteristics/topics. It also reveals the number of patterns assigned to each characteristic. This type of matrix can be referred to as a morphological box (Lüdeke-Freund et al., 2019b; Remane et al., 2017; Zwicky, 1967) and is shown in Figure 22. Its structure is explained in more detail below.

The first dimension, hierarchical impact, differentiates between prototypical patterns (e.g. *e-mall*) and solution patterns (e.g. *food boxes*) (D1). Prototypical patterns affect the holistic BM and describe the general configuration, while solution patterns influence specific business building blocks, or even single elements of a BM (Amshoff et al., 2015; Remane et al., 2017). In German online grocery businesses, the types of target customers (D2) can be differentiated by selling to other companies (e.g. *benefitting B2B*), reaching specific new customer segments (e.g. *stock-up*), and customer participation (e.g. *co-creation*).

The value proposition of online grocery BM is affected by products (D3), post-purchase services (D4), delivery services (D5), differentiation strategies (D6), and COVID-19 prevention approaches (D7). For the products dimension, the taxonomy differentiates between quality (e.g. *expert advice*), assortment (e.g. c*lick- and-collect*), and cooperation with other businesses (e.g. *partnerships*). The post-purchase services are broken down into customer bonuses (e.g. *new customer discounts*), product return policy (e.g. *freshness guarantee*), and locking in existing customers (e.g. *connection to home automation*). Delivery services are broken down into flexibility and plannability (e.g. *late-night delivery*) as well as the door service and its reliability

(e.g. *leave it on the doorstep*). Differentiation among the online grocery BMs is possible by product prices (e.g. *deal of the day*), access to the online shop (e.g. *no registration*), the provided shopping experience (e.g. *experience provider*), sustainable services (e.g. *the 2 Rs*), and the delivery service coverage (e.g. *delimited coverage*). The seventh dimension, prevention, is engaged with additional prevention strategies that have been developed by online grocery BM during the COVID-19 crisis and aims at service offerings that slow the spread of the virus (e.g. *COVID-19 educator*).

Business Model Elements	Dimension (D)	Characteristics per dimension & number of patterns influencing this characteristic					
Hierar-chical Impact	D1: Hierarchical Impact	Prototypical Pattern (13)			Solution Pattern (66)		
Target Customer Segments	D2: Target Customers	Other Companies (1)	Specific New Customer Segments (54)		Participation (5)	No Impact on Target Customer (19)	
Value Proposition	D3: Products	Quality (11)	Assortment (22)		Cooperation (2)	No Impact on Products (44)	
	D4: Post Purchase Service	Bonus (10)	Return Policy (10)		Lock-in (20)	No Impact on Post-Purchase Service (39)	
	D5: Delivery Services	Flexibility & Plannability (20)		At the Door Service & Reliability (10)		No Impact on Delivery Services (49)	
	D6: Differentiation Strategy	Price (18)	Access (6)	Experience (32)	Sustainability (6)	Service Coverage (10)	No Impact on Differentiation Strategy (7)
	D7: Prevention	Covid-19 Prevention (19)			No Impact on Covid-19 Prevention (60)		
Value Chain	D8: Customer Acquisition	Discounts (13)	(In)Convenient Services (39)		Customization (7)	No Impact on Customer Acquisition (20)	
	D9: Sales Channels	Digital (6)		Hybrid (14)		No Impact on Sales Channels (59)	
	D10: Technical Functionalities	Payment (3)	Customer Time Efficiency (18)		Customer Relationship (14)	Technical Functionality not Specified (44)	
	D11: Delivery Infrastructure	Make (14)		Buy (3)		Delivery Infrastructure not Specified (62)	
Revenue Model	D12: Revenue Model	Product Sales (20)		Delivery Costs (27)		Revenue Model not Specified (32)	

Figure 22: Morphological Box of Online Grocery Business Model Patterns

The value chain of online grocery BMs is affected by patterns including customer acquisition (D8), sales channels (D9), technical functionalities (D10), and the delivery infrastructure (D11). The customer acquisition strategies include discounts (e.g. *word of mouth benefits*),

(in)convenient services[16] (e.g. *bottle deposit returns*), and customization services (e.g. *offering of alternative products*). Online grocery BM specific sales channels include digital channels (e.g. *pure player*) and hybrid channels (e.g. *bricks-and-clicks*). The value chain of online grocery BMs includes their technical functionalities, a category that includes payment services (e.g. *no-frills payment*), time efficacy for the customer (e.g. *planning enthusiast*), as well as how customer relationships are established (e.g. *personalized recommendations*). Patterns affecting the deployed delivery infrastructure include make (e.g. *own delivery service*) and buy (e.g. *hand it to the pros*). The final dimension, revenue model (D12), classifies the revenue infrastructure between product sales (e.g. *solution provider*) and delivery costs (e.g. *delivery flat-rate*). All patterns assigned to the respective dimensions and characteristics are shown in Appendix C.

8.4.3 Practical Application of the Extracted Business Model Patterns

Due to their complexity, it would be impractical and overwhelming to try to understand all 79 patterns at once. The taxonomy scheme and the corresponding morphological box scheme help to reduce this complexity. Based on their BM elements, as well as their structural and functional features, the morphological box scheme illustrates how current online grocery providers' BMs are organized in general. Furthermore, the morphological box scheme helps BMI practitioners to target the correct set of BMPs for their purpose.

The practical application of proposed instruments require the combined utilization of the pattern descriptions (see Table 33 and Table 34), the morphological box scheme (see Figure 22), and the taxonomy scheme (see Appendix C). To make these three instruments accessible to practitioners, I developed an application procedure, which is illustrated in Figure 23.

I propose two procedures or mechanisms that can be employed to put into practice the proposed instruments. Those procedures are initiated by two different initial questions. The person who applies the instruments chooses the initial question that needs to be answered. He or she then follows the proceeding that is suggested for this initial question, whether it is A or B. Question A is, *Are you looking for a new BMP for your BM?* Question B is, *Do you want to know about the impact of a BMP on an element of your BM??*

The procedure can be repeated arbitrarily until a suitable answer to the chosen initial question is found. Once the process in proceeding A has been completed, the user can re-enter the process at any point (any point from Steps 2 to 4 is recommended) and continue the process until one or several BMPs are identified. While proceeding A serves as an inspiration process to find proposals

[16] The ambiguity of the characteristic "(in)convenience" is deliberate because some services can have a negative influence on the acquisition of new customers.

for change through patterns or industry-specific illustrations, proceeding B supports the strategic understanding of the influences on the different elements of the BM. Unlike proceeding A, the process of proceeding B must be completed holistically, as an inter-stage entry does not yield meaningful information.

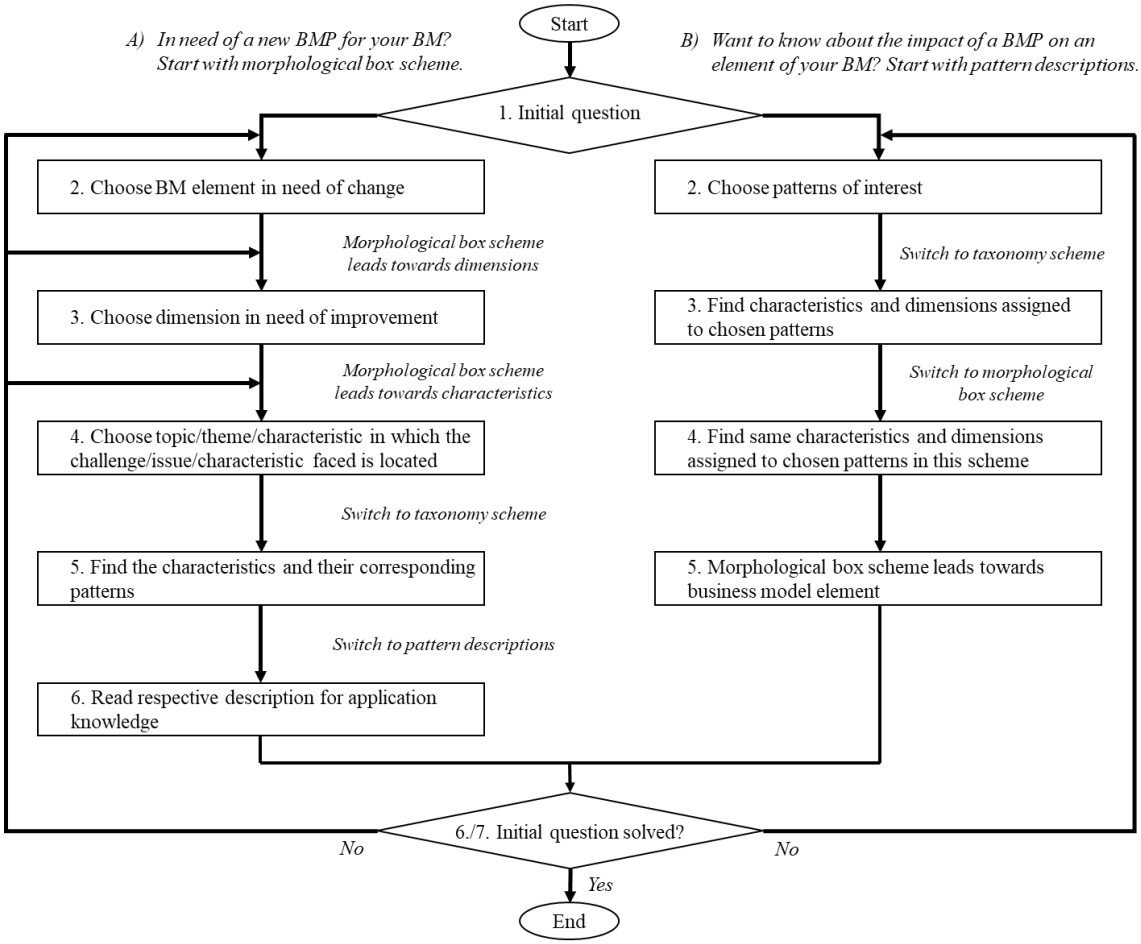

Figure 23: Proposed Usage Procedures for the Practical Combined Application of the Taxonomy, Morphological Box, and Online Grocery Patterns

8.5 Discussion

8.5.1 Implications for Practice

This research began with the premise that current German online grocery business models are not able to successfully deliver value to the market and customers, resulting in unfulfilled customer needs and a lack of economic success. With this, I derived the necessity to refine and innovate existing BMs. The first step to understand the weaknesses and the potential for innovation of online grocery BMs is to analyze and describe them. One efficient approach for the structural analysis of BMI potential is the concept of BMPs. I found that for the online grocery industry, neither a specific BM analysis nor a special description of patterns has been scientifically devised

in prior research. To understand current structures of online grocery BM and make existing BMP more accessible for scholars and practitioners, I analyzed the structure of 40 online grocery businesses in Germany and extracted 79 patterns they were applying. 39 of them are generic and can be found in other industries. 30 are specific online grocery permutations of generic patterns. And 10 of the extracted patterns are specific to online grocery, such as the *Milkman Model* and the *Product Check at the Handover*. I described each of the extracted patterns clearly and developed a structural overview or taxonomy. This taxonomy supports the identification of the relevant set of patterns for a targeted effect on the business model elements.

To make a valuable contribution to online grocery practitioners and to overcome the currently unsuccessful value delivery of online grocery BMs, I discuss reasons for the lack of online grocery success in Germany and link the examined BMPs with some of the results of the second paper in the following. I outline the current challenges that I identified through the comparison of current online grocery BMPs with the derived consumer needs. I discuss the need for change and possible directions for future BMP developments by referring to online grocery trends in other countries. By referencing the diversity of the derived patterns, I point out unexploited potentials for innovation. Subsequently, I provide recommendations for online grocery BM practitioners.

The most successful businesses in terms of popularity (Krajewski, 2020; Stiftung Warentest, 2018) are those limiting their coverage to certain areas and simultaneously deploying their own infrastructure.[17] The downside of this strategy is the exclusion of rural and suburban areas, which, as I showed in Paper 2, causes great dissatisfaction among potential customers. Businesses that offer overall coverage in most cases outsource this service to traditional mail coaches like the DHL or DPD. From a consumer perspective, this has at least two disadvantages. First, the delivery costs are high, and second, in most cases, the customer has no option to choose the delivery time. Some businesses use a hybrid delivery approach: they deliver fresh foods in metropolitan areas using their own infrastructure and ship non-fresh and stock foods Germany-wide with traditional postal services. This hybrid model leaves room for improvement to fully satisfy the customers in at least two ways: (1) customers want a full product assortment including fresh groceries and (2) customers want to integrate the deliveries into their daily life, meaning that they want to select the delivery date and time instead of having them imposed by the system.

[17] For this assessment, I linked the structures of the 39 analyzed business models with the evaluations of their popularity. The popularity evaluation is based on the findings of my second paper, such as which business models have been used most frequently, as well as on recent tests and evaluations published online in German product and business model testing institutions.

Furthermore, more thought must be given to new ways of online shopping. In Paper 2, I find that the needs to be fulfilled when shopping for groceries online are different from those that need to be fulfilled when shopping for clothing or technical equipment. The greatest challenges in this regard are (1) to overcome the need for physical evaluation, (2) to enable inspirational and spontaneous shopping, and (3) to change the deeply-rooted behavior of traditional grocery shopping into digital or hybrid habits. These challenges require online grocery businesses to provide an inspirational shopping environment that transcends the desire for haptic assessment. One option to overcome this challenge might lie in the application of modern technologies, like 360-degree digital tours through the supermarket, combined with augmented or virtual reality features. Another opportunity lies in building a larger network for Click-and-Collect services, maybe even in cooperation with other retailers.

In other countries, online grocery shopping is a success when it does not simply translate offline services into online ones. In France, the grocery drive-through approach has been hugely popular (Wells, 2017). In the USA, the introduction of an application integrated into Facebook messenger has increased online grocery shopping success (Brandon, 2016). The application takes the order and provides the customers with an artificial-intelligence-based chatbot helping them with quality and ingredient questions as well as potential recipes. A third example of a successful (if unusual) online grocery shopping concept is that of Carrefour Brazil, which partnered up with the delivery app Rappi. In cooperation, they not only introduced express delivery within 35 minutes, but also real-time communication between the customer and a personal shopper, allowing for picture exchange and customized wishes (Carrefour, 2020; Dumont, 2019).

By contrast, in Germany, only a handful of the 40 examined online grocery businesses vary substantially (e.g. etepetete or myEnzo) from the classical online grocery BM that more or less copies other forms of online retail (e.g. AmazonFresh and Rewe Online). This indicates that there is untapped innovation potential in online grocery BM structures. Identifying the characteristics and dimensions that are undiversified may serve as a starting point for the identification, design, and implementation of new BMPs.

To further support online grocery BM practitioners in finding a starting point for the BM re-design, I provide a list of online grocery BMPs that fail to sufficiently meet the customer needs (see Table 35). For this, I compared the extracted online grocery BMPs and their various specifications to the extracted customer experiences from Paper 2. Even though the outlined BMPs are developed for fulfilling customer requirements, I find that at least ten of the patterns are insufficiently well designed and therefore fail to satisfy the consumer needs. Some of the patterns even hinder the adoption of online grocery shopping.

Table 35: Insufficiently Fulfilled Consumer Needs Regarding Derived Patterns

Derived Patterns	*Consumer Needs*	*Degree of Fulfillment (assessed by analyzing experiences of study participants)*	*Comment*
Delimited Coverage	Sufficient delivery coverage in rural areas	unfulfilled	Rural areas are currently supplied only very sporadically, leading to high customer dissatisfaction. Target customer segment can be extended by considering these groups.
	Sufficient delivery coverage in urban suburbs	partially fulfilled	Suburban areas are not supplied in many parts of Germany.
Customization	Choice of individual quantities	unfulfilled	Only one examined business model allows for the selection of customized quantities.
Shopping inspiration	Inspirational Shopping Environment	partially fulfilled	Shopping inspiration during the shopping process is currently delivered via blogs, recipes and cooking-events, remaining insufficient to attract the spontaneous shopper.
Minimum Order Value	Reasonable minimum order value	partially fulfilled	The most popular online grocery businesses only offer their services when a certain minimum order value is reached. In my studies, I found that €40 is the highest minimum order value that a single person is willing to accept.
Flexible Scheduling/ Late Night Delivery/ Same Day Delivery	Flexibility of Delivery and Opportunity to Book a Time Frame	partially fulfilled	The delivery flexibility is only present in urban/metropolitan areas. In suburban and rural areas, less or no flexibility is provided, resulting in reduced behavioral intention.
The 2 Rs	Environmentally friendly packaging	partially fulfilled	Only six patterns are engaged with sustainability strategies (Electro Delivery and Re-use/Re-cycling). Including sustainability patterns not only helps acquire new customer groups but also satisfies existing ones.
Electro Delivery	Ecological friendly delivery	partially fulfilled	
Time saver	Possibility to build standard shopping carts	partially fulfilled	Creating a wish list or save a shopping list promotes the behavioral intention of future usage of planning-type shoppers. Only a few businesses currently incorporate this pattern.
Quality Selling	Wide product assortment	partially fulfilled	Customers still find that the product assortment is not sufficient to use online grocery shopping as the only shopping option.
Click-and-Collect	Self-pickup service (Click- and-Collect) available	partially fulfilled	The Click-and-Collect pattern enables the inclusion of a broader range of customers, especially those outside the delimited coverage in suburban and rural areas. This pattern is only very rarely used in these areas.

Through the comparison of the needs from Paper 2 with the BMPs in this paper, I additionally provide an overview of customer needs which are not (yet) reflected in the derived online grocery BMPs:

- Getting inspired by products
- Options to self-select the products
- Friendly customer service at product handover
- Transparency of the data handling/data security
- Transparency of delivery costs
- Undamaged delivery
- Acceptable delivery fees targeted to the individual customer

These results indicate which aspects of online grocery BMs require modification to achieve greater acceptance and purchasing intention of potential customers. They therefore serve as a basis for future BMI.

Finally, the morphological box (Section 8.4.3) is an easy-to-use heuristic tool to handle the variety of online grocery BMPs. It serves as a starting point for the re-design of BMs in the online grocery industry e.g. in the following way: the practitioner chooses the BM element that is in need of change, the morphological box scheme subsequently leads the user towards the dimensions and characteristics linked to it. The taxonomy then reveals the set of business model patterns that are linked to the characteristics and elements of interest. The provided patterns finally provide a helpful inspiration for online grocery experts to rethink BMs beyond the classic online grocery BM.

8.5.2 Implications for Theory

The main goal of this work is to contribute to the understanding of how successful business models that satisfy open customer needs can be designed. To address this objective in an initial approximation, I analyzed 40 online grocery BMs in Germany and derived an online grocery BMP collection consisting of 79 patterns.

Through the investigation of BMPs in a more nuanced and industry-focused way than in previous literature, I complement prior research and point out online grocery industry-specific illustrations of generic business model patterns. With this, I provide new insights into BMI theory. In particular, I complement the research on BMI by contributing to a better understanding of the design of BMs through providing BMPs for online grocery businesses and describing potential solutions to repetitive difficulties.

With the development of the taxonomy, I provide a consolidating structure of the collected knowledge regarding online grocery BMs. I unfold the advantages of BMPs and simultaneously help other researchers and practitioners in overcoming the challenges of designing successful online grocery BMs. By making the process of the taxonomy development as transparent and comprehensible as possible, I contribute to the understanding of the relationships between different online grocery concepts on a theoretical level and facilitate hypothesizing about their relations to each other (Beynon-Davies, 2018; Lüdeke-Freund et al., 2019b; Remane et al., 2017). The extracted patterns and illustrations enable researchers to identify and compare different online grocery BM designs and help in the understanding of current value creation rationales of online grocery businesses.

By listing partially fulfilled and unfulfilled customer needs, I outline possible directions for further research on BMI. As with any new emerging research stream, research in the field of online groceries is currently fragmented and non-structural (Martín et al., 2019). The transparent research approach of this work counteracts the lack of theoretical underpinning and systematically addresses fundamental questions. The findings regarding the general applicability of existing BMP taxonomies deliver insights related to the ongoing debate on the validity and necessity of BMP classifications. I confirm the general validity of the taxonomy developed by Remane et al. (2017). By extending and modifying their taxonomy to an industry-specific context, I show that their taxonomy can be used in different contexts and industries. However, I also argue that their taxonomy cannot be applied without changes and pattern reassignments in an industry-specific context.

Finally, the findings regarding the derived COVID-19-driven BMPs deliver insights into the crisis-driven changing processes of BMs. Through the COVID-19-specific patterns and illustrations, I show that situational factors – of which the pandemic is one – strongly influence the organization of the business. The coronavirus pandemic caused a sharp increase in customer numbers for online grocery businesses, while product availability and delivery mechanisms became challenging. Following the contingency theory of organizations, the effectiveness of an organization "results from fitting characteristics […] to contingencies that reflect the situation" (Donaldson, 2001, p. 1). Therefore, online grocery businesses had to react quickly to the SARS-CoV-2 induced contingencies and adjust their processes.

Observing numerous adjustments regarding product and service offerings, delivery infrastructure, and mechanisms, I contribute to confirming the validity of the contingency theory (Donaldson, 2001; Kieser and Kubicek, 1977), underscoring the fact that crisis-driven contingencies affect the value creation process of an organization. Additionally, I contribute to the understanding of the

COVID-19-driven transition paths. In recent crisis-related literature it has been an open question how business will develop and transition during and after the COVID-19 pandemic (Ritter and Pedersen, 2020; Seetharaman, 2020). With this work, I outline short-term and crisis-driven BMP amendments as well as the increasing success in terms of customer growth in the online grocery industry.

8.5.3 Limitations and Further Research

Despite various contributions to practice and research, this research is not free from limitations. In the following, I outline avenues for further research, particularly concerning the overall research question.

This research is a first step towards the understanding of how online grocery business models can be built successfully while fulfilling open customer needs. It outlines the structure of business models currently operating in the German market and allows first insights into the strengths and weaknesses of current German online grocery BMs. Through the comparison with open customer needs that have been explored in the second paper, this research shows how BMs have to change (see Section 8.5.1). However, the next step towards answering the overall research question is to identify the factors of success and failure of online grocery business models and align them with open consumer needs. A good way to start is by comparing the BM structures of thriving and failing companies. Additionally, this research proposes that the variety in BMs in other countries highlights the lack of BM variety in Germany and consequently indicates hidden innovation potential. For a more comprehensive understanding of the innovation potential of BMs, the research should be extended to markets outside Germany.

Second, even though the market analysis of online grocery retailers was performed by two researchers, it is impossible to ensure that this analysis is complete and without omissions. I tried to identify as many online grocery retailers as possible, but there is a chance that I did not find them all during the intensive online research I conducted. If there is a German online grocery retailer that I missed in my research, it is questionable whether this business is really reliable or usable: if it operates online, it should be findable online. Furthermore, I did not include every single local online grocery shopping service for two main reasons: either I did not find an online presence or their BM patterns were already represented by other local retailers included in the research.

Third, the mapping of the patterns to the dimensions of the taxonomy might be subjectively biased. To avoid possible biases, the derived dimensions as well as the assignment of patterns to it were discussed between two researchers. Additionally, I conducted multiple cross- and spot

checks to verify that there was no overlap among the characteristics of each dimension and their assigned patterns.

Fourth, this research outlines crisis-driven online grocery BMPs. These patterns have been initiated so that business can continue to operate and avoid losing money. The questions of whether these patterns prove to be effective and how the damaged BMs can return to a stable post-COVID-19 state are not part of this work. Evaluations of how the patterns provide support during the challenging situation and how online BMs are coping with the crisis will be useful for further research, especially as a preparation for further crises. What I am currently observing, however, is that online grocery BMs have stabilized to the extent that delivery slots are available again and the product range is no longer restricted. Whether the positive attitude towards the intention to use online grocery shopping will continue to exist and whether the coronavirus crisis, as a situational factor, has brought long-term success to online grocery BMs can only be answered with further research.

Finally, the applicability of the combination of the online grocery BMP taxonomy, the morphological box, and the BMP descriptions has not been verified. A study involving industry experts should be fruitful to gain a better practicability. I did not create the taxonomy for the purpose of delivering an automatic tool for systematic online grocery shopping BM decisions, but rather as a heuristic basis for practitioners to strategically (re)design their BMs. The process of translating this strategic process into concrete activities is not part of this research. In the future, the taxonomy I developed may be of use for further exploration of the translation process from concept to practice in this industry.

Appendix

APPENDIX A – PREDEFINED MULTIDIMENSIONAL MATRIX BUSINESS MODEL ANALYSIS

Parameter	Features/Characteristics						
	[Name of the Online Grocery Retailer]						
Who? - Who ist your target customer (segment)? Every business model serves a certain customer group (Chesbrough and Rosenbloom 2002; Hamel2000). Thus, it should answer the question Who is the customer? (Magretta2002). Drawing on the argument from Morris et al. (2005, p. 730) that the failure to adequately de fine the market is a key factor associated with venture fail-ure , we identify the definition of the target custom-er as one central dimension in designing a new business model.							
What? - What is offered to the customer? (Value Proposition) The second dimension describes what is offered to the target customer, or, put differently, what the customer values. This notion is commonly referred to as the customer value proposition (John-sonet al. 2008), or, more simply, the value proposi-tion (Teece 2010). It can be defined as a holistic view of a company's bundle of products and ser-vices that are of value to the customer (Osterwalder 2004)							
How? - How is the value proposition created? (Value Chain) To build and distribute the value proposi-tion, a firm has to master several processes and activities. These processes and activities, along with the involved resources (Hedman and Kalling 2003) and capabilities (Morris et al. 2005), plus their orchestration in the focal firm's internal value chain form the third dimension within the design of a new business model							
Value - How is revenue created? (Revenue Model) The fourth dimension explains why the business model is financially viable, thus it relates to the revenue model. In essence, it unifies aspects such as, for example, the cost structure and the applied revenue mechanisms, and points to the elementary question of any firm, namely how to make money in the business							

APPENDIX B – REPETITIVE BUSINESS MODEL PATTERNS ALREADY PUBLISHED

Generic Business Model Patterns and Online Grocery Specific Illustrations***	*Sources*
Alternative Products** (as online grocery specific illustration of pattern “Guaranteed availability”)	Gassmann et. al. (2013)
Benefitting B2B*	Gassmann et al. (2013)
Bottle Deposit Return** (as online grocery specific illustration of the pattern "Add-on")	Gassmann et al. (2013)
Bricks-and-Clicks*	Gassmann et al. (2013); Johnson (2009); Rappa (2001)
Cash on Delivery** (as online grocery specific illustration of the pattern "Add-on")	Gassmann et al. (2013)
Click-and-Collect*	Gassmann et. al. (2013); Johnson (2009); Rappa (2001)
Co-Creation*/Open Business Model*	Gassmann et al. (2013)
Connection to Home Automation** (as online grocery specific illustration of the pattern "Experience Selling")	Gassmann et al. (2013)
Contactless Delivery** (as online grocery specific illustration of the pattern "Self-service")	Gassmann et al. (2013)
COVID-19 Educator** (as online grocery specific illustration of the pattern "Educator")	Remane et al. (2017)
Cross-Selling*	Gassmann et al. (2013)
Customer Loyalty*	Gassmann et al. (2013); Rappa (2001)
Customization*	Gassmann et al. (2013); Linder and Cantrell (2000); Strauss and Frost (2014)
Deal of the day* (as online grocery specific illustration of the pattern "Target the Poor")	Gassmann et al. (2013)
Delivery Flat-rate* (as online grocery specific illustration of the pattern "Flat-rate")	Gassmann et al. (2013)
Direct Selling*	Gassmann et al. (2013), Rappa (2001); Strauss and Frost (2014); Weill and Vitale (2001)
Donations* (as online grocery specific illustration of the pattern "One-Sided Social Mission")	Lüdeke-Freund (2018); Dohrmann (2015)
Eco-friendly Delivery** (as online grocery specific illustration of the pattern "Micro Distribution and Retail")	Lüdeke-Freund et al. (2018); Baptista et al., (2011)
Educator**	Remane et al. (2017)

Generic Business Model Patterns and Online Grocery Specific Illustrations***	*Sources*
E-mall*	Gasmann et al. (2013); Rappa (2001)
Experience Provider**	Clemons (2009)
Expert Advice** (as online grocery specific illustration of the pattern "Layer Player")	Gassmann et al. (2013)
Express Click-and-Collect ** (as online grocery specific illustration of the pattern "Experience Selling"	Gassmann et. al. (2013), Johnson (2009), Rappa (2001)
Express Shopping*	Gassmann et al. (2013)
Extra Charges for Fresh Deliveries** (as online grocery specific illustration of the pattern "Add-on")	Gasmann et al. (2013)
Find what you came for** (as online grocery specific illustration of the pattern "Experience Selling")	Gassmann et al. (2013)
First come first serve** (as online grocery specific illustration of the patten "Auction")	Gassmann et al. (2013)
Food Boxes/Only Bundled**	Hanson (2000); Johnson and Lafley, (2010); Tuff and Wunker (2010)
Forced Scarcity**	Remane et al. (2017)
Free Delivery* (as online grocery specific illustration of the pattern "Freemium")	Gassmann et al. (2013)
Hand it to the Pros** (as online grocery specific illustration of the pattern "Brand Building")	Linder and Cantrell (2000)
Hybrid Access Point*	Gassmann et al. (2013)
Introducing a new own delivery service** (as online grocery specific illustration of the pattern "Do more to address the job")	Johnson and Lafley (2010)
Late Night Delivery* (as online grocery specific illustration of the pattern "Experience Selling" or as illustration of the pattern "One-stop convenient shopping" or as illustration of the pattern "Add-On")	Gassmann et al. (2013); Linder and Cantrell (2000)
Leave it on the Doorstep** (as online grocery specific illustration of the pattern "Micro Distribution and Retail")	Lüdeke-Freund et al. (2018); Baptista et al. (2011)
Mail Coach* (as online grocery specific illustration of the pattern "Orchestrator")	Gassmann et al. (2013)
Make sure it works* (as online grocery specific illustration of the pattern "Experience Selling")	Gassmann et al. (2013)

Generic Business Model Patterns and Online Grocery Specific Illustrations***	*Sources*
Membership*	Remane et al. (2017)
Minimum Order Value*/Risk Sharing	Tuff and Wunker (2010)
Modified Minimum Order Value*/Risk Sharing*	Tuff and Wunker (2010)
New Customer Discounts* (as online grocery specific illustration of the pattern "Customer Loyalty")	Gassmann et al. (2013)
No Bottle Deposit Take Back** (reersal of the online grocery specific illustration of the pattern "Add-on")	Gasmann et al. (2013)
No Deals** (as online grocery specific illustration of the pattern "Customer Loyalty")	Gassmann et al. (2013)
No Frills Payment* (as online grocery specific illustration of the pattern "No Frills")	Gassmann et al. (2013)
No new customers** (as online grocery specific illustration of the pattern "Customer Loyalty")	Gassmann et al. (2013)
No Registration*/Freemium*	Gassmann et al. (2013)
No Reuse** (as online grocery specificillustration of the pattern the reuse)	Planing, (2015); Kiørboe et al., (2015)
Online Experience Provider** (as online grocery specific illustration of the pattern "Experience Provider")	Clemons, (2009)
Own Delivery Service** (as online grocery specific illustration of the pattern "Do more to address the job")	Johnson and Lafley (2010)
Parachute**	Lüdeke-Freund et al. (2018); Bisgaard, (1995)
Parcel Tracking* (as online grocery specific illustration of the pattern "Experience Selling" or as the illustration of the pattern "Add-On")	Gassmann et al. (2013)
Partnerships*	Gassmann et al. (2013)
Pay how you want* (as online grocery specific illustration of the pattern "Experience Selling" or as illustration of the pattern "Add-On")	Gassmann et al. (2013)
Pay per Use*	Gassmann et al. (2014); Johnson and Lafley, (2010); Rappa (2001); Tuff and Wunker (2010)

Generic Business Model Patterns and Online Grocery Specific Illustrations***	*Sources*
Personalized Recommendations* (as online grocery specific illustration of the pattern "Business intelligence" or as illustration of the pattern "Leverage customer data")	Frost and Strauss (2016); Gassmann et al. (2013)
Pure Player*/E-commerce*	Gassmann et al. (2013)
Quality Selling*	Gassmann et al. (2013); Linder and Cantrell (2000)
Same day Delivery*	Linder and Cantrell (2000)
Save the day* (as online grocery specific illustration of the pattern "Guaranteed availability")	Gassann et al. (2013)
Shopping Inspiration** (as online grocery specific illustration of the pattern "Experience Selling")	Gassann et al. (2013)
Solution Provider*	Gassmann et al. (2013); Linder and Cantrell (2000); Weill and Vitale, (2001)
Stock Up** (as online grocery specific illustration of the patern "Buying Club")	Linder and Cantrell, (2000)
Subscription*	Gassmann et al. (2014), Johnson and Lafley (2010); Rappa (2010); Tuff and Wunker (2010),
Support Essential Workers** (as online grocery specific illustration of the pattern "Commercially Utilized Social Mission")	Lüdeke-Freund (2018), Dohrmann et al., 2015
The 2 Rs* (as online grocery specific illustration of the two patterns recycling and reuse)	Planing (2015); Kiørboe et al. (2015)
Time saver** (as online grocery specific illustration of the pattern "Experience Selling")	Gassmann et al. (2013)
Trash to Cash*	Gassmann et al. (2013)
Tryouts** (as online grocery specific illustration of the pattern "Customer Loyalty")	Gassmann et al. (2013)
Word of Mouth Benefits* (as online grocery specific illustration of the pattern "Customer Loyalty")	Gassmann et al. (2013)

APPENDIX C – PATTERN ASSIGNMENT (TAXONOMY) (red patterns = crises-driven patterns)

Dimensions

Patterns	Hierarchical Impact		Target Customer				Products				Post-Purchase Service				Delivery Services			Differentiation Strategy						Prevention		Customer Acquisition				Sales Channels			Technical Functionalities				Delivery Infrastructure			Revenue Model		
	Prototypical Pattern	Solution Pattern	Other Companies	Specific New Customer Segments	Participation	No Impact on Target Customer	Quality	Assortment	Cooperation	No Impact on Products	Bonus	Return Policy	Lock-in	No Impact on Post-Purchase Service	Flexibility & Plannability	At the door Service & Reliability	No Impact on Delivery Services	Price	Access	Experience	Sustainability	Service Coverage	No Impact on Differentiation Strategy	Covid-19 Prevention	No Impact on Covid-19 Prevention	Discounts	(In)Convenient Services	Customization	No Impact on Customer Acquisition	Digital	Hybrid	No Impact on Sales Channel	Payment	Customer Time Efficiency	Customer Relationship	Technical Functionality not Specified	Make	Buy	Delivery Infrastructure not Specified	Product Sales	Delivery Costs	Revenue Model not Specified
Additional Delivery Slots		x		x						x				x	x					x				x			x					x				x			x		x	
Alternative Products		x				x		x						x			x			x				x				x				x			x				x	x		
Benefitting B2B		x	x							x			x		x			x							x	x						x				x			x	x		
Bottle Deposit Returns		x		x						x			x			x					x				x		x					x				x	x					x
Bricks and Clicks		x		x				x						x			x		x					x			x				x			x			x				x	
Cash on Delivery		x		x						x			x			x				x					x				x		x					x	x				x	
Click and Collect		x		x				x						x	x							x		x			x				x			x			x				x	
Co-Creation	x				x					x			x				x			x					x			x				x			x				x			x
Connection to Home Automation		x		x						x				x			x		x						x		x			x					x				x			x
Contactless Delivery		x				x				x				x		x							x	x			x					x				x			x			x
Covid-19 Educator		x				x				x				x			x			x				x			x					x				x			x			x
Cross-Selling		x		x					x					x			x			x					x				x			x				x			x	x		
Customer Loyalty		x		x						x	x						x	x							x	x						x				x			x	x		
Customization		x			x			x					x				x	x							x			x			x				x				x	x		
Deal of the day		x		x				x			x						x	x							x	x						x				x			x	x		
Delimited Coverage		x		x						x				x			x					x			x		x				x					x			x		x	

	Dimensions																																									
	Hierarchical Impact		Target Customer				Products				Post-Purchase Service				Delivery Services			Differen-tiation Strategy						Prevention		Customer Acquisition				Sales Channels			Technical Function-alities				Delivery Infras-tructure			Revenue Model		
Patterns	Prototypical Pattern	Solution Pattern	Other Companies	Specific New Customer Segments	Participation	No Impact on Target Customer	Quality	Assortment	Cooperation	No Impact on Products	Bonus	Return Policy	Lock-in	No Impact on Post-Purchase Service	Flexibility & Plannability	At the door Service & Reliability	No Impact on Delivery Services	Price	Access	Experience	Sustainability	Service Coverage	No Impact on Differentiation Strategy	Covid-19 Prevention	No Impact on Covid-19 Prevention	Discounts	(In)Convenient Services	Customization	No Impact on Customer Acquisition	Digital	Hybrid	No Impact on Sales Channel	Payment	Customer Time Efficiency	Customer Relationship	Technical Functionality not Specified	Make	Buy	Delivery Infrastructure not Specified	Product Sales	Delivery Costs	Revenue Model not Specified
Delivery Flat Rate		x		x						x			x		x			x						x		x						x			x				x		x	
Direct Selling	x			x			x					x					x	x							x		x			x						x	x			x		
Donations		x				x				x				x			x						x		x	x						x				x			x			x
Educator	x				x		x						x				x			x					x		x					x				x			x			x
Electro Delivery	x			x						x			x				x				x				x				x			x				x	x				x	
E-mall	x			x				x						x			x			x					x		x				x			x					x	x		
Experience Provider		x			x		x						x				x			x					x		x				x				x				x			x
Expert Advice		x			x		x						x				x			x					x		x				x				x				x			x
Express Click and Collect		x		x				x				x			x							x		x			x				x			x			x				x	
Express Shopping		x				x				x				x			x			x					x		x			x				x					x			x
Extra Charges for Fresh Deliveries		x		x			x							x		x		x							x				x			x				x			x		x	
Find what you came for		x				x				x				x			x			x					x				x			x		x					x			x
First come first serve		x				x				x				x			x						x		x				x			x			x				x			x
Flexible Scheduling		x		x				x						x	x					x					x		x					x		x			x				x	
Food Boxes		x		x				x						x			x				x				x		x					x				x			x	x		
Forced Scarcity		x				x		x						x			x			x					x				x			x				x			x	x		

	Dimensions																																									
	Hierarchical Impact		Target Customer				Products				Post-Purchase Service				Delivery Services			Differentiation Strategy						Prevention		Customer Acquisition				Sales Channels			Technical Functionalities				Delivery Infrastructure			Revenue Model		
Patterns	Prototypical Pattern	Solution Pattern	Other Companies	Specific New Customer Segments	Participation	No Impact on Target Customer	Quality	Assortment	Cooperation	No Impact on Products	Bonus	Return Policy	Lock-in	No Impact on Post-Purchase Service	Flexibility & Plannability	At the door Service & Reliability	No Impact on Delivery Services	Price	Access	Experience	Sustainability	Service Coverage	No Impact on Differentiation Strategy	Covid-19 Prevention	No Impact on Covid-19 Prevention	Discounts	(In)Convenient Services	Customization	No Impact on Customer Acquisition	Digital	Hybrid	No Impact on Sales Channel	Payment	Customer Time Efficiency	Customer Relationship	Technical Functionality not Specified	Make	Buy	Delivery Infrastructure not Specified	Product Sales	Delivery Costs	Revenue Model not Specified
Free Delivery		x		x						x	x						x	x						x		x						x				x			x		x	
Freshness Guarantee		x		x			x					x				x				x					x		x				x					x			x		x	
Hand it to the Pros	x			x						x		x			x							x			x				x			x		x				x			x	
Products Removed from Assortment		x				x		x						x			x			x					x				x			x				x			x	x		
Hybrid Access Point		x		x						x				x			x		x						x		x			x					x				x			x
Introducing a new own delivery service	x			x						x		x			x							x		x					x			x		x			x				x	
Late Night Delivery		x		x				x					x		x					x					x		x					x		x			x				x	
Leave it on the Doorstep		x		x						x			x			x				x				x			x					x				x			x		x	
Mail Coach	x			x				x				x			x							x			x				x			x				x		x			x	
Make sure it works		x				x				x				x	x					x					x				x			x		x					x			x
Membership		x		x						x			x				x	x							x	x						x			x				x			x
Milkman Model		x		x						x				x	x							x			x				x			x				x	x				x	
Minimum Order Value		x		x						x				x			x	x							x		x					x				x			x		x	
New Customer Discounts		x		x						x	x						x	x							x	x						x				x			x			x
No Bottle Deposit Take Back		x				x				x		x				x					x			x					x			x				x			x			x
No Deals		x				x		x			x						x	x							x				x			x				x			x			x
No Frills Payment		x				x				x				x			x			x					x	x						x	x						x			x

Patterns	Hierarchical Impact		Target Customer				Products				Post-Purchase Service				Delivery Services			Differen-tiation Strategy						Prevention		Customer Acquisition				Sales Channels			Technical Function-alities				Delivery Infras-tructure			Revenue Model		
	Prototypical Pattern	Solution Pattern	Other Companies	Specific New Customer Segments	Participation	No Impact on Target Customer	Quality	Assortment	Cooperation	No Impact on Products	Bonus	Return Policy	Lock-in	No Impact on Post-Purchase Service	Flexibility & Plannability	At the door Service & Reliability	No Impact on Delivery Services	Price	Access	Experience	Sustainability	Service Coverage	No Impact on Differentiation Strategy	Covid-19 Prevention	No Impact on Covid-19 Prevention	Discounts	(In)Convenient Services	Customization	No Impact on Customer Acquisition	Digital	Hybrid	No Impact on Sales Channel	Payment	Customer Time Efficiency	Customer Relationship	Technical Functionality not Specified	Make	Buy	Delivery Infrastructure not Specified	Product Sales	Delivery Costs	Revenue Model not Specified
No new customers		x		x						x				x			x						x		x		x					x				x			x			x
No Registration		x		x						x				x	x				x						x		x					x		x					x			x
No Reuse		x				x				x				x			x				x			x					x			x				x			x			x
Online Experience Provider		x		x			x							x			x			x				x			x				x					x			x			x
Own Delivery Service		x		x						x		x			x							x			x				x			x		x			x				x	
Parachute		x				x	x					x				x				x					x		x				x				x				x			x
Parcel Tracking		x		x						x				x	x					x					x		x					x		x					x		x	
Partnerships	x			x					x					x			x			x					x		x				x					x		x		x		
Pay how you want		x				x				x				x			x			x					x				x			x	x						x			x
Pay per Use		x		x						x				x			x	x							x				x			x	x						x		x	
Personalized Recommendations		x				x		x			x						x			x					x			x		x					x				x	x		
Planning Enthusiast		x		x						x				x	x								x		x		x					x		x					x			x
Product Check at Handover		x		x			x					x				x				x					x			x				x				x	x				x	
Pure Player	x			x				x						x			x		x						x				x	x						x			x			x
Quality Selling		x		x			x						x				x	x							x		x					x				x			x	x		
Raised Minimum Order Value		x		x						x				x			x	x							x		x					x				x			x		x	
Same day Delivery		x		x				x					x		x							x		x			x					x		x			x				x	

Dimensions

Patterns	Hierarchical Impact		Target Customer				Products				Post-Purchase Service				Delivery Services			Differen-tiation Strategy						Prevention		Customer Acquisition				Sales Channels			Technical Function-alities				Delivery Infras-tructure			Revenue Model		
	Prototypical Pattern	Solution Pattern	Other Companies	Specific New Customer Segments	Participation	No Impact on Target Customer	Quality	Assortment	Cooperation	No Impact on Products	Bonus	Return Policy	Lock-in	No Impact on Post-Purchase Service	Flexibility & Plannability	At the door Service & Reliability	No Impact on Delivery Services	Price	Access	Experience	Sustainability	Service Coverage	No Impact on Differentiation Strategy	Covid-19 Prevention	No Impact on Covid-19 Prevention	Discounts	(In)Convenient Services	Customization	No Impact on Customer Acquisition	Digital	Hybrid	No Impact on Sales Channel	Payment	Customer Time Efficiency	Customer Relationship	Technical Functionality not Specified	Make	Buy	Delivery Infrastructure not Specified	Product Sales	Delivery Costs	Revenue Model not Specified
Save the day		x		x						x				x	x							x		x			x					x		x					x		x	
Shopping Inspiration	x			x				x					x				x			x					x		x				x					x			x	x		
Solution Provider	x			x				x			x						x			x					x		x					x				x			x	x		
Stock Up	x			x				x			x				x			x						x			x					x				x			x	x		
Subscription		x		x						x	x						x	x							x	x						x			x				x			x
Support Essential Workers		x		x						x			x		x				x					x				x				x				x			x		x	
Survival Packages		x		x				x						x			x			x				x				x				x				x			x	x		
The 2 Rs		x		x						x			x			x					x				x		x					x				x			x			x
Time Saver		x				x				x			x				x			x					x		x					x		x					x			x
Trash to Cash		x		x			x							x			x	x							x	x						x				x			x	x		
Tryouts		x		x				x					x				x			x					x	x						x				x			x	x		
Waiting List		x				x				x				x			x						x		x		x					x			x				x			x
Word of Mouth Benefits		x		x						x	x						x						x		x	x						x				x			x			x

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