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Harvesting Season?

On the Process of Digitalisation in German Food Retail

eingereicht von Philipp Piroth im Dezember 2021

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Summary

Efforts to induce customers to buy groceries through the Internet have existed for around twenty years. Early on, the market structures of the digital grocery trade were still strongly fragmented and poorly coordinated. Due to the technological advancement in the past decade, the digital purchase of groceries has become more attractive. The adoption rate of these services varies greatly between different regions. In Germany in particular, the digital grocery trade is stagnating at a comparatively low level. In this regard, this dissertation analyzes both the retail-side market structures and the expectations and obstacles of German consumers.

The year 2020 connotes a turning point for the online grocery trade, as daily routines such as grocery shopping were subject to strict regulations imparted at a governmental level in order to reduce COVID-19 infections. At the same time, despite this opportunity, the digital grocery trade has not yet established itself nationwide in Germany. This can be attributed to a lack of investments, but also to inadequate digitization measures. A stronger synchronization between the digital and stationary offer, better integration of digital food services at a regional level as well as adapted, target group-appropriate digital solutions for the efficient breakdown of usage barriers will benefit service usage. The importance of stable food chains and distribution channels was illustrated by the COVID-19 pandemic. Further research should help to develop the digital food trade into a stable and sustainable supplementation of the stationary store.

Zusammenfassung

Seit etwa zwanzig Jahren existieren Bemühungen Kunden zum Kauf von Lebensmitteln im Internet zu bewegen. Dabei waren die Marktstrukturen des digitalen Lebensmittelhandels zu Beginn noch stark fragementiert und schlecht abgestimmt. Durch die technologische Weiterentwicklung in den vergangenen Dekade hat der digitale Lebensmittelkauf an Attraktivität gewonnen. Die Nutzungsadaption dieser Diensteleistungen variiert dabei jedoch sehr stark zwischen unterschiedlichen Regionen. Besonders in Deutschland stagniert der digitalen Lebensmittelhandel auf einem vergleichweise niedrigen Niveau. Diesbezüglich analysiert diese Dissertation sowohl die händlerseitigen Marktstrukturen, als auch die Erwartungen und Hindernisse deutscher Konsumenten gegenüber der Serviceleistung.

Das Jahr 2020 konnotiert einen Wendepunkt für den Online Lebensmittelhandel, als, im Zuge politischer Maßnahmen zur Reduzierung der COVID-19 Infektionen, tägliche Routinen wie der Lebensmitteleinkauf starken Regulierungen unterlagen. Gleichzeitig hat es der digitale Lebensmittelhandel trotz dieser Gelegenheit noch nicht geschafft sich flächendeckend in Deutschland zu etablieren. Dies kann auf fehlende Investments, aber auch unzulängliche Digitalisierungsmaßnahmen zurückgeführt werden. Eine stärkere Synchronisierung zwischen digitalem und stationärem Angebot, bessere Integration digitaler Lebensmitteldienste auf regionaler Ebene sowie angepasste, zielgruppenadäquate digitale Lösungen zum effizienten Abbau von Nutzungsbarrieren. Die Wichtigkeit stabiler Lebensmittelketten und –verteilung konnte durch die COVID-19 Pandemie illustriert werden. Weitere Forschung sollte helfen den digitalen Lebensmittelhandel zu einer nachhaltigen und stabilen Supplementierung des stationären Angebots zu entwickeln.

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Mannheim, March 2022

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List of Abbreviations

AVE	Average Variance Extracted
CO_2	Carbon Dioxide
COVID-19	Coronavirus SARS-CoV-2
CR	Composite Reliability
CSA	Community Supported Agriculture
eSERVQUAL	Electronic Service Quality
HDE	German Retail Federation
IFH	German Institute for Retail Research
IGD	Institute of Grocery Distribution
IHK	German Chamber of Industry and Commerce
LDA	Latent Dirichlect Allocation
LSD	Fishers Least Square Distance Measure
NLP	Natural Language Processing
OGS	Online Grocery Shopping
QCA	Qualitative Content Analysis
QDA	Qualitative Data Analysis
SEM	Structural Equation Model
TAM	Technology Acceptance Model
TPB	Theory-of-Planned-Behaviour
TRA	Theory-of-Reasoned-Action
t-SNE	t-Distributed Stochastic Neighbor Embedding
UAV	Unmanned Aerial Vehicle
WHO	World Health Organization

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Part I Introduction

Problem Statement and Research Gap

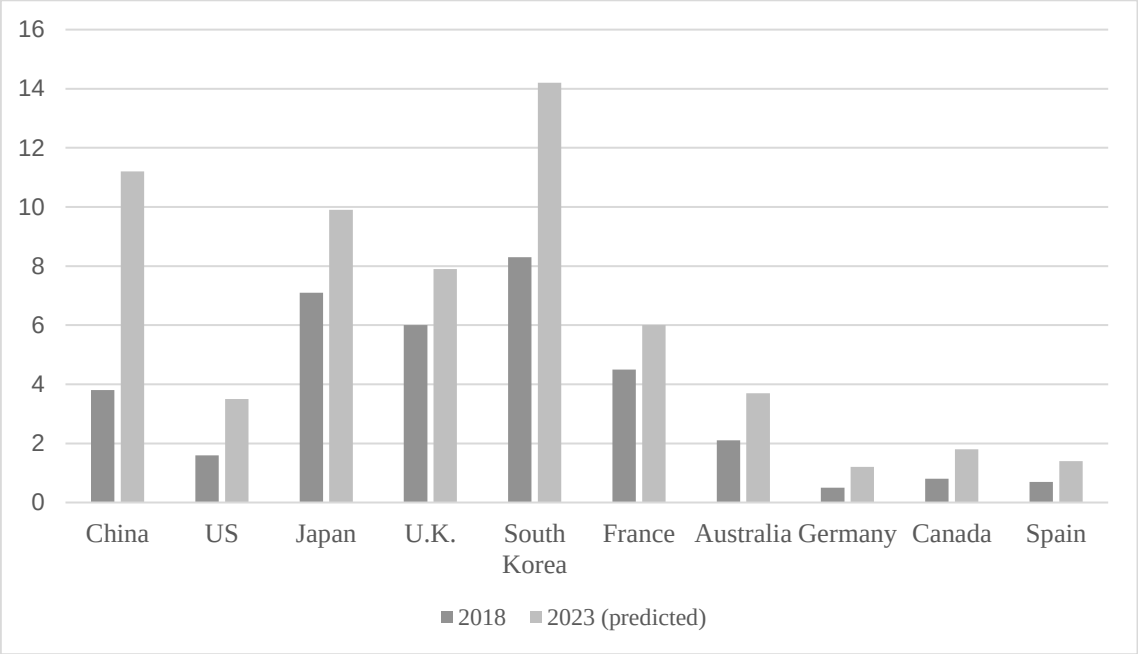
The era of digital transformation has disrupted many business segments: amongst others, the vanishing of video rentals in favor of streaming platforms comes to mind. Digitalisation describes the on-going transformation of business models and processes via the use of digital technologies. However, large gaps in consumer acceptance of these digitalisation processes across product groups can be observed, with food being rather difficult to mass-digitalise (Elms et al., 2016). Food is a complex product as it is highly integrated into social rituals, cultures and norms (Lupton, 1994).

As food consumption is vital to the functionality of the human body, the importance of universal food distribution and availability remains indisputable. Food products account for large proportions of overall consumer spending (Ramus & Asger Nielsen, 2005) and grocery retail in general is described as highly saturated and hyper-competitive, with low overall margins. Ever since the early 2000s online grocery shopping (OGS) has emerged as a new way of shopping for groceries, and allows consumers to shop from the convenience of their own homes. Around the same time, the first academic papers into OGS research started appearing (Martín et al., 2019).

The first wave of online grocers soon faded into oblivion as the market structures were highly fragmented and the existing services at the time were poorly aligned (Perkins, 2001). Following advances in information technology and the adaptations of retail in the past twenty years, OGS has enjoyed a global revival (see **Figure 1**).

Figure 1. Online grocery channel share (in per cent).

Source: adapted from IGD (2018)



Whilst online grocery shopping has gained momentum in the past years its adoption remains somewhat underdeveloped and varies greatly across countries. After a tremendous increase of 44 per cent in revenue during the COVID-19 pandemic, the online share of food retail rests at a mere 2.0 per cent in Germany (HDE, 2021, p. 8). OGS has been characterised as a "*discontinued innovation*" (Hansen, 2005) and as such requires significant alteration of consumer behaviour (Robertson, 1967).

The reasoning for the overall lower adoption in Germany is multifarious: The country has the highest supermarket density throughout Europe (Nielsen, 2018), somewhat liberal opening hours and a high general appreciation for stationary grocery shopping (Seitz et al., 2017). On the other hand, infrastructure in rural areas is often weak (Dannenberg et al., 2020) limiting the availability of OGS services to certain consumer segments.

Two main operational modes of OGS services exist: click-and-collect, and home delivery - the latter being more prominent in Germany. An average grocery basket may also contain a wide variety of different food products – each with specific cooling and packaging requirements. This poses very specific challenges to the distribution process. Many stationary retailers therefore ressort to applying cross- and omni-channel strategies (e.g. Hübner et al., 2016) to

align their existing business with the digital competition. Supply streams are often operated out of larger warehouses in close proximity to metropolitan areas.

The buying and evaluation process of groceries is furthermore described as being culture-bound (Lupton, 1994), indicating different mind-sets towards OGS adoption across different cultures and geographical regions. This is also reflected in the choice of market place (Everts & Jackson, 2009), associated expectations towards the shopping experience, and in varied product expectations, observable in the high need for haptical inspection prior to a grocery buying decision (Kühn et al., 2020).

All these aspects present plenty of possible influencing factors that may impact adoption of OGS. Academic research so far has brought forward different research streams: Initial studies took a look at success factors and obstacles (Morganosky & Cude, 2000; Ramus & Asger Nielsen, 2005), as well as market structures (Perkins, 2001). In 2005 a theoretical framework for OGS adoption was proposed by Grunert and Ramus based on the frequently applied theory-of-planned behaviour (TPB) model (Ajzen, 1991). From this point on, further studies, often rooted in consumer behaviour related fields, have also emerged (Hansen et al., 2004; Hansen, 2008).

With the introduction of situational factors (e.g. changes in career, birth of a child or sickness) as initial triggers to OGS usage (Hand et al., 2009) circumstantial conditions were included as sources of influence. Newer research eventually strenghtened the emphasis on technology acceptance (Brand et al., 2020; Driediger & Bhatiasevi, 2019; Muhammad et al., 2016) as well as consumer search and information behaviour (Benn et al., 2015; Kühn et al., 2020; Mortimer et al., 2016).

Most of these studies focus on an individual assessment of OGS adoption, while van Droogenbroeck and van Hove (2017) suggest adoption measurement at a household-level rather than based on personal characteristics. With a growing user base, retention and churn management in OGS have also become a growing research domain (Singh & Rosengren, 2020), challenging early assumptions that argued OGS usage would soon fade if the initial trigger was no longer prevalent (Hand et al., 2009; Singh & Söderlund, 2020). Despite the broad academic publication base, large knowledge gaps in OGS research *"particularly in Germany"* (Martín et al., 2019, p. 7) remain.

To this end, this dissertation contributes to the understanding of retail digitalisation processes, and consequential consumer behaviour, by studying the on-going digital transformation of food

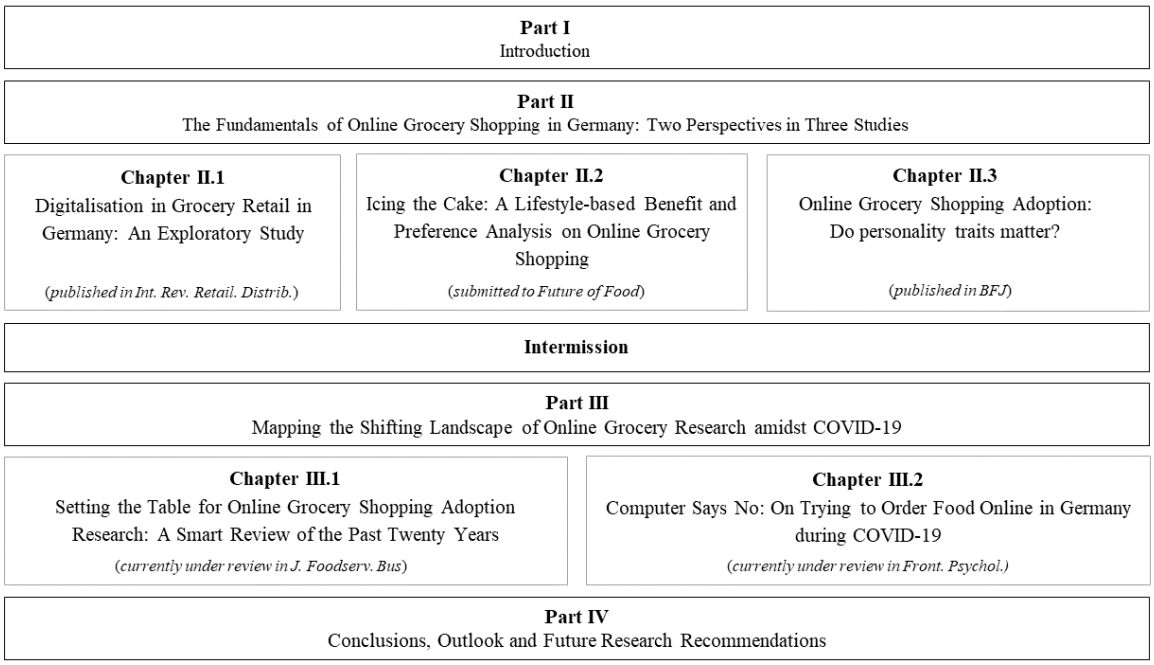
retail. The author addresses the short-comings in the German OGS market from a supply and demand-side perspective and highlights the shifting nature of OGS research throughout the COVID-19 pandemic.

Structure and Content

This dissertation examines the process of digitalisation within food retail in Germany and subsequent consumer response. The thesis is structured into a total of four parts. This first part serves to introduce the reader to the background of this research proposal and demonstrate the existing research gaps.

Both the second and third part are sub-structured into three and two chapters respectively, each of which presents either already published articles or findings still under review at this point in time. **Figure 2** illustrates the structure and consequential line of arguments proposed in this thesis.

Figure 2. Structure of this dissertation.



In Chapter II.1, the author lays out the market structures of food and online grocery retail in Germany via qualitative data analysis gathered from twenty interviews with industry experts. The findings were published in the *International Review of Retail, Distribution and Consumer*

Research (Int. Rev. Retail. Distrib.). The chapter focuses on an assessment of market structures, success factors and general assessment of the future of OGS. This study chooses a qualitative approach to explore the matter. Therefore, a total of 20 in-depth expert interviews were conducted. The experts stem from various areas within the online grocery segment such as retailers, institutions (such as chamber of commerce) and related industries (such as web agencies). Data collection for this study took place between August 2017 and May 2018.

To supplement the business perspective, part II.2 of this dissertation qualitatively explores German consumers' perceived benefits and preferences in OGS services through use of a focus group methodology. The associated manuscript has been submitted to *Future of Food: Journal on Food, Agriculture and Society (FOFJ)*. This study too follows a qualitative approach and a total of three focus group sessions were conducted between August 2018 and March 2019. Research is focussed on the usage of OGS by different consumer types within individual living circumstances. The research on consumer adoption is expanded towards personality traits in a third quantitative study (chapter II.3). This research uses structural equation modelling and was published in the *British Food Journal (BFJ)*. In the article, the authors analyse the influence of personality traits on consumer buying intention for groceries online in a German data-set of N=678 participants collected between December 2018 and March 2019. The three studies summarised in part II act as a baseline for the research presented in the third part of the thesis.

Part III is split in two chapters, where the authors address the overall OGS adoption research landscape and its changes as a result of the pandemic. The associated manuscript is currently under review at the *Journal of Foodservice Business Research (J Foodserv Bus)*. The article applies a natural language process (NLP) and subsequent thematic clustering based on Latent Dirichlet Allocation (LDA) on the abstracts of over 100 articles published in the past twenty years (chapter III.1). A short viewpoint article then addresses the shifting nature of OGS services, eating behaviour and consequences for local food supply in the light of the COVID-19 pandemic. The article argues for diversifying digitalisation of the grocery shopping experience – both offline and online (chapter III.2). The associate manuscript is currently under review for the *Eating Behaviour* section in *Frontiers in Psychology (Front. Psychol.)*.

A short Intermission between Part II and III briefly summarises the findings and addresses the disruptions caused to the original research set-up of this thesis as a result of the COVID-19 pandemic. The thesis closes with an overall discussion and conclusion of the findings as well as some remarks on its limitations. It concludes with an outlook for future research and the on-going relevance and economic potential of digital transformation in food retail.

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Part II The Fundamentals of Online Grocery Shopping in Germany: Two Perspectives in Three Studies

Chapter II.1 Online Grocery Retailing in Germany: An Exploratory Study

Philipp Piroth, Edith Rüger-Muck and Johan Bruwer

Declaration of Contribution

This article resulted from a collaboration with ERM and JB. The areas idea and conception, conduction of the study and writing of the article have been mainly covered by PP. I would like to acknowledge the following contributions. The idea was developed in close collaboration with ERM. The conception was developed in close collaboration with ERM. The initial draft of the article, data gathering and analysis was covered by PP. Final version was written in close collaboration with ERM and JB.

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Online Grocery Retailing in Germany: An Exploratory Study

Abstract

This study examines German online grocery retailing structures, market participants and the degree of digitalisation in marketing services. This industry is characterised by a subpar share (0.9 per cent) coupled with an above-average growth (20 per cent from 2015 to 2017) thus making the market economically auspicious. This has attracted new competition with pure online players joining the market themselves or pairing with established logistic providers. While there is academic research on global online grocery retailing mostly on consumer behaviour and adoption, academic research for the German market with a changing environment due to globalisation and an ageing society, is very limited. This research therefore functions as a baseline study to allow further confirmatory research on the German market. To add more knowledge to this research gap we conducted an exploratory, qualitative study based on twenty in-depth interviews with industry experts. Data analysis was conducted using MAXQDA (Vers. 2018) that facilitated qualitative content analysis (QCA). We found that logistic issues (specifically maintenance of the distribution cool chain) and technological infrastructure are viewed as key drivers of online grocery retailing. Furthermore, the degree of digitalisation within service processing can still be improved upon. This is especially true regarding an integrated and holistic customer experience from order to reception. Most online grocery retailers still lack a convincing online service and communication strategy. This is particularly true with regard to communication of real-time delivery location and the integration of social functionality within their online offerings. Marketers should therefore adapt to these crucial and perceivable remarks from the experts perspective.

Keywords: online grocery retailing; market structures; qualitative in-depth interviews, German market

Introduction

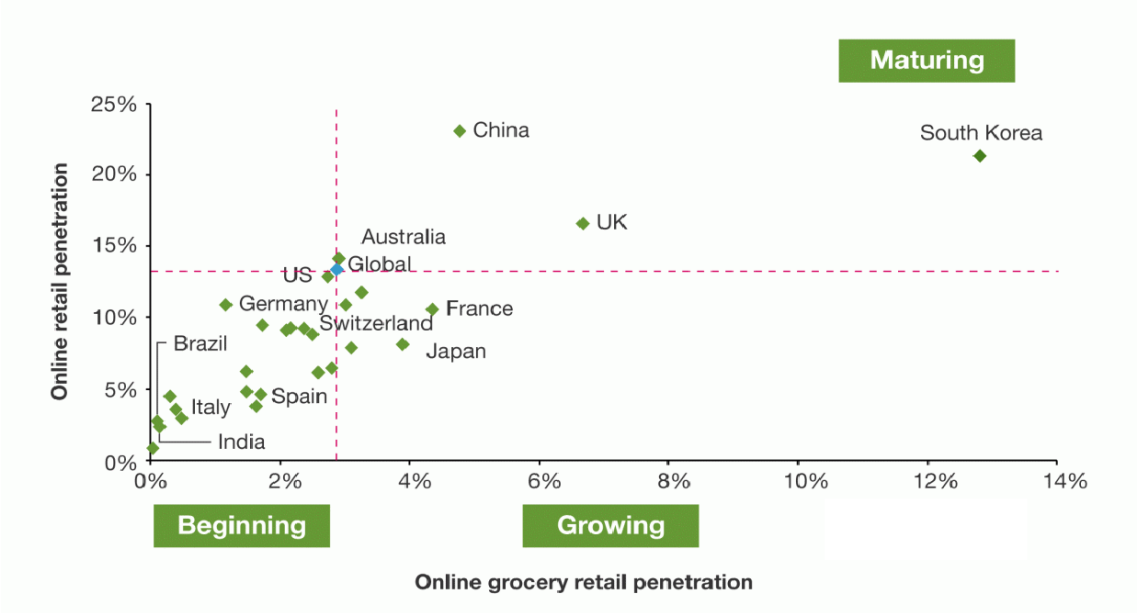
While online grocery retailing attracted academic interest throughout the early 2000´s, research has not kept pace with the development of the market and its rapidly changing nature. This is particularly true for underdeveloped markets such as the German one despite the substantial presence of distance selling in Germany (Colla 2004, 57). Despite large increases in its sales volume the segment itself remains comparatively small within e-Commerce. In 2017, approximately 21 per cent of German consumers bought groceries online (Eurostat 2017).

This is reflected in a subpar online share of approximately 0.9 per cent in 2017 with an above-average growth rate of 20 per cent in the timeframe 2015 to 2017 (IfH / HDE 2018, 15). While this is a tremendous increase within the last decade Germany still ranks low on an international scale; however growth is increasing (IGD 2018), rendering the segment economically attractive. Globally mature markets are found particularly in Asia (specifically South Korea, China, Japan) and to some degree in Northern America and Australia. Within Europe, the UK and France are of interest due to their advanced state, whereas the German, Spanish and Portuguese markets are still in their adoption phase (Saskia, Mareï, and Blanquart 2016). Nonetheless both the German and Spanish market found entrance to The Institute of Grocery Distribution´s (IGD) top ten leading market list in 2018 (IGD 2018).

Global online grocery retailing has grown strongly throughout the last decade and is likely to continue to do so. Market researchers expect the global market of the segment to grow at an annual compound rate of 20 per cent until 2023 (IGD 2018); however national adoption varies strongly between different countries (Forrester 2018 - see **Figure 3**).

Figure 3. Online retail penetration compared to online grocery retail penetration in selected countries.

Source: adapted from Forrester (2018)



Qualitative insight into the segment and its structures, to our knowledge, remains underexplored. Due to its rapidly changing nature there could be considerable interest in academic research of the infrastructure and dynamics of the German online grocery market specifically in liaison with societal changes such as globalisation and an ageing society in general.

With new participants entering the market and posing a challenge to existing (often stationary) market structures, the process of digitalisation, globalisation and demographic consequences on the German population; this business segment may drastically change in the near future allowing plentiful business and research opportunities. The purpose of this study is to evaluate the current market situation with its participants and present findings from semi-structured expert interviews within related segments of the online grocery retailing industry. The following research questions directed the discussion in this paper:

- *How can the current state of online grocery retailing in Germany be described?*
- *Which characteristics are perceived as crucial for successful online grocery retailing?*

- *Which development can be expected from online grocery retailing in Germany in the future? And how do these developments match the international development?*

This study aims to describe German market structures, participants and degree of digitalisation within online grocery retailing. It is the first academic study that combines analysis of industry structures with predicted success factors and adds both to the current analyses within logistics and usage of in-depth qualitative interviews (Wollenburg et al. 2018). This research should therefore serve as a baseline study (Bruwer and McCutcheon 2017) and to enable further confirmatory research that tests success factors in the context of increasing importance of omni-channel (OC) business approaches and changing consumer behaviour.

Literature review

Online grocery retailing has attracted academic interest at different points in time and, due to its rapidly changing nature, research has not kept pace. **Table 1** lists a selection of academic studies with year of publication and geographical as well as research focus that mainly contribute research on market structures of online grocery retailing. A majority of more recent literature on the matter, particularly with an international angle, stems from industry studies (Ernst & Young 2014; pwc 2018; YouGov 2016), while academic research has mainly focused on consumer behaviour and adoption (Anesbury et al. 2016; Benn et al. 2015; Hand et al. 2009; Hansen 2005, 2008; Morganosky and Cude 2000; Muhammad, Sujak, and Rahman 2016; Park and Kim 2003; Picot-Coupey et al. 2009; Raijas and Tuunainen 2001; Ramus and Nielsen 2005; Wilson-Jeanselme and Reynolds 2006).

Table 1. Overview of academic studies with an emphasis on market structures and market participants.

Year	Author	Geographical Focus	Research Focus
2001	Perkins	Europe	Overview of European retailing market participants and online retailing potential.
2001	Keh and Shieh	None	Potential and obstacles in online grocery retailing.

2004	Colla	Europe	Analysis and outlook on food retailing market structures in European countries.
2013	Kuhn and Sternbeck	Europe / Germany	Qualitative analysis of structures and interrelations in grocery retail logistic.
2014	Grant, Fernie, and Schulz	Germany	Identification of enablers and barriers in online grocery retailing.
2016	Saskia, Mareï, and Blanquart	Germany / France	Comparison of innovative concepts in eGrocery and their consequence on transportation and logistics.
2018	Wollenburg et al.	Europe	Evaluation of logistic system integration with bricks-and-mortar retailers
2019	Hübner et al.	Europe	Multiple case study on European grocery retailing concepts.

More recently, Seitz et al. (2017) offer quantitative assessment of important factors for consumers and Fedoseeva, Herrmann, and Nickolaus (2017) have examined price dispersion between online and offline grocery retailers. There is room for discussion on which factors influence the success of online grocery markets: While Asian countries often have superior technological infrastructure and high-speed internet connections, supermarket density (UK), physical proximity (Australia) and legal restrictions on opening times (Switzerland) may have a significant influence on consumer adoption as well. Furthermore, there might be cultural or personal traits that influence the willingness to adopt online grocery shopping (Hansen 2005; 2008). Reinforcement for this chain of arguments can be found at Seitz et al. (2017, 1252) where consumers ranked '*happy with status quo*' as the second highest (71.6 percent) and researchers were able to empirically confirm differences in the general e-commerce acceptance across different cultures (Choi and Geistfeld 2004; Park and Jun 2003). These cultural and personal factors may be particularly important for groceries and its purchasing process potentially being culture-bound and traditionalised (Keh and Shieh 2001, 74).

Perkins (2001) analyses the European food retailing sector in a comparative matter and identifies online potential. It is noteworthy that out of the 16 largest European food retailers in 2001 a total of five were German with one having had an online shop since 2001. Perkins (2001) acknowledges the advantages of stationary retailers as having trusted brands and recognition. Keh and Shieh (2001) found similar reasoning towards advantages and potential pitfalls in online grocery retailing. Colla (2004) presented a general overview of European retailing formats and its development. The researcher identified changes in consumer behaviour, legislation, technological process and internationalisation with the entry of new market participants as crucial factors of change. Colla (2004, 65) argues that retail distribution systems ”rarely experience sudden and rapid change” rather than being dependent on continuous transformation. Methodologically similar to this study Grant, Fernie, and Schulz (2014) identified enablers and barriers of online grocery retailing in Germany. They found a broad consumer base, large assortment range, web shop design, technology and logistics as the main enablers, while the last-mile issue still remains unsolved. Furthermore, large up-front investments may keep companies out of the market. Grant, Fernie, and Schulz (2014) point out the high research need within online grocery shopping.

History and State of Online Grocery Retailing in Germany

The history of the eGrocery market development is riddled with setbacks and the reasons for that are diverse. In the heyday of the technological bubble and around the change of the millennium online grocery retailing concepts emerged all over the world, even though stationary grocery retailing generated solid revenue streams. A comprehensive analysis of stationary retailing structures across Europe during this time can be found in Colla (2004). Most early movers within online grocery retailing share a similar fate: ‘Webvan’ (USA) opened for business in 1996 and filed for bankruptcy in 2001. Only two years later the German mail-order company Otto terminated its online grocery service, just like Spar and Tengelmann shortly prior. They all faced heavy competition with price-aggressive traditional discounters such as Aldi and Lidl and therefore stopped investing in their cost-intensive online business (Nufer and Kronenberg 2014). Many other pure online based retailers faced the same problem.

The early market structures of online grocery retailing can be described as ‘*fragmented*’ with low entry barriers, high transportation costs, perishability of the product and

specialisation on geographical regions to use economies of scale contributing to this fragmentation (Keh and Shieh 2001, 73). Other reasons for the struggling eGrocery business (specifically in Germany) could be seen in problematic infrastructure (slow internet connection), necessity of significant investments (high logistics and warehousing costs), complex delivery process for fresh food with the requirements for maintaining of cooling and overall low margins (Keh and Shieh 2001, 73; Saskia, Mareï, and Blanquart 2016, 826).

With regard to most other online purchases groceries can be classified as being '*time-sensitive*', have a certain degree of habit and most consumers prefer to haptically inspect them prior to buying (Keh and Shieh 2001, 74). As a result of the various set-backs grocery retailing have gone through a "transformational change" as the retailing infrastructure moved to omni-channel (OC) retailing and strongly emphasised logistical activities (Hübner, Holzapfel, and Kuhn 2016; Ishfaq et al. 2016; Kuhn and Sternbeck 2013) to meet the "high-performance expectations" of consumers (Fernie, Sparks, and McKinnon 2010; Nicholls and Watson 2005). Hübner et al. (2019, 307) observe three phases of said change where retailers will eventually reconsider merging their stationary and online logistics.

These newer approaches towards online grocery retailing mitigate previously stated problems by either facilitating warehousing using stationary retailer outlets (for bricks-and-mortar concepts) or relying heavily on existing logistical structures provided by third parties (hybrid approach / bricks-and-clicks), while pure online approaches are on the rise. For further details on the logistical implications the interested reader is referred to Hübner, Kuhn, and Wollenburg (2016) and Kuhn and Sternbeck (2013) who laid out a strategic framework and detailed argumentation on the importance of retail logistics in the context of grocery distribution. Furthermore fragmentation within the industry still exists due to various niche offerings (for instance office supply and specialities). The German grocery segment is the third largest within Europe (behind the UK and France) and is characterised by a number of bricks-and-mortar retailers that turned towards online grocery retailing within the last decade. The market is generally described as "increasingly competitive" and faced consolidation (Kuhn and Sternbeck 2013). Market shares in grocery retailing throughout Europe are somewhat concentrated: Kuhn and Sternbeck (2013) state, that the market share in both Switzerland and Austria is condensed with two (approx. 67 per cent) and three (approx. 78.5 per cent) grocery retailers. The

German situation is similar (Kuhn and Sternbeck 2013): The three biggest retailers account for approx. 48.8 per cent (see **table 2**).

Within Europe, the UK can be seen as a pioneer market for eGroceries (McKevitt 2017; Nufer and Kronenberg 2014, 2; Saskia, Mareï, and Blanquart 2016, 826). In the beginning of 2000, Ocado and Tesco as ‘traditional” retailers started with the complimentary eGrocery business. All other major UK retailers followed between then and 2006. In 2017 approximately 7.6 per cent of all grocery sales were made online (McKevitt 2017). Fernie, Sparks, and McKinnon (2010) see the logistical process as quasi-complete within the UK. In France the share of eGrocery sales was about 3 per cent in 2009 (Picot-Coupey et al. 2009, 438) and now is expected to increase to above five per cent by 2023 (IGD 2018).

Classification and analysis of business approaches

Currently, the worldwide market offers two different business delivery models which can also be found in the German market: ‘click and collect” and ‘home delivery’ (Saskia, Mareï, and Blanquart 2016, 831f.). While all companies offer some form of online presence (homepage, digital shopping lists, mobile applications, etc.) fewer offer a ‘click-and-collect’ service where customers can order groceries online and pick them up at their local bricks-and-mortar retailer. This aligns with the concept of ‘bricks and clicks” describing companies that apply a hybrid between online and offline presence (Herhausen et al. 2015; Wollenburg et al. 2018). Within the hybrid category are all companies that allow online ordering of groceries and actual home delivery where consumers get their groceries delivered to their doorsteps. The logistical approach preferences seem to differ between Germany and its European neighbours: Wollenburg et al. (2018) state that German bricks-and-mortar retailers satisfy their supply mainly through their store outlets while other European countries have committed to online distribution centres for home delivery (e.g. UK and Denmark) and pick-up stations (France).

In terms of product assortment depth, we differentiate companies whether they offer specialities particularly or a full range of essential goods and perishables in particular. We can furthermore distinguish between office suppliers (large quantity orders) and food box providers (delivering recipe boxes pre-cast with ingredients and recipes for different quantities of meals). This classification aligns with and reflects the issue of maintaining the distribution cool chain. We propose descriptive clusters of the eGrocery market participants by the degree of digitalisation of their processes. For the scoring on the degree

of digitalisation we facilitated Meier and Stormer's (2012, 128f.) maturity model in which they propose four stages of digitalisation:

(1) Information: This stage is characterised by provision of information about the company, their products and services online.
(2) Communication: In this stage the digital interaction increases towards a communication with customers in the form of online chats, forums, etc.
(3) Transaction: Engagement within this stage includes online ordering, payment and general business transaction processes that are carried out digitally.
(4) Personalisation: The highest form of digitalisation includes one-to-one marketing, online order tracking and usage of digital agents to consult and sell individual products or services.

Table 2 depicts an overview of market participants based on the analysis by Meier and Stormer (2012) and is enriched with data from further dimensions:

- Revenue structure and market share
- Geographical focus
- Last-mile fulfilment approach
- Product range

Table 2. Background information on market participants in the German grocery market.
Source: partially adapted from (Lebensmittel Zeitung 2018)

	Degree of Digitalisation in Service Processing				Revenue in Mil. Euro in 2017	Change in revenue from 2016 in percent	MS in 2017 in percent	Focus	Last-mile fulfilment		PR
	Information	Communication	Transaction	Personalisation					CnC	Home Delivery	
Edeka	■	■	■		55,896	+ 4.10	20.30	N[a]	✓	✓	FRT
Rewe	■	■	■		38,152	+ 7.60	14.00	N[a]	✓	✓	FRT
Lidl	■	■	■		24,330	+ 7.60	14.50	N			FRT
Kaufland	■	■			15,497	+ 1.40	n.r.	N			FRT
Amazon	■	■	■	■	12,229	+ 17.60	4.40	N[a]		✓	FRT
Lekkerland	■	■			9,304	+ 2.00	3.40	N			FRT
Real	■	■	■		8,427	n.r.	n.r.	N[a]	✓	✓	FRT
dm	■	■	■		7,857	+ 4.80	2.90	N		✓	PRT
Rossmann	■	■	■		6,400	+ 4.60	2.30	N	✓	✓	PRT
Globus	■	■			3,370	+ 1.00	1.9	R			FRT
hellofresh.de	■	■	■		3.5 – 4.0[b]	n.r.	n.r.	N		✓	PRT
allyouneedfresh.de	■	■	■		n.r.	n.r.	n.r.	N		✓	FRT
Picnic.app	■	■	■	■	1.0[c]	n.r.	n.r.	R		✓	FRT

Notes: Focus: N = Nationwide, R = Regional; Last-mile fulfilment: CnC = Click and Collect; PR = Product range, FRT = Full-Range Trader, PRT = Partial-Range Trader.
[a] while being active nationwide online grocery retailing is restricted to certain areas, mainly metropolitan areas. [b] estimated values for hellofresh.de (Graf 2017). [c] company forecast for 2018 was estimated at 2.5 Mio. Euro (Ksienrzyk 2018).

Each cluster of market participants is distinguishable from the viewpoint of their individual predisposition; however, it remains crucial to understand the evolution of the market. Most of the market is still dominated by traditional retailers (mostly in terms of quantity (see **table 2**) that converted their bricks-and-mortar towards a bricks-and-clicks approach (Wollenburg et al. 2018).

These *traditional retailers* (such as REWE and Edeka) offer eGrocery as an addition to their bricks and mortar business. These companies are threatened by the competitor online businesses weakening their market share. They are relative newcomers to using the online sales channels. Due to decentralised decision-making and organisational structures (such as various and diverse ownership structures and business approaches) they often struggle to adapt to what the other pure online players are doing. On the flip side, they have fundamental knowledge of the market and the advantage of a well-known and trusted brand (Perkins 2001). Still, the grocery segment is characterised by lower overall margins as the current example of "Real" underlines (Kläsgen 2019).

A second group of companies in the German eGrocery industry are *pure online players*. These companies challenge traditional retailers. They face the disadvantage of an unknown and potentially untrusted brand and are challenged with the establishment of trust and recognition which is intensive both in time and financially (Perkins 2001). They mainly tend to focus on – innovative – niche markets (e.g. sustainable meat[1], beverages[2]) or geographical regions to effectively use their resources. Another notable mention is the newly formed Dutch company picnic[3] which focusses on partially servicing the German market in a pure online fashion. The company predicted its revenue in 2018 at 2.5 million Euro and has shown immense growth in the last three years (Ksienrzyk 2018). This cluster is often characterised by high insolvency rates and strong segmentation which complicates data collection.

The third form of new players can be described as *logistic experts* such as DHL (allyouneed.com) and Amazon (amazonfresh.de) which have diversified their existing business with the selling or delivery of groceries and have largely impacted the economic environment (Amazon for instance increased its revenue from 2016 to 2017 by 17.60 percent, see **table 2**). They benefit from their sophisticated delivery network (Nufer and Kronenberg 2014) and advanced experience in logistics.

[1] See www.besserfleisch.de for further information.
[2] See www.flaschenpost.de for further information.
[3] See www.picnic.app/de for further information.

Methodology

The results outlined in this paper are based on the evaluation of 20 semi-structured expert interviews. The chosen interviewees come from various backgrounds regarding their industrial affiliation (associations such as chamber of commerce, food retailing industry and related industry such as web content agencies) and their hierarchical position. The experts were chosen based on their individual potential to estimate the current state of the industry in general and to estimate possible future scenarios in particular. Furthermore, they were asked to evaluate success factors and obstacles within the industry regarding consumer preferences. The chosen method for analysing the interviews was a qualitative content analysis using MAXQDA (Vers. 2018). The interviews were therefore coded by category of the statements made by the interviewees.

A total of 20 experts (subsequently referred to as E01-E20) were chosen to partake in this study out of 98 inquiries sent out (return rate = 20.41 per cent). Out of the 20 experts twelve were working within retailing itself, three were working for associations and the remaining five participants were working in related industries. Most participants were male (15 out of 20 interview partners). In their daily work routine all of the experts had contact with the topic of digital grocery retailing thus confirming their experience within the field as above average. Detailed information on the interviewees can be found in the appendix. All interviews were conducted between July 2017 and September 2018.

Results

Status Quo and Experts´ Personal Level of Experience

All experts agreed that the current state of eGrocery within Germany can be seen as a supplement to the stationary grocery distribution. While many experts view significant importance within eGrocery, various reasons are hindering a larger importance at this point. As expert E03 states: '*There is just no way to completely avoid the stationary supermarket for now.*'

One expert describes this as a co-dependency between stationary and digital grocery shopping as the storage often requires stationary supermarket facilities for storage and distribution (E08). One expert particularly pointed out the supporting elements of a digital grocery strategy that can be largely beneficial to the stationary supermarket by '*digitalising the shopping experience*' (E10). Another mentions the Internet's speed for information gathering and resulting

transparency as not suitable for grocery shopping (E05). While price comparison sites are fairly popular amongst most product categories they fall rather short when it comes to comparing grocery prices[4]. Even though being personally affiliated with the online grocery sector, only one-third of the experts had ever ordered groceries online for their personal use. The main reasons for this behaviour was explained by the close physical proximity to a store (E10; E15). Experts that had purchased groceries online prior to the interview mainly bought specialities such as imported articles from foreign countries (E13; E16). The answer of expert E09 was particularly interesting as he had only ever used it while his wife was on vacation but immediately stopped using the service after '*two to three weeks when my wife returned*.'

Chances and Risks

When it comes to potential chances in the grocery retailing environment being created by online grocery distribution, this occurs for a couple of reasons. There is strong agreement that the main opportunity lies in strengthening the bond with the customer base and some experts see the potential to extend their target groups (E12; E01; E02; E07); one expert specifically states a potential target group as '*elderly and mobility-impaired people and health affectionate young families*' (E01). Other reasons were diversification of the company strategy (E02), more efficient data gathering and consumer profiling (E06), better opportunity for niche products (E03; E05) and in creating market barriers for other companies (E04).

We furthermore asked the experts to point out specific risks of digital grocery selling. A frequently brought up reason is related to company-specific restructuring that may be required to keep up with the digital age and especially when looking at the competition between bricks-and-mortar retailers gone digital and pure online players which may result in the loss of a retailers USP (unique selling property) altogether (E04). Two experts point out that the early stages of eGrocery may discourage consumers due to inefficient services (E07; E08). Another argues that an oversupply may harm the industry and result in consumers refusing to adapt to the digital structures (E06).

[4] With the exception of Simplora (https://www.simplora.de/) that offers price comparison and direct ordering via their own site (Nufer and Kronenberg 2014, 14).

Success Factors

Within the expert interviews the following success factors were mentioned (listed by frequency):

- Logistics and delivery conditions
- Technological infrastructure
- Assortment
- Pricing
- Shopping experience and webpage design
- Convenience
- Customer service and complaint management
- Data security
- Quality[5]
- Staffing requirements

Logistics and Delivery Conditions

Within the interviews we found that the experts differentiated logistics into four main parts being the storage, physical transportation, the delivery timing and, the distribution cool chain. The consumer however, is mainly affected by the latter two of these. One of the main problems with digital grocery retailing as seen by experts is the distribution cool chain (E08; E05; E10) as it correlates with a certain cost level but being a crucial success factor for customers. Expert E05 points out the two-fold argumentation when it comes to logistics: '*The economic aspect is as crucial as the unscathed delivery of goods, particularly with fresh goods.*' This is somewhat contrary to Expert E01 who argues that customers will not be willing to pay for delivery fees. E08 agrees but points out that there is currently no possibility to do so because of the high level of investment required.

E03 views Amazon and companies with well-adjusted logistics in a fortunate position and points out the possibility for local producers and sellers to use their platforms and market places thus resulting in larger market penetration and diversity. The most discussed topic within logistics however, remains the distribution cool chain. E05 and E08 argue that an average grocery shopping basket contains a variety of products with individual refrigeration

[5] Quality was seen as a basic necessity by all experts and was therefore excluded from further in-depth discussion.

requirements. The main possibility to solve this is seen by many experts to be delivery stations[6] with an installed refrigeration system. E10 sees possibilities to have the grocery delivered at neighbours or at the office, however these options somewhat contradict the distribution cool chain aspect. A flexible delivery time may only be possible with very efficient logistics (E08). Most retailers do offer this possibility but charge the consumer for using it, thus rendering the online grocery shopping less attractive.

Technological Infrastructure

'*If I want to go the way of digitalisation I need the necessary technology*' states E05. Generally all experts agree that the importance of technological aspects is crucial to the success of digital grocery retailing or as E07 states: '*It is the absolute base of the business. If the system is not running the rest isn´t either*'. E10 contends that the '*usability, utility, loading times and the clarity are essential'* and then specifies loading times greater than 30 seconds to be not suitable anymore. The expert directly relates this to the weaker internet infrastructure generally found in Germany and specifically within rural areas.

Assortment

In terms of assortment range most experts see digital grocery retailing in a fortunate position due to little to no limitations in (virtual) shelf space. E08 argues in favour of specialised assortments as being beneficial for both retailer and consumer. E10 sees pure digital players like Amazon in an advantageous position but highlights general restrictions for groceries: '(…) *variety is vital, various options to choose from. I am not certain that can be reproduced for online grocery retailing.*'

Pricing

A big problem with digital grocery shopping is seen in the value of the customer shopping basket. Expert E10 argues that, in order to work profitably, companies have to extend their reach to consumers like '*families that do their weekly shopping online with spending somewhere around 250 CHF* [Note: equals approx. 215 Euro]', while shopping carts with a

[6] Delivery stations are stationary storage units provided by Deutsche Post. Users can use their smartphone to access stored deliveries using a TAN system. As of 2014 there were a total of approximately 2,750 stations throughout Germany with over five million registered users.

value of '*40 something Euro*' just do not result in the desired economic outcome. Companies have thus far tried to eliminate low-value shopping baskets by introducing minimum order values (e.g. 40 Euro for REWE Online; 20 Euro for Edeka – but free of the delivery fee of 75 Euro). Some experts agreed that convenience of online grocery shopping needs to be reflected within the price (E02; E05) and highlight the high price sensitivity of German consumers (E02). A potential solution is mentioned by expert E10 in the introduction of subscription-based long-term contracts between consumers and online grocery retailer.

Shopping Experience and Webpage Design

In terms of shopping experience there are again two main streams of argumentation to be found in the interviews. On the one hand, groceries are very tactile products that consumers like to inspect before purchasing, while on the other hand, literature suggests that there is a wish to shorten time spent to and within the supermarkets. E04 states that the best grocery shopping experience for the customer is the one '*where he or she* [the customer] *gets out the fastest*.'

As the internet is not able to stimulate tactile senses most experts see potential to increase the online experience in two ways. First is the usage of '*suitable images to transport emotionality*' and rich and well-written information (E11). Another way of increasing the perceived shopping experience is by adding additional services like '*recipes or comment and service functions*' (E06). In terms of the appearance within the shop itself expert E10 argues that the homepage has to make the consumer feel welcome and create a pleasant atmosphere. E10 says that this could be achieved by the usage of suitable pictures and short but expressive texts. E11 argues that pictures are particularly important as consumers tend to be very sceptical about groceries when they do not have the option of physically evaluating them prior to the purchase. E11 also adds the legal restrictions on grocery information for consideration. This particularly accounts for grocery information on antigens regarding possible allergies. A fastidious care of the core data on all grocery goods furthermore enables valid filtering options within the search functionality. E11 illustrates this with problematic search results in the case of a search for a specific product but the results listing every product partially containing initially searched products. The expert furthermore criticizes various search entries for the same product by different producers which is not '*beneficial for the shopping experience*'.

Convenience

Convenience was perceived to be one of the strongest arguments for consumers however all experts saw online grocery shopping as advantageous compared to bricks-and-mortar shopping. E10: *'Yes personally I would argue convenience to be the most important factor for consumers.'* The convenience aspect was also seen as potentially more attractive for certain consumer types such as '*people that work all day*" (E15) and '*those who perceive weekly shopping as a burden*' (E08).

Customer Service and Complaint Management

Additional services were seen as the main tool for customer engagement and retention. E01 states that customers want to do '*as little thinking as possible*' when shopping online and suggests the usage of recipes and nutrition advice based on the consumers' shopping basket. Furthermore, social interaction is mentioned as a way of engaging with consumers: '*Ideally the retailer has someone you can initially contact via chat or phone*' (E10).

All experts agreed that the complaint management and specifically the return of goods is a critical point in online grocery shopping transactions. Complaints have to be handled '*swiftly*' (E08; E10) and '*without objection*' (E01; E09). Almost all experts do agree that online retailers fulfil these standards due to the critical nature of the issue: '*They simply cannot risk not being completely cooperative if they want customers to keep using their service*' (E10).

Data Security

Data security was not an issue for some experts: '*With the new generation of consumers that are used to social media platforms* (…), *that is just no issue for them*' (E09); '*Data security is just not that important anymore*' (E10). In general, almost all experts agreed that the importance of data security was declining (E07; E03) but all argued that this is because retailers are already fulfilling the expectations in terms of data security: '*Consumers take data security for granted and retailers naturally fulfil this*' (E04).

Staffing Requirements

Only one expert paid attention to the topic of staffing requirements and sees positive development in the near future: '*How do I train my staff? This development is gradually*

happening (…) eCommerce business administrator will be a qualified job to meet the requirements' (E05). However, both E19 and E20 argued on the potential of job creation by OGS retailing and facilities in structurally weak areas and regions.

Outlook and Prediction

We can generally describe the expert opinion within two categories when it comes to predicting the future of online grocery shopping. While only one expert argues for a stagnation (E01) most experts either see moderate or radical growth and developments within the area. However, most experts agree that a significant share within grocery selling is not expected soon but rather within a timeframe of five to ten years (E09; E11; E06).

Most experts differentiate their prediction depending on the region. While growing cities provide solid infrastructure for delivery this cannot be said for the broader countryside. Therefore, some experts relate their predication to advancements within technologies that may enable quicker and larger adoption. The main two advancements identified here are developments within the means of transportation and delivery (such as using drones while maintaining the distribution cool chain) and smart home applications and alike[7] being integrated into day-to-day life. E09 extends this analysis and argues on behalf of '*personalised stores*' - independently from being physical or virtual - which for instance just display products suitable for the consumers' individual taste or health condition: '*If you are diabetic it will simply not show you any products containing large quantities of sugar*'. Concepts like these could be realised using virtual and augmented reality applications and hardware. E09 further points out that this concept could work both ways and emphasizes the general '*interactivity of shopping spaces*' regardless of whether they are digital or physical.

In terms of competition within the market the experts commonly see an increase within the next years, however they conclude that eventually '*only a couple of players will remain*' (E03). Expert E02 is certain that the remaining companies will be those '*with the strongest financial power such as Amazon Fresh, REWE and Kaufland*'.

[7] For instance an increased usage of dash buttons or voice operated systems like personal assistants (E09).

Discussion and Conclusions

In this exploratory study we found differing opinions on the German eGrocery market that to some extent reflect the findings in literature and industry studies. Even though all industry expert interviewees had a professional background within the industry very few tried online grocery shopping themselves. This may be symptomatic in terms of consumers having completely integrated and ritualised the trip to supermarkets as part of household life. This could be explained by social interaction and the broader shopping experience as a main driver. Academic and industry studies identify similar behaviour in ways that consumers tend to use online and offline grocery retailing in parallel (Burt et al. 2015, 5), often depending on their current situation (Hand et al. 2009). This cannot however, be directly influenced by retailers besides adapting advertising and marketing strategies.

In terms of success factors various reasons were mentioned by experts that have already been the issue of academic and industrial acknowledgment. The logistical aspects seem to be dominating in terms of importance and relative non-fulfilment. This is true for both on-time delivery as well as the maintenance of the cool chain. These findings are in line with previous research on the need for "synchronisation" of distribution systems with marketing strategies as these systems are "increasingly having direct contact with customers, and influencing customer services" (Hübner et al. 2019, 307).

In order to increase transparency and reduce potential risk perception with consumers' retailers could implement live-tracking for their food delivery vehicles. These live-tracking information systems provide consumers with the location of the vehicle and predicted time of delivery. Similar systems are currently used by various food delivery service providers thus potentially enabling easy integration for eGrocery retailers. This would also contribute to increasing the personalisation aspect of digitalisation and hence potentially increase identification with the service offering. A second solution that was raised by the experts are delivery stations which are already in use but so far mainly focussed in metropolitan areas. Necessary investments are seen as crucial by experts – specifically in terms of delivery infrastructure. These investments could partially be covered by delivery fees. Huang and Oppewal (2006, 347) found that delivery fees may not be as concerning as anticipated by the experts in our study. It is noteworthy that these findings resulted from a study undertaken in Great Britain where we generally find a different scenario in terms of supermarket coverage and density. A similar analysis can be found at Chintagunta, Chu and Cebollada (2012). This argumentation has also been used by Nufer and Kronenberg (2014, 14f.). The authors find positive reinforcement for their statements in

the UK (lower supermarket density when compared to Germany) and Switzerland (earlier closing hours when compared to Germany) that may influence the willingness to use online grocery shopping. To which extent delivery fees might function as an obstacle therefore remains unclear at this point.

Amongst the expert opinions we find broad agreement towards the necessary technological foundations in order to properly offer online grocery shopping services. A retailer's influence on the realisation on this remains small, as the topic is primarily of political nature. The influence of technological infrastructure is not to be neglected as there seems to be indication of a correlation between broadband internet connection availability and high-speed internet connections and the share in online grocery shopping. This can easily be illustrated with examples such as South Korea and China.

Another problem identified by the experts is the discrepancy between average basket values and the minimum order value. This may result in a perceived financial disadvantage on the customer side (Nufer and Kronenberg 2014, 13), particularly when considering the average receipt value on grocery shopping in Germany. As German consumers decrease their number of shopping trips the average receipt value increased to an average of 16.74 Euro for FMCG goods in 2017 (GfK 2018, 1). This implies a more structured and organised approach towards grocery shopping (GfK 2018). This effect is diminished within particular consumer groups: The average shopping receipt value of a family (22 to 24.10 Euro) and young couples (19.90 Euro) being above-average (Nielsen 2016, 54). Increasing receipt values and a more structured approach towards grocery shopping might be beneficial for online grocery retailing mid to long-term, however the difference between average value and minimum order value is still large. This does however, provide room for innovative companies that address niche markets as price sensitivity may be of lower importance here.

In terms of shopping experience, the findings would indicate that companies need to focus on a transformation and adoption of their service offerings to the digital world. Online chat clients may be a way of further implementing a seamless customer experience and the integration of social media plug-ins could add a layer of social interaction to the online shopping experience. This may enable identification and help facilitate customer retention. Hübner et al. (2019) see further potential for innovation with shared economy approaches being on the rise.

This may again be a domain where pure online players may take the lead as they already operate and facilitate similar systems. In times of demographic changes and globalisation the integration of elderly and rural structures may furthermore be of critical importance to penetrate

different and underdeveloped consumer segments. Regarding staff requirements we foresee the increasing importance of tailored training towards e-commerce. As of August 2018 the German Chamber of Commerce (IHK) listed e-commerce agent as a qualified full-time apprenticeship (Industrie- und Handelskammer 2018). It therefore appears as if this topic is being addressed.

Limitations and Future Research

Due to the exploratory nature of this study the research design finds itself not without flaws. First the selection of industry experts is always subject to personal preference and decision criteria as well as availability of inquired experts. By including a broader range of affiliations, the findings in this study could be refined. This may also help to better understand specific business approaches. This may be particularly true when considering the geographical restrictions as well: most experts were based locally so results from larger metropolitan regions may vary due to easier access and a therefore higher level of development and adoption. Secondly, the statements on customer preferences need to be validated.

From a future research viewpoint we propose focus groups sessions of German consumers similar to existing research (Hand et al. 2009; Morganosky and Cude 2000; Ramus and Nielsen 2005;). This could also help to identify culture specific perception and expectation towards online grocery retailing. The same accounts for a similar study to this one with focus groups of experts from different countries. To deepen the understanding subsequent quantitative and qualitative research on consumers should be assessed to validate the estimations of the experts in this study. Future research may furthermore pay attention to the integration of mentioned societal changes (globalisation, digitalisation and demographic changes) and their consequences for online grocery retailing potential. As potential technological advancements may come into place within the near future, the structure of the industry may be significantly altered which could render current predictions somewhat tenuous.

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Appendix

Appendix: Detailed information on the interviewees

Participant	Branch	Business model	Experience	Department / Position	Company information		
					General information	MS[a] (in per cent)	Time Active in OGS
E01	R	BnC	2 years	Food Manager	Regional food producer	n.a.	< 2 years
E02	R	BnC	5.5 years	Head of Quality Management	Outlet of large German grocery retailer	14.50	> 5 years
E03	R	BnC	5 years	Head of R & D	Outlet of large German grocery retailer	20.30	> 5 years
E04	I	n.a.	3 years[b]	Innovation Manager	Consulting agency for retailing formats	n.a.	n.a.
E05	R	BnC	5 years	Team Leader HR development	Outlet of large German grocery retailer	20.30	> 5 years
E06	P	n.a.	2 years	Digital Marketing Consultant	Local outlet of German food retail association	n.a.	n.a.
E07	I	n.a.	10 years	Data Security Commisioner	Local outlet of Chamber of Commerce	n.a.	n.a.
E08	R	BnC	2.5 years	Digital Marketing Manager	Outlet of large German grocery retailer	20.30	> 5 years
E09	I	n.a.	1 year	Chairman	Outlet of large German grocery retailer	n.a.	n.a.
E10	R	BnC	9 years	Assistant Store Manager	Outlet of large German grocery retailer	14.50	> 5 years
E11	I	n.a.	6.5 years	Managing Partner	Local outlet of German food retail association	n.a.	n.a.
E12	R	BnC	2 years	Trainee Replenishment	Outlet of large German grocery retailer	14.00	> 5 years
E13	R	BnC	3 years	Employee Retailing	Outlet of large German grocery retailer	14.00	> 5 years
E14	R	BnC	7 years	Proprietor	Outlet of large German grocery retailer	20.30	> 5 years
E15	R	BnC	1.5 years	Employee	Outlet of large German grocery retailer	14.00	> 5 years
E16	R	BnC	6 years	Proprietor	Outlet of large German grocery retailer	20.30	> 5 years

E17	R	BnC	4.5 years	Employee	Outlet of large German grocery retailer	14.00	> 5 years
E18	I	n.a.	3 years	Employee	Outlet of large German grocery retailer	n.a.	n.a.
E19	P	n.a.	2.5 years	Infrastructure manager	Local outlet of Chamber of Commerce	n.a.	n.a
E20	P	n.a.	4 years	City development manager	Local outlet of Chamber of Commerce	n.a.	n.a.

Notes: R = Retailer, P = Public Institution, I = Related Industry; BnC = Bricks-and-Clicks, PO = Pure Online, n.a. = not applicable / not available; MS=Market Share. [a] Source: Lebensmittel Zeitung (2018) [b] E04 had prior experience (4 years) within innovation management at a large German grocery retailer.

Chapter II.2 Icing the Cake: A Lifestyle-based Benefit and Preference Analysis on Online Grocery Shopping

Philipp Piroth and Edith Rüger-Muck

Declaration of Contribution

This article resulted from a collaboration with ERM. The areas idea and conception, conduction of the study and writing of the article have been mainly covered by PP. I would like to acknowledge the following contributions. The idea was developed in close collaboration with ERM. The conception was developed in close collaboration with ERM. The initial draft of the article, data gathering and analysis was covered by PP. Final version was written in close collaboration with ERM.

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Icing the Cake: A Lifestyle-based Benefit and Preference Analysis on Online Grocery Shopping

Abstract

Germany has not kept pace with the global development of online grocery shopping (OGS) and despite a pandemic-related increase remains on a moderate level. This phenomenon may reflect infrastructural benefits of stationary retailing, personal and household preferences, and perceptions of OGS services. To this end, this study investigates the determinants of OGS benefit perception addressing the interconnection between personal and household benefits and situational conditions based on qualitative data analysis. Data in three consumer lifestyle segments are gathered from a total of twelve German consumers. The study's theoretical structure resorts to the theory of planned behavior (TPB) to cluster beliefs and to assess the impact of situational conditions. The study's findings reveal large knowledge gaps and different individual preferences in service usage across the groups. We then reflect these preferences in the circumstances of the pandemic. We propose that retailers should increase advertising and consumer education efforts in some consumer segments while enhancing services transparency to consolidate consumers' trust. On a mid-term level further structural investments will be necessary to successfully compete in the future and serve a perspectively growing market.

Keywords: *online food marketing, online grocery shopping, focus group research, consumer preference, theory of planned behavior*

Introduction

As of 2018 almost every second customer in Germany indicated an interest in buying food online (Donath 2018), yet the current share of revenue in the segment remains at a mere 2.0 per cent in 2020 (HDE, 2021, p. 8). To add some more context: The overall online share of German retail commerce is estimated at 12.6 per cent at a revenue volume estimated at 577bn Euro of which 204bn Euro relate to the food segment as of 2020 (HDE, 2021, p. 8).

At the same time, the segment is expanding at an annual growth rate of almost 60 per cent unitl from 2019 to 2020 (HDE, 2021, p. 9) outpacing the overall e-commerce performance (estimated at 17 per cent for 2021; HDE, 2021, p. 6). This renders OGS as a economically attractive market segment prone to dedicated marketing activities and a fruitful research area to study adoption patterns of digitalisation within the complex category of food products.

OGS services in Germany are mainly operated via home delivery by pure online market participants (e.g. Amazon) and stationary retailers (e.g. REWE) supplementing their existing offline channel (Piroth, Rüger-Muck, & Bruwer, 2020). The slow OGS adoption in Germany may depend on various country / culture-specific factors: Germany records the highest supermarket density in Europe (Nielsen, 2018, p. 215), fairly liberal opening hours, and consumers largely agreeing to be "*happy with the status quo*" of grocery retailing in Germany (Seitz, Pokrivčák, Tóth, & Plevný, 2017). Dannenberg, Fuchs, Riedler, and Wiedemann (2020) however, point out the infrastrastructual weaknesses of OGS particularly in rural areas, and van Droogenbroeck and van Hove (2017) highlight household-level analysis as food shopping is found to be influenced by the individual household set-up.

To this end, this study explores the perceived advantageousness of OGS services of three specific archetypal customer segments. We understand perceived advantageousness as the point in time where a consumer may be inclined to completely substitute their stationary food shopping via online channels. Many researchers have conducted qualitative research in OGS with different methodological approaches (Elms, Kervenoael, & Hallsworth, 2016; Hand, Dall'Olmo Riley, Harris, Singh, & Rettie, 2009; Piroth, Rüger-Muck, & Bruwer, 2020; Ramus & Nielsen, 2005; van Droogenbroeck & van Hove, 2020a, 2020b). This study's methodological set-up is grounded on earlier research succesfully applying qualitative measures in countries such as Denmark and the UK (Hand et al., 2009; Ramus & Nielsen, 2005). This article concludes with recommendations to retailers to adequately attract and market to these consumer segments to increase the overall accessibility of OGS services. To our knowledge, it is the first study that combines individual avantagesousness and strives to show the value of in-depth data

and interpretation stems from its ability to contextualize quantitative research and illustrate "everyday" consumer behavior in online food shopping, generating actionable advise to practiconers.

Literature Review and Research Questions

Preference analysis has been performed within OGS since the early market development (Jukka, Jukka, Timo, & Kristiina, 1998; Morganosky & Cude, 2000, 2002; Raijas & Tuunainen, 2001), given its implications for customer segmentation. For instance, Wilson-Jeanselme and Reynolds (2006, p. 539) recommend "*a segmentation of consumers based on understanding their expressed preferences as opposed to more traditional segmentation methods*" as consumer groups may be similar in certain preferences despite their differing characteristics. Brand, Schwanen, and Anable (2020) argue that there is no "*average online grocery shopper*" due to heterogenety in consumer preferences. Many of these advantages can be linked to target consumer segments such as mobility-impaired customers, elderly and disabled (Jukka et al., 1998; Seitz et al., 2017), time-savvy families, and "double Income no Kids" households (Raijas & Tuunainen, 2001). These groups seem to particularly benefit from OGS service; however, they face different individual obstacles, as shown by van Droogenbroeck and van Hove (2017) in the context of an comparing personal and household-level adoption of OGS services. This can be easily illustrated using the example of its distributional set-up. Retail operates online food purchases via two main distributional approaches: click-and-collect and home delivery. The individual benefit of, and subsequent satisfaction with OGS service usage is found to be trip (Chintagunta, Chu, & Cebollada, 2012) and shopping mode (Nilsson, Gärling, & Marell, 2017) dependent. The two distribution approaches have been shown to generate different customer values across customer segments (Vyt, Jara, & Cliquet, 2017). Previous studies agree on convenience and time-saving as primary determinants of OGS service usage (Morganosky & Cude, 2000; Picot-Coupey, Huré, Cliquet, & Petr, 2009; Raijas & Tuunainen, 2001; Ramus & Nielsen, 2005; Seitz et al., 2017).

The individual benefit of OGS service offerings seems related to a consumer's personal preferences and situational conditions. Many quantitative studies focus on the assessment of individual OGS usage motivation (Hansen, 2008; Hansen, Møller Jensen, & Stubbe Solgaard, 2004; Piroth, Ritter, & Rueger-Muck, 2020); however, OGS adoption may be "*related (at least in part) not to personal but to household characteristics*" (van Droogenbroeck & van Hove, 2017, p. 258). The authors argue that ability and motivation may not necessarily coincide as a

(tech-savvy) household may be able to resort to OGS but refrains from doing so as long as one person in the family can do the grocery shopping in-store (ibid.). However, the very same household set-up has a potentially higher advantage in using click-and-collect service offerings related to "research online, buying offline" customer segments (Vyt et al., 2017, p. 146) and has the potential to substitute in-store grocery shopping. Different value predispositions and benefits have been illustrated by various levels of advantageousness when comparing the impact of socio-demographic attributes on a personal (e.g., age, income) and household level (e.g., household size, the existence of dependent children) (Hansen, 2005; Hiser, Nayga, & Capps, 1999; Hui & Wan, 2009). These phenomena are in line with previous findings on changing situational conditions (such as changes in job or family configuration and health issues) as initial triggers of OGS usage (Hand et al., 2009). These triggers affect the beneficial predisposition of the service by altering the personal and/or household advantageousness. Preference-based consumer segmentation analysis has received increasing attention in the literature, including cluster analysis (e.g. Brand et al., 2020). Studies on consumer segmentation in OGS generally find three to five cluster solutions, depending on the theoretical background. Hand et al. (2009, p. 1213) propose a three-cluster solution with a health-and-kids-focused segment, highlighting the influence of situational conditions in the adoption process.

Consumer and market segmentation and their success potential have arisen as topics of interest in the literature (Jukka et al., 1998; Shea & Zivic, 2011). Wilson-Jeanselme and Reynolds (2006, p. 539) highlight the importance of the interaction between, and the attributional combination of, consumer expectancies toward OGS.

Hence, we propose the following research questions (RQ):

- ***RQ1.*** *How do consumer target segments differ in their individual knowledge?*
- ***RQ2.*** *How do consumer target segments differ in their individual benefits?*
- ***RQ3.*** *Which relational (personal, household) conditions influence individual perceptions of the benefits?*

The next section will explore the theoretical framework used to examine consumer beliefs and benefit perceptions of OGS services.

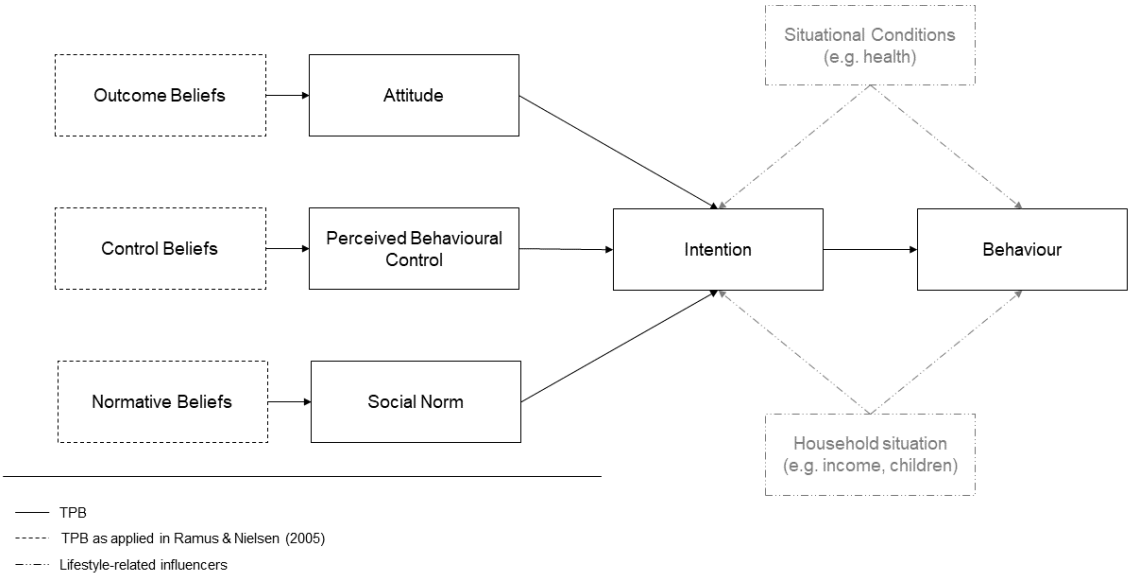
Materials and Methods

Theoretical Framework

Ramus and Nielsen (2005) apply the Theory-of-Planned-Behaviour (TPB) approach as introduced by Ajzen (1991) to evaluate consumer beliefs amongst users and non-users of OGS services in Denmark and the UK based on focus group data. They translate the attitude, social norm, and perceived behavioral control dimensions from the TPB construct to outcome, normative, and control beliefs, respectively. Attitude describes the individual perception of a specific behavior's advantageousness, social norm reflects the pressure to perform a certain behavior, and perceived behavioral control describes the individual capabilities to perform a given behavior (Ajzen, 1991; Ajzen & Fishbein, 1980).

Ramus and Nielsen (2005, p. 348) report that "*experienced and inexperienced internet shoppers did not differ very much in their pool of stated outcome and control beliefs*" and a "*remarkable overlap in positive and negative beliefs* (…)" toward OGS was reported. TPB is grounded on the argumentation that attitude, social norm, and perceived behavioral control constitute one´s individual intention to use a service, proposing that intention may result in behavior. However, Donath (2018) shows that even though almost 50% of German consumers state the intention to use OGS, the actual usage rate is drastically low. In this article, we argue that both situational conditions and household characteristics influence the OSG usage intention and behavior (see **Figure 4**).

Figure 4. Theoretical Framework.



TPB approaches are a common methodology in OGS research and have found application in both qualitative (Kureshi & Thomas, 2019; Ramus & Nielsen, 2005) and quantitative (Hansen et al., 2004; Hansen, 2008; Piroth, Ritter, & Rueger-Muck, 2020; Troise, O'Driscoll, Tani, & Prisco, 2021) research set-ups.

Approach and Procedure

Following Ramus and Nielsen (2005), we propose an exploratory design for focus group sessions in which participants were able to freely express their experiences and expectations with OGS. Krueger (1994) found that participants were more willing to share their experiences in homogenous groups. We created such groups based on their socio-demographic features and living situation but adopting different views (in line with the above-mentioned score) on the matter, enabling some controversy in the discussions. We also followed suggestions by Freitas, Oliveira, Jenkins, and Popjoy (1998, 12f.) to include strangers and balance groups in terms of gender.

This study used single (D. L. Morgan, 1996) mini focus groups (Kamberelis & Dimitriadis, 2011) with dual moderation (Krueger & Casey, 2015).

Each focus group's session duration and group size were set between one and two hours for four participants, in line with academic recommendations (Krueger, 1994; D. Morgan, 1997; Vaughn, Schumm, & Sinagub, 1996). Each focus group discussion was sequenced as follows:

- Short introduction to the topic via video presentation;
- Participants shared their previous experience with OGS services in an open discussion;
- Participants evaluated their most crucial preferences and benefits as well as obstacles and concerns with the service in an open discussion;
- Each session concluded with participants sharing their expectations for future OGS activity and usage intention.

The moderation of the focus group was based on a lightly structured questionnaire. We only resorted to the guidelines when the discussion came to an end to provide enough conversational space for the participants. All focus group sessions were recorded using a multidirectional table microphone and then transcribed. Participants were encouraged to freely share their OGS experiences, individual preferences, and expectations with the group as all data were anonymized to comply with data privacy concerns. We provided coffee and light refreshments to create a welcoming and relaxing atmosphere during the sessions.

Data Analysis

We facilitated transcript-based qualitative content analysis using MAXQDA Vers. 2020 (Verbi GmbH). All transcripts were coded based on the TPB framework by two researchers; remaining issues on unclear and inconclusive coding were discussed and resolved among the involved scholars. Each dimension of beliefs was first reviewed within each focus group session and then across group sessions.

Participant Selection

Participants were selected based on their suitability for the study by answering an online pre-study questionnaire distributed to 98 people via e-mail at a research facility in Southern Germany. Suitability was assumed if the participant had a) prior purchasing experience with OGS and b) a noteable opionion towards the matter. Using a scoring approach (five-point scale ranging from "strongly like it" to "strongly dislike it"), potential participants were classified into three distinct groups based on similar living conditions (e.g., household set-up) but different opinions toward OGS. A total of 22 replies were received, and 12 participants finally agreed to partake in the study. Their opinions were measured for a second time at the end of the session to account for, and report changes in opinion induced by the focus group session itself. Seitz et al. (2017) and Jukka et al. (1998) identified and discussed three consumer segments of OGS users that underline a consumer life-cycle approach to adoption research. All three identified segments were shown to have interest in OGS usage (Seitz et al., 2017, p. 1251) and were, therefore, used in this study.

Focus Groups

Young consumers with urban and sub-urban lifestyles were included in the first focus group, referred to as Young Professionals (YP). The average age in this group was 24 years (SD=1.87), and the gender ratio was 50%. Most participants (75%) lived in a flat arrangement with a domestic partner, while one participant lived in a flatshare. The living location of all participants could be described as urban and suburban. The group generally had a positive opinion toward OGS, and the conversation share was equally distributed within the group (*range=6.97%*). The YP group had an average household income of approx. 2,000 Euro per month. In terms of education, two participants had finished apprenticeships, one had completed general

qualification, and one participant was working as a foreman. Besides the foreman, all three participants were enrolled as students.

The second focus group consisted of four female participants between 33 and 50 years old (*M=38 years; SD=7.4*) in different family arrangements (two with more than one child, two with one child, one of each as a single parent). They lived in mixed locations and had fairly diverse opinions toward OGS. This group earned slightly more than the younger group, 2,050.40 Euro per month, and will be referred to as Family (F).

The third focus group had an average age of 58.25 years (*SD=2.17*) and a gender ratio of 50%. Both the living situation and location varied across participants. The average household income in the group was approximately 2,700 Euro per month, and the mindset toward OGS could be described as indifferent for the group (with two participants in favor and two against). In terms of education, this group could be described as above average (with three participants with an academic background). As the term Best Ager has been largely recognized in the German literature and linguistic area, this group was referred to as BA. However, the terms silver surfer, golden ager, and over 50´s are used more or less synonymously in the literature. The complete socio-demographic characteristics of the study's participants are summarized in **Table 3** alongside the conditions of each focus group session.

Table 3. Descriptive Statistics of Participants and Session Conditions.

Participant / Session	Age	Gender[a]	Net Household Income in €	Household Configuration[b]	Living Location[c]	Att[d] (Pre)	Att[d] (Post)	Speaking Contribution[e] (in percent, incl. mod.)
Hannah, YP	24	F	1,001 – 2,500	C	U	+	+	18.42
Ben, YP	23	M	2,501 – 4,000	FS	U	-	-	14.80
Emma, YP	27	F	< 1,000	C	SU	+	+	19.41
Jonas, YP	22	M	1,001 – 2,500	C	U	+	+	18.42
Mia, F	38	F	1,001 – 2,500	SP	SU	++	++	6.98
Amelie, F	50	F	1,001 – 2,500	F	SU	+	+	12.56
Anna, F	31	F	1,001 – 2,500	SP	U	--	++	16.74
Emily, F	33	F	2,501 – 4,000	F	SU	0	+	21.40
Elisabeth, BA	61	F	2,501 – 4,000	C	SU	-	-	21.96

Wolfgang, BA	58	M	1,001 – 2,500	S	U	+	++	23.51
Ida, BA	55	F	2,501 – 4,000	F	RU	-	+	8.53
Peter, BA	59	M	> 4,000	F	SU	+	-	20.41

Notes: [a] Gender: M = Male; F = Female. [b] Household situation: S = Single; FS = Flat Share; C = Couple flat (no children); F = Family with one or more children; SP = Single parent. [c] Living location: U = Urban, SU = Suburban, RU = Rural. [d] Attitude was measured before the session (pre) and shortly after the session had taken place (post). A total of four changes in attitude have been registered and are highlighted in bold font. Ratings: ++ = very positive (+2); + = somewhat positive (+1); 0 = indifferent (0); - = somewhat negative (-1); -- = very negative (-2). [e] Speaking Contribution of each participant. Moderation to be included for 100 per cent.

All participant names were anonymized to ensure data privacy. The full anonymized transcripts in German are available upon request. All focus group sessions took place in early to mid 2018.

Focus Group Sessions

The intensity of the focus group discussions varied across sessions (**Table 3**). We also reported that four participants changed their opinion toward OGS during the focus group sessions. The majority of those who changed their mind were in the BA focus group, indicating problematic opinion leadership within the group (Marg, 2014). Three of the four participants who changed their mind left the discussion with a more favorable opinion toward OGS (see **Table 3**), hinting at potential gaps in consumer knowledge and awareness, as well as the crucial influence of peers (Piroth, Ritter, & Rueger-Muck, 2020; Ramus & Nielsen, 2005).

Results

The first part of this section provides the descriptive analysis of the focus group data and the dimensions that will subsequently be supplemented with qualitative assessment. The largest sections of the focus group discussion related to outcome beliefs and motivational aspects of the OGS service usage. Within this dimension, we were able to extract six thematic sub-sections that showed striking similarities with the reported data structure in Ramus and Nielsen (2005). As expected, the importance of the motivational aspects varied across target segments. For instance, younger consumers were more concerned with OGS pricing levels, while elderly consumers perceived the charges to be adequate for the added convenience. The findings were then divided into sub-sections for each beliefs dimension, for which detailed consumer remarks are reported. The belief structure across all belief dimensions is reported in **table 4** at the end of this section.

Outcome Beliefs

Six distinct groups of outcome beliefs regarding the usage of OGS services were identified:

1) Convenience and Ease of Life;
2) Shopping Experience and Enjoyment;
3) Pricing and Cost;
4) Social Responsibility and Sustainability;
5) Product Range and Service Availability;
6) Impulsiveness.

Convenience and Ease of Life. Across all focus groups, ease of life aspects were perceived to be crucial, with convenience being the primary influencer. All focus groups saw significant advantages in delivering groceries, particularly heavy goods (such as beverages), to the doorstep. In this context, the wide range of deliverables was highlighted using the example of *Flaschenpost*, a German online retailer invested in the sole distribution of beverages. All groups agreed that OGS improved the convenience and shopping experience at busy times. All groups perceived OGS as particularly relieving to young families or lone parents in their daily life routines. A BA group participant stated: "*I am temporarily mobility impaired and live on the fifth floor; so, why should I do the carrying myself?*" (Wolfgang, BA). All groups highlighted the utility of OGS to maintain autonomy in specific situations (e.g. sickness and job changes) or in the advanced age. In terms of time-saving, YP and BA groups perceived OGS to be only partially viable. The YP group argued that the full potential of time-saving would only be realized through same-day delivery, reflecting a preference for flexible shopping options.

Shopping Experience and Enjoyment. Both YP and BA groups described grocery shopping trips as "relaxing" (Wolfgang, BA; Emma, YP) and associated them with positive emotion. Wolfgang, BA stated: "*I actually enjoy going food shopping, (…) and just pray for a bit*." F and BA focus groups emphasized social interaction during grocery shopping, while this aspect played a marginal role for the YP group. While group F preferred social interaction, the BA group perceived OGS as potentially threatening toward social interaction. Wolfgang, BA illustrated this aspect using the example of home depot delivery systems: "*I would not even have to keep in with the neighbors anymore. I would not like that*."

Pricing and Cost. Cost appeared to be the most crucial issue for the YP group. They would be more likely to use OGS in the absence of additional charges, while BA consumers were easily

willing to accept the extra costs: "*For me, the additional five euro are easily worth it as I save myself the struggle of shopping*" (Wolfgang, BA). YP participants described their willingness to pay the extra charge as circumstantial:

> "*When I had stressful times during work, I was in no mood for grocery shopping, so I had it delivered. I still go to the supermarket mostly, though, because I do not want to spend the extra money on fees*." (Ben, YP)

> "(…) *if you buy in bulk, for a party or with your flatshare, where the costs are shared, it is not too bad*" (Jonas, YP)

Lower price sensitivity was observed in all focus groups for special products that were difficult to obtain (e.g., specialties) or had to be imported from abroad.

Social Responsibility and Sustainability. The BA group significantly differed from the YP and FS groups in this respect. BA participants strongly emphasized the need for social responsibility with OGS. They perceived it to cause the demise of rural stores, providing poor working conditions for OGS employees (specifical drivers), and adopting unclear data collection policies. Participants in the BA group were also more likely to support local farms and shops (such as bakeries, among others). The YP and FS groups perceived OGS as positive in terms of the potential for innovative companies to successfully address niche markets (Emma, YP), thus resulting in future job creation. The sustainability aspect, consisting of the sub-themes of packaging, wastage, and energy footprint, was also addressed. While the BA group did not seem to be worried about the packaging material, both groups agreed on a severe problem with packaging waste:

> "*What I found to be negative was that you are left with a lot of packaging material*." (Ben, YP)

A potential solution for this issue was discussed in the YP group, where service offerings were preferred, as they were believed to facilitate recycling, and pick up of the used packaging material. However, the needed appointments decreased the advantageousness of this solution drastically.

The BA and YP groups agreed on the importance of reducing grocery wastage, and the energy footprint was of similar importance for both groups. They discussed the possibility to pool trips to stores, especially in rural areas:

> *"In this village live (…) probably fifty people and they all drive to the market one by one. It would be economically beneficial if only one van would do the trip, right?"* (Hannah, YP)

Product Range and Service Availability. Product variety, niche products, and local shopping options were discussed. The BA and YP groups showed very different perceptions of OGS and stationary retailing, providing insights into the different levels of consumer knowledge:

> "*The online store has a way larger assortment range*." (Jonas, YP)

> *"The spectrum of products you have in a shop, (…) you just do not have that online."* (Elisabeth, BA)

All groups agreed on the easier availability of niche products via OGS, such as *"special Whiskey for a tasting"* (Wolfgang, BA) and innovative concepts within these niche segments, such as "*sustainable meat from an innovative company"* (Peter, BA). The F focus group was affected by availability in a slightly different way. The group found that the high supermarket density restricted the relative advantageousness of OGS: "*It is just easier for me to go to the store than to start up my laptop" (*Anna, F); "*I cross like ten grocery stores on my way home from work"* (Mia, F). The YP and BA groups highlighted the relevance of OGS for rural areas with weaker infrastructure; however, Ida, BA, criticized the weak market coverage: *"Especially because all the markets that offer this service [OGS] are not close to me so they do not deliver to me*."

Impulsiveness. All participants perceived OGS as a particularly structured and planned approach toward grocery shopping that reduced impulsive buying and helped consumers educate themselves about the product range:

> *"When I buy groceries online, I check my storage as I order. (…) With stationary grocery shopping, I always end up buying 15 items I did not need but forgetting about the five I did need."* (Hannah, YP)

> *"(…) that I just browse through the assortment a little bit more aware and able to inform myself and compare products."* (Hannah, YP)

However, this decrease in impulsive buying was not necessarily seen as desirable. Both YP and F groups argued that, with OGS, the potential for *"spontaneous"* (Mia, F) and *"inspired"* (Jonas, YP) shopping would decrease. Jonas, YP argued: *"I always go to the supermarket and let myself get inspired with the products they offer."*

Control Beliefs

We identified two distinct beliefs regarding individual control over the service usage:

1) Confidence in Service and Product Quality;
2) Transparency and Flexibility.

Confidence in Service and Product Quality. In three focus group sessions, product and service quality were the most likely determinants of OGS service usage. The F group held higher quality expectations toward OGS: "*I am way pickier when I ordered online compared to when I bought the products myself* (Mia, F*).*" Both the BA and YP groups were convinced that online grocers delivered equal or even higher product quality than in-store to avoid dissatisfied customers. BA and YP groups allocated similar importance to the haptic inspection of groceries before the purchase. Another largely discussed topic within F and YP groups was the return of mistakenly delivered or damaged products and the associated effort. Participants expressed their need for adequate online customer service, at least similar to the service offered by physical shops. OGS retailers' product replacement[8] policies elicited mixed feelings:

> *"When they did not have the beer I ordered, they send a similar one that I ended up enjoying just as much*." (Jonas, YP)
>
> *"I would just prefer them to credit my money instead of an alternative product that I might not like."* (Emma, YP)

All groups agreed that online grocery retailers had superior knowledge and means for ensuring cooling with the distribution chain, even under unusual conditions such as *"midsummer time"* (Emily, F). All three focus groups agreed on the importance of choosing short time windows for the delivery to ensure flexibility. "*That would be stressful for me – if I had to commit to being home from 9 to 5 like with a craftsman. I do not like committing to such long-time frames.*" (Hannah, YP). Amelie, F highlighted the impact of having kids: "*It has to be there on time. There is no point in saying they will deliver at seven, I have three kids, and they are all hungry (…). If the food then arrives at nine, I still need to cook.*" All groups agreed that the order reliability needed to be assured. In terms of product quality, the groups differentiated between perishable and non-perishables. For perishables, the YP and F groups argued that the online goods were not as fresh as in offline stores. They did not trust the retailer with choosing the *"right"* (Ben, YP) goods. These factors were not considered essential for non-perishables;

[8] If the originally requested item is not in stock, OGS retailers occasionally replace the item with a more or less similar alternative.

however, general skepticism toward the product quality remained. The YP group argued that wrong expectations on the product quality could be the result of euphemistic product presentation on the website. "*I like to see the goods before I buy* (…)" stated Hannah, YP, highlighting the need for haptic validation before the purchase. All groups agreed that packaging material should only be used to provide a stable cool chain and preserve the integrity of the goods:

> *"Just for tomatoes (...), you need special packing materials to ensure that you actually receive tomatoes - not passata."* (Jonas, YP)

Transparency and Flexibility. The flexibility issue was not distinguishable by further sub-themes. All focus groups felt constrained by a long delivery time and the necessary planning attached to OGS purchases:

> *"Personally, I feel limited if I know that the grocery delivery is coming, and I cannot do anything else for that time frame."* (Anna, F)

> *"When I order groceries online, I am kind of stuck with eating them, but what if I do not fancy noodles two days after the delivery?"* (Jonas, YP)

The BA focus group was least concerned about availability in general but criticized the earlier closing hours at local and rural stores, a problem that OGS could potentially solve: "*The bakery in my village closes at 12, so it is just hard luck"* (Ida, BA). At the same time, the BA group showed the most significant knowledge gaps regarding the delivery timing options.

Normative Beliefs

Regarding normative beliefs held in the focus groups, we identified one main belief: *Referral and information exchange.* All groups highlighted two main peer groups involved in the OGS usage decision process: household members were named as the primary group, and family, friends, and colleagues as a secondary information source. The YP group expressed their willingness to refer OGS services to relevant peer groups, mainly elderly family members incapable of or limited in conducting their grocery shopping. *"We educated my grandparents to use it, however, ended up doing the ordering for them, but they still handle the delivery, so it is still less work overall"* (Hannah, YP). Similar beliefs were expressed by the F group. Participants in both groups were, to some degree, involved in the caretaking and grocery shopping of elderly family members. The recommendations of OGS services toward elderly

consumers seemed particularly relevant as they decreased the necessary effort for all involved parties.

Table 4. Beliefs across consumer segments.

	YP	F	BA
Outcome Beliefs			
Convenience and Ease of Life	✓	✓	✓
Shopping Experience and Enjoyment	✓	✓	✓
Pricing and Cost	✓		
Social Responsibility and Sustainability	✓		✓
Product Range and Service Availability	✓	✓	✓
Impulsiveness	✓	✓	
Control Beliefs			
Confidence in Service and Product Quality	✓	✓	✓
Transparency and Flexibility	✓	✓	
Normative Beliefs			
Referral and information exchange	✓	✓	

Discussion

In this section, we would like to discuss our findings with regard to the proposed research questions. First, we were curious to see whether there were knowledge gaps between the target segments (*RQ1*). This can be confirmed given that, we found varying levels of knowledge across the groups. Knowledge gaps were found regarding the possibility to select time slots for the delivery, the price levels, product range, and availability, and the potential delivery of goods that could not be purchased via a different retailing channel (e.g., specialties). These knowledge gaps were differently distributed across the focus groups. While young participants were skeptical about the price level and "right" choice of products offered by the retailers, elderly consumers argued that retailers could not afford to not meet their quality expectations.

Regarding *RQ2* we found similar belief structures across the target segments (see also **table 4**). General trust was observed toward the technology and services across all groups; however, specific preferences were found across living situations and household characteristics, as suggested by van Droogenbroeck and van Hove (2017). Elderly consumers emphasized the social interaction associated with the shopping experience, while this aspect did not play a vital role for the YP and F focus groups. The integration of social interactivity (e.g., via social and task-oriented chatbots) within online food delivery environments has been investigated, indicating an effect of these bots on perceived social presence and enjoyment (Cicco, Silva, & Alparone, 2021). Some researchers have proposed designs to address user behavior in OGS using neuro-economical approaches (Benn, Webb, Chang, & Reidy, 2015). Similar studies on social interaction might explain actual behaviors within OGS shops, allowing retailers to tailor their service offering toward different consumer demands. While OGS was perceived to be reducing impulsive buying patterns in this study, Munson, Tiropanis, and Lowe (2017) found that most items in OGS baskets resulted from "disruptive activities" such as using the search bar or interacting with the retailers' promotional content. This study's findings mostly confirm earlier research by Ramus and Nielsen (2005), as we found strong support for both security and social interaction beliefs.

In RQ3 we questioned which individual circumstances on a household level would effect benefit perception. We found that younger consumers, while living in the city, and therefore having a higher accessibility to the service, may not be inclined to use the service due to higher costs. Elder consumers report low accesibility as a result of their rural living circumstances. Participants in family set-ups were inclined to use the service, however due to regular commuting they had a number of options to use stationary shopping. We also replicated previous findings on the crucial importance of situational factors (Hand et al., 2009) as all groups emphasised usage during difficult circumstances (such as illness, etc.).

Many of the considered success factors in this study were strongly affected by the COVID-19 pandemic, that increased demand for OGS services on a global scale. With long queues in front of supermarkets due to customer traffic limitations and impulsive stockpiling behaviour in the early stages of the pandemic, OGS services in Germany were fully booked for weeks ahead. These developments highlight the necessity of local food structures particularly in rural areas. The Dutch company Picnic succesfully operates such a "milkman" principle in some areas in North Rhine-Westphalia. Dannenberg et al. (2020) doubt that the COVID-19 pandemic fundamentally transitioned food retail in Germany, despite opening a "window of opportunity".

Theoretical Implications

As mentioned above, this study confirmed earlier findings that applied qualitative in-depth data analysis to OGS usage adoption and motivation (Hand et al., 2009; Ramus & Nielsen, 2005) for a sample of German consumers. We were able to replicate a similar belief structure as in the Ramus and Nielsen (2005) study with regard of the overall TPB structure. Qualitative data analysis might further contribute to this research area, adopting cross-cultural[9] and ethnographic approaches (Elms et al., 2016). Further quantitative and qualitative research in this area is required. The presented findings should also be enriched with changes to consumer perception and behaviour due to the pandemic.

Practical Implications

Online grocery retailing should focus on increasing transparency, especially in the delivery process and the choices of products. While most retailers offer the possibility to limit the delivery time frame, it is unclear why live tracking options are not enabled in OGS services, as this would drastically increase transparency and scheduling abilities for consumers. Similar systems operate at online food ordering services (such as Lieferando). This study confirmed the findings by Ramus and Nielsen (2005) in terms of the social interaction of OGS; however, this aspect was mainly stressed by elderly consumers. Therefore, we recommend using customer feedback and evaluation options and potentially integrating social media pages to allow consumers to engage in social interaction online. Other online communities may help facilitate necessary infrastructure and/or inspiration.

This aspect highlights the importance of connected databases across platforms and may be of particular interest for pure online players, as they already possess the necessary digital infrastructure. Retailers should leverage the general appreciation toward OGS service offerings by *precisely* informing consumers about these offerings and filling the existing knowledge gaps. While the influence of situational factors remains crucial, this aspect can be addressed by advertising and marketing strategies, as well as concepts aimed at improving rural delivery coverage. In the light of demographic changes and sudden surges in demand (as illustrated in the light of the COVID-19 pandemic), this aspect is of importance and future relevance for the adoption of OGS in Germany.

[9] Of particular interest should be well-developed markets such as South Korea and China.

Limitations and Future Research Recommendations

We conducted three focus group discussions to evaluate the opinions and reasoning behind the behaviors of consumers in the German eGrocery market. The main limitations of this study lie in its small sample size and geographical restrictions. Since OGS is not as accesiable in rural areas or small cities as in large cities, our focus group assessments may be biased.

To understand possible cultural differences between consumers, we recommend international focus groups and quantitative validation to address this large usage disparity. Research on OGS usage adoption should also include measuring perception at the individual level. Previous studies have already addressed this topic by investigating the influence of consumer values (Hansen, 2008), personality traits (Piroth, Ritter, & Rueger-Muck, 2020), and neuro-economic applications on OGS (Benn et al., 2015). Combining different approaches may help deepen the current understanding of the various determinants of OGS behaviors.

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Chapter III.3 Online Grocery Shopping Adoption: Do Personality Traits Matter?

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Declaration of Contribution

This article resulted from a collaboration with MSR and ERM. The areas idea and conception, conduction of the study and writing of the article have been mainly covered by PP. I would like to acknowledge the following contributions. The idea was developed in close collaboration with MSR. The conception was developed in close collaboration with MSR and ERM. The initial draft of the article, data gathering and analysis was covered by PP in close collaboration with MSR and ERM. Final version was written in close collaboration with MSR and ERM.

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Online Grocery Shopping Adoption: Do Personality Traits Matter?

Abstract

This study examines the relationship between personality traits and the willingness to buy groceries online. Our research is based on research on consumer values regarding online grocery shopping (OGS) and we argue that customer values are aggregated states of personality traits. We therefore propose predicitive power of personality traits towards OGS usage adoption. For a more thorough evaluation on the matter we conducted an online administered questionnaire resulting in N=678 valid responses and conducted structural equation modelling using IBM AMOS (Vers. 25). We found that none of the five personality traits had a significant influence on the attitude towards OGS. However subjective norm had strong influence on attitude and both, subjective norm and attitude were solid predictors of purchase intention for groceries online. Unsurprisingly, the attitude towards OGS was higher for consumer groups with prior experience. The results indicate a high relevance of peer groups in the decision making process on buying groceries online and a crucial importance of an initial purchase. Practitioners, therefore, may resort their marketing strategies to peer groups and initial purchasing behaviour and address the level of experience with the usage of OGS as well as situational aspects. This may be facilitated by precisely targeted online marketing activities and marketing service strategy adaptations. This is the first study to examine the influence of personality traits towards the willingness to conduct OGS with an emphasis on the lower overall adoption within Germany. We furthermore validate the predictive power of the theory of planned behaviour (TPB) construct for the economically attractive market segment of OGS by adapting and enhancing the scope of previous research.

Keywords: *personality traits, online grocery shopping, quantitative research, structural equation modelling*

Introduction

Online grocery shopping (OGS) has been available to German consumers for over a decade now, but revenue share of the segment remains low (Linder and Rennhak, 2012, p. 1; Ifh, 2017, p. 8) as the technology remains underused. There are apparently several reasons for the overall lower adoption: First, Germany is characterised by a high supermarket density, somewhat liberal opening hours, a suboptimal infrastructure for online grocery retailers (Nufer and Kronenberg, 2014) and a generally lower price level in offline retailing (Linder and Rennhak, 2012, p. 3). This argumentation can be supplemented with adoption rates across Europe where Germany scores on the lower end with a share of online grocery sales at 1.1 per cent (Hde, 2017). Second, groceries can be described as "culture-bound" products (Kragh, 1996; Lupton, 1994) potentially indicating different mind-sets towards the goods and their purchasing process. OGS can be seen as a discontinuous innovation (Hansen, 2005, p. 102) and as such requires significant behavioural change according to Robertson (1967).

The process of OGS adoption has been evaluated from various viewpoints among different disciplines. Hence, research focused on various facets such as infrastructure (Hübner *et al.*, 2016; Saskia *et al.*, 2016), consumer behaviour and expectance (Morganosky and Cude, 2000; Ramus and Nielsen, 2005; Raijas and Tuunainen, 2001; Seitz *et al.*, 2017; Driediger and Bhatiasevi, 2019), situational factors (Hand *et al.*, 2009; Muhammad *et al.*, 2016; Huang and Oppewal, 2006; Nilsson *et al.*, 2015) and search and information behaviour (Benn *et al.*, 2015). An assessment of consumer values has been reported by Hansen (2008), however the analysis of personality traits regarding the above mentioned factors – to our knowledge – remains underexplored. We find that there is an on-going debate on the causal direction between personality traits and consumer values (Grankvist and Kajonius, 2015). Olver and Mooradian (2003) argue that values are "*learned adaptations strongly influenced by environment*" and Grankvist and Kajonius (2015) phrase: "(…), *we take traits to be viewed more as products of 'nature' (i.e. biological/genetic) while values should be viewed more as results of interactions between 'nature' and the 'environment'*." While we acknowledge and appreciate the current academic discussion on this issue, we will refrain from adding viewpoints to it within this article. In extension to the findings of Hansen (2008), this study enlarges the scope to an examination of personality traits as an upstream variable to consumer values combined with the well-established measures of the theory of planned behaviour. Our study may be

of particular interest as Martín *et al.* (2019) describe "*impotent gaps*" within OGS research "(…), *especially in Germany and Spain*".

Theoretical Framework

The present study is strongly based on the work of Hansen (2008) and aims to replicate some of the findings while enhancing the scope of research towards personality traits. Hansen (2008) examines the relationship between consumer values and the willingness to buy groceries online by facilitating Schwartz (1992) theory of values. The items in the scale relate to the four constructs openness to change, conservation, self-enhancement and self-transcendence. These are in direct opposition to each other, namely conservation being contrary to openness to change, and self-enhancement being opposite to self-transcendence. While both openness to change and conservation reflect the two sides of openness to experience, self-enhancement and self–transcendence can be related to agreeableness and conscientiousness. Hansen (2008, p. 130) proposes a positive relationship between openness to change and self-enhancement towards the attitude on OGS and a negative relation between conservation and self-transcendence towards it. These assumptions were accepted for conservation and self-enhancement (Hansen, 2008, p. 134). Furthermore, attitude was confirmed as a predictor of willingness to buy groceries online. In this study, we will integrate Hansen (2008) argumentation on consumer values into the study of personality traits based on the big five inventory (BFI). The hierarchical model of personality traits approach (Mowen, 2000) was taken by Bosnjak *et al.* (2007) where the researchers applied hierarchical analysis of personality, compound, situational and surface traits. There are several authors contributing to the current state of academical research regarding the influence of personality traits on shopping behaviour. A study by Goldsmith (2016) shows that especially agreeableness and openness to experience positively correlate with shopping indicators. It has to be noted that this study examined the influence in regard to non-grocery items. Proof of similar effects in the context of OGS remains scarce. The same applies for the result of Otero-López and Villardefrancos (2013) who confirm the influence of the personality trait neuroticsm towards excessive buying behaviour. Mendes *et al.* (2019) identifiy personality traits as crucial in regard to decision making in online shopping. Again, these findings need further confirmation with regard to OGS. We argue that consumer values describe aggregated states of personality

and would therefore assume that personality traits should be indicative of the perception and hence willingness to use OGS.

Personality traits have been researched from various fields of marketing research including customer engagement (Islam *et al.*, 2017; Marbach *et al.*, 2016), brand personality (Mulyanegara *et al.*, 2009) and repurchasing behaviour (Lin and Huang, 2012; Gountas and Gountas, 2007) to name a few. Grant *et al.* (2014) specifically pointed out the necessity to research consumer personalities to deepen the understanding for OGS adoption. This study will add to this research gap by providing insight into the predictive power of personality traits towards OGS usage by embedding these dimension into the TPB concept. We hope to enable further discussion both on personality traits as predictors for OGS usage as well as emphasize the topics matter in the context of the mixed adoption rates across countries. Within this study we will add to the growing academic interest (Hansen *et al.*, 2004; Hansen, 2008; Bosnjak *et al.*, 2007) in understanding the predictive power of well-established measures with regard to OGS usage. We expect the results of this study to be of practical importance for marketing strategies within online grocery retailing.

Hypothesis development

Openness to experience

Individuals with high scores on the dimension of openness to experience tend to be more flexible, creative, innovative, imaginative, reflecting curious and untraditional while low-scoring people can be described as conventional, narrow on interests and unanalytical (McCrae, 1996; McCrae, 2007). Openness to experience tends to be Gaussian distributed with only small numbers of individuals scoring on extreme values (McCrae and John, 1992a). In terms of the relationship between openness to experience and online shopping behaviour different findings have been reported: A weak but significant positive effect of openness to experience on intention to shop online has been reported by Bosnjak *et al.* (2007, p. 603) and a development of passion towards online shopping in general was found by Wang and Yang (2008). While Rosen and Kluemper (2008) found a positive relationship between openness to experience and perceived usefulness of new technology for social media websites these findings could not be validated for technology acceptance in general (Devaraj *et al.*, 2008, p. 101). Furthermore, openness to experience can be associated with a drive for adventure and the motivation to try out new options (Huang

and Yang, 2010). OGS as a new, innovative way of buying groceries fits these descriptions, hence we assume a positive correlation between openness and the attitude towards OGS:

H1. Openness to experience is positively correlated with attitude.

Conscientiousness

Conscientiousness indicates an individual´s degree of organisation, persistence, hard work and motivation in the pursuit of accomplishing ones goals. A conscientious person is purposeful, strong willed, and determinant, punctual and reliable (Costa and McCrae, 1992). It includes traits like efficient, organized, planned, reliable, neat behaviour and implies the desire to do a task well (John, 1989). Huang and Yang (2010) report that conscientiousness is positively associated with convenience and can lead to an increased usage of shopping activities. Convenience as well as time saving have been found as motivators to use OGS (Ramus and Nielsen, 2005; Morganosky and Cude, 2000). OGS enables individuals to conduct their shopping with very little situational distraction and is suitable to an organised way of conducting shopping. This results in:

H2. Conscientiousness is positively correlated with attitude.

Extraversion

Extraversion reflects an individual's intensity of being interactive and social (Choi *et al.*, 2015). They feel comfortable to share their experience and express feelings (Seidman, 2013). Extrovert people attribute great value on interpersonal relationships and enjoy being in sociable environments both online (Ross *et al.*, 2009; Correa *et al.*, 2010) and offline in large groups and gatherings (Costa and McCrae, 1992). As OGS delivers little benefit in terms of interpersonal and social interaction we would argue for a negative relationship between extraversion and the usage of OGS and therefore propose:

H3. Extraversion is negatively correlated with attitude.

Agreeableness

Agreeable people can be described as suggested within reciprocal altruism theories (Trivers, 1971) and act in a cooperative and friendly manner towards fellow human beings (Mowen, 2000). They are strongly pro-social oriented, comply with rules established by others, are tender-minded, trustworthy and modest (John and Srivastava, 1999, 30). As agreeableness describes a pro-social orientation, one could expect it to be positively related to shopping offline. Mooradian and Olver (1996) found that agreeableness "suprisingly" does not relate to social shopping motivation. It is noteworthy that motives do not necessarily imply purchasing intention nor actual shopping behaviour. Bosnjak *et al.* (2007) found a significant negative link between agreeableness and online shopping intention; the effect however remains fairly small *(-.14*). Wang and Yang (2008) report a that agreeableness can "lead individuals to develop a passion for online shopping activities". They reflect these findings to be of relevance for the discussion on personality traits with regard to online shopping. Tsao and Chang (2010, p. 1802) describe individuals with high scores on agreeableness as more trusting and easier influenced by visual and aesthetic effects on shopping websites and Islam *et al.* (2017) found a positive relation to customer engagement in online brand communities. Based on the absence of human-interaction in OGS and previous research we would assume that:

H4. Agreeableness is negatively correlated with attitude.

Neuroticism

Research on neuroticism has been applied in the context of social anxiety and a lack of sociality motivation (Huang and Yang, 2010; Kaplan *et al.*, 2015). It was also linked to compulsive buying behaviour (Silvera *et al.*, 2008). Individuals scoring high on neurotisicm tend to experience anxiety, hostility, depression, self-consciousness, impulsiveness and vulnerability (Thompson, 2008; Costa and McCrae, 2010; McCrae and John, 1992b). Furthermore, individuals high on neuroticism are worried in crowds and frequently use the internet to mitigate loneliness (Ryan and Xenos, 2011; Butt and Phillips, 2008). Islam *et al.* (2017) reported that neuroticism has a positive effect on customer engagement in online brand communities hinting at their willingness to partake in online activity. OGS may decrease the amount of stimuli that may cause negative

reactions with individuals high on neuroticism as it mitigates the necessity of human interaction. Thus we would propose:

H5. Neuroticism is positively correlated with attitude.

Theory of Planned behaviour and Willingness-to-buy

The theory of planned behaviour (TPB) (Ajzen, 1991; Ajzen and Fishbein, 1980) links an individual's beliefs towards a behaviour and argues on three constructs perceived by consumers that determine the intention to conduct a certain behaviour. These beliefs are constituted as subjective norm, perceived behavioural control and attitude. TPB is an iteration on the earlier theory of reasoned action (TRA). Hansen *et al.* (2004) tested whether both theory of reasoned action (TRA) and TPB were suitable predictors for OGS intention. While both constructs are able to explain high proportions of the variation and fit the model well, the authors argue that TPB with the inclusion of a path from SN to attitude provides the best fit and prediction power (Hansen *et al.*, 2004, p. 546). This confirms earlier research by Chang (1998) and has therefore been applied in this study.

Subjective norm

Subjective norm (SN) reflects the social pressure to perform or omit a certain behaviour (Ajzen, 1991). Researchers have found significant positive links between SN and the intention to shop online both in grocery and non-grocery scenarios (Hansen, 2008; Nor and Pearson, 2008). We would agree that circumstances are likely to influence the purchasing intention towards a good or service and therefore propose that:

H6. Subjective norm is positively correlated with willingness-to-buy.

Perceived behavioural control

Perceived behavioural control (PBC) can be described as the perception of a person's own capabilities to engage in a certain behaviour (Posthuma and Dworkin, 2000). TPB argues that a consumer is more likely to conduct a certain behaviour if carrying out this behaviour is perceived as easy. This relationship has been reported by Hansen (2008), hence we posit:

H7. Perceived behavioural control is positively correlated with willingness-to-buy.

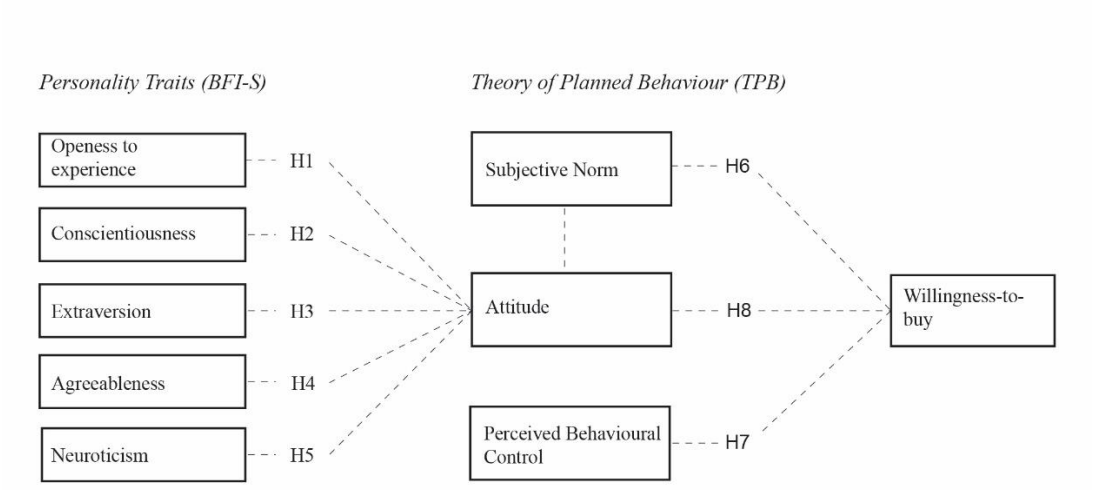
Attitude

Attitude relates to the perception of advantageousness of a certain behaviour and is therefore likely to predict whether a consumer will conduct a certain behaviour (Ajzen and Fishbein, 1980). As stated earlier we would propose that consumer values are aggregates of personality traits and should therefore be considered as predictors towards attitude. It therefore seems reasonable to argue on a positive relationship between the attitude and willingness to conduct a certain behaviour. We therefore suggest:

H8. Attitude is positively correlated with willingness-to-buy.

In summary and based on the hypotheses we would propose a causal framework as depicted in **figure 5**.

Figure 5. Proposed Causal Construct.



Methodology

Sample

We registered a total of N= 815 responses from which we were able to use 678 cases in our statistical considerations due to a completed[10] questionnaire. The data was collected between December 2018 and March 2019 in Southern Germany.

The sample is largely female (65.0 percent) and single (75.1 percent). The average age in the sample is at M=29.63 years (*sd=11.92; md=25*). The majority of the sample (70.2 percent) had not used OGS reflecting the lower overall adoption of the technology. Out of the participants that were experienced with OGS 10.2 percent bought perishables while 16.7 only purchased non-perishables. The living environment was evenly distributed between urban (27.0 percent), sub-urban (22.7 percent), small-towns (27.4 percent) and rural (22.9 percent). In most cases the participant was responsible for grocery shopping (44.2 percent) or at least involved in the process (38.2 percent). Most participants were either students (60.9 percent) or employed (32.9 percent). An overview of all socio-demographic variables can be found in the appendix.

Measures

This study used an online administered questionnaire created in Qualtrics in German language consisting of three sections. In the first section participants were evaluated on the TPB constructs SN, PBC and attitude as well as on their potential willingness to use OGS in the near future (12 month period). The second section evaluated their personality traits. Both of these sections were accompanied by a short introduction. The sequence of TPB and personality traits was chosen as we propose that personality traits should be unrelated to the TPB constructs and this sequence order should reflect stable personality traits. The items within the personality traits section were randomised. The third section asked for socio-demographic information. For measuring personality traits we adapted BFI-S scale by Schupp and Gerlitz (2008) with additional items from Lang *et al.* (2001). BFI scales have been found to be robust to various assessment methods (Lang *et al.*, 2011) and time frames (Cobb-Clark and Schurer, 2012; Rantanen *et al.*, 2007). The TPB constructs SN, PBC and Attitude were consecutively measured with two, three and three

[10] We dismissed all cases with missing values for any question to ensure data consistency. For sensitive questions (e.g. income) participants had the option to not provide an answer.

items. These items were extracted from literature (Hansen, 2008). Wtb was measured with two items as suggested by Hansen (2008). All items were evaluated on a seven-point Likert scale ranging from 1 (“totally disagree”) to 7 (“totally agree”). For the analysis we used R base and psych package as well as IBM AMOS (Vers. 25).

Analysis and Results

First we evaluated the descriptive statistics of the mean values regarding all constructs and the experience level towards OGS in order to identify potential differences caused by prior usage. QQ-Plot analysis indicated Gaussian distribution for all constructs with the exception of PBC.

Table 5 provides mean values for all BFI and TPB constructs based on experience level. To elaborate on the group differences we ran Fishers Least Significant Distance (LSD) post-hoc test. Group difference test with the usage of Bonferroni criterion produced the same results. As expected we find that the highest score on attitude and Intention was to be found in the group that had prior experience with OGS. This would imply that consumers with prior usage experience generally have a better opinion towards OGS.

Table 5. Mean value comparison.

	All respondents n=678	Group A n=69	Group B n=113	Group C n=476	Group D n=20	Mean Comparison
Oe	4.92 (0.94)	5.12 (0.93)	5.11 (0.92)	4.84 (0.93)	5.09 (0.88)	A = B = D > C
Cs	5.10 (0.92)	5.26 (1.01)	4.91 (0.93)	5.11 (0.91)	4.99 (0.88)	A = B = C = D
Ev	4.71 (1.23)	4.98 (1.18)	4.70 (1.31)	4.65 (1.21)	5.29 (0.79)	A = B < C < D
Ag	5.12 (0.88)	4.89 (1.06)	5.11 (0.94)	5.16 (0.84)	5.11 (1.03)	A = B = C = D
Nr	3.89 (1.13)	3.79 (1.25)	4.03 (1.18)	3.87 (1.11)	3.91 (0.75)	A = B = C = D
SN	3.08 (1.40)	3.62 (1.52)	3.15 (1.24)	3.01 (1.36)	2.70 (1.11)	A > B > C = D
PBC	5.71 (0.94)	6.05 (0.90)	5.87 (0.80)	5.63 (0.94)	5.58 (1.53)	A > B > C = D
Att	3.35 (1.50)	4.50 (1.69)	3.76 (1.30)	3.12 (1.40)	2.38 (1.31)	A > B > C > D

Int	2.31 (1.40)	3.96 (1.68)	3.03 (1.23)	1.91 (1.13)	2.00 (1.10)	A > B > C = D

Notes: Groups: (A) prior experience with OGS including perishables, (B) prior experience with OGS excluding perishables, (C) no prior experience with OGS, (D) generally no internet shopping. Standard deviations in parentheses. Mean value comparison was conducted using Fishers Least Significant Distance test (*α=0.05*).

The second part of the analysis consists of measurement and co-variance-based structural equation modelling (SEM). SEM provides the possiblity to simultaniously compute and test structural relationships with multiple dependent and independent variables (Anderson and Gerbing, 1988) and has been previously applied to examine relationships regarding OGS usage (Hansen, 2008; Driediger and Bhatiasevi, 2019).

During the analysis we encountered a number of validity issues, which will be outlined first. It seems that – while all constructs resulted in somewhat satisfying reliability and validity – the construct PBC was troublesome. This is indicated by its comparatively high mean value for the total sample (*5.71, md=5.67, sd=.97*, see **Table 5**) and low internal reliability (*Cronbach´s α=.34*). The problematic value constellation for PBC may be due to restrictions within the sample because the majority of participants (n=576) showed strong agreement towards the unproblematic ordering of groceries online. We interpret this in a way that while the usage of the technology itself is seen as unproblematic this perception is not reflected in attitude (*m=3.35, sd=1.49*) and SN (*m=3.08, sd=1.37*). Still PBC does significantly correlate with both attitude (*β=.238, p<0.00*) and SN (*β=.213, p<0.00*). Regression analysis on TPB and Wtb suggests significant prediction power of attitude towards Wtb (*β=.553, p<0.00*) and SN (*β=.305, p=0.02*), however PBC did not yield a significant effect at a five percent level (*β=.10, p=.086*). TPB was able to explain 61 percent of variance in Wtb.

Next, we tested for the influence within the TPB construct itself and modelled attitude to be predicted by both SN[11] and PBC. We found a strong influence of attitude by SN (*β=.69, p<0.00*) and to a lower degree by PBC (*β=.29, p<0.00*). The TPB model itself shows satisfying fit (*χ^2/df=3.57, CFI=.961, SRMR=0.07, RMSEA=0.062, PClose=0.04*) to the data. From this analysis we may conclude that the attitude towards OGS may be strongly influenced by a consumer's personal environment, while the sample in general seemed to be overly confident to be able to conduct OGS behaviour regardless of prior experience and social surrounding. In order to construct the final structural equation model we first conducted confirmatory factor analysis with all constructs as correlated

[11] Hansen *et al.* (2004) found an increase in the predictive power when adding a path from SN to attitude.

factors using IBM AMOS 25 with the inclusion of plugins[12] for model-fit measurement and validity testing for ease of analysis and interpretation by Gaskin and Lim (2016).

Our initial results were somewhat unsatisfying in terms of reliability: We therefore removed items with factor loadings lower than .30 where possible, applying recommendations by Comrey and Lee (2013). By doing so most constructs became acceptable in terms of composite reliability (CR). If we follow Fornell and Larcker (1981) argumentation that average variance extracted (AVE) below 0.5 is acceptable when in co-occurence with CR above 0.6 we find almost satisfying results for construct validity. Malhotra and Dash (2011) furthermore argue that AVE often tends to be too strict and reliability can be established through CR alone, while Bagozzi and Yi (1988) recommend a minimum threshold of 0.7 for CR and 0.5 for AVE. **Table 6** summarises factor loadings, internal reliability, CR and AVE, while **table 7** provides the inter-correlation matrix for all constructs. It is noteworthy that inter-correlation for two constructs is problematic: First, the correlation between attitude and SN exceedes the AVE of SN (.760 > .728) and second the correlation between attitude and Wtb – while still acceptable – is fairly close (.792 < .798). For the relation between attitude and Wtb Hansen (2008) already laid out sufficient argumentation. As we hypothesised relationships between attitude, SN and Wtb this correlation is not suprising. We therefore assume sufficient discriminant validity.

In terms of model fit the model showed an acceptable overall fit with $\chi^2/df=3.006$, *CFI=0.890, IFI=0.891, SRMR=0.064, RMSEA=0.054, PClose=0.020* (Hair *et al.*, 2010; Browne and Cudeck, 1992; Hu and Bentler, 1999). Both construct validity and model fit could have been improved by removing further items however we decided to not change it in order to strike a fair balance between acceptable prediction power and retaining as much of the original design as possible. We did however analyse multivariate outliers using Mahalanobis distance test (Mahalanobis, 1936). This resulted in the removal of n=98 cases which slightly increased reliability and validity measures; no further modifications were undertaken.

[12] The following plugins were used during our analysis: (1) model fit measures, for ease of interpretation of the model fit measures, (2) specific bias test, to conduct bias analyses, and (3) validitiy and reliability test to generate inter-correlation matrices. All plugins are downloadable at: http://statwiki.kolobkreations.com/index.php?title=Plugins.

Table 6. Overview of items, internal reliability, CR and AVE.

Construct	Items	Factor loadings	Cronbach´s α	CR	AVE
Openness to experience			0.70	0.692	0.381
	o1	0.53			
	o2	0.84			
	o3	0.42			
	o4	0.52			
	o5[a,b]	0.20			
Conscientiousness			0.68	0.686	0.360
	c1	0.62			
	c2	0.72			
	c3	0.56			
	c4[a]	0.42			
	c5[a]	0.39			
Extraversion			0.85	0.862	0.563
	e1	0.84			
	e2	0.88			
	e3	0.57			
	e4[a]	0.71			
	e5[a]	0.69			
Agreeableness			0.62	0.700	0.462
	a1	0.42			
	a2[b]	0.21			
	a3[b]	0.15			
	a4[a]	0.88			
	a5[a]	0.65			
Neuroticism			0.76	0.778	0.421
	n1	0.51			
	n2	0.55			
	n3	0.66			
	n4[a]	0.73			
	n5[a]	0.69			
Attitude			0.84	0.851	0.656
	att1	0.85			
	att2	0.77			
	att3	0.80			

Perceived behavioural control			0.34	0.411	0.300
	pbc1	0.30			
	pbc2	0.71			
	pbc3[b]	0.16			
Social norm			0.69	0.692	0.530
	sn1	0.69			
	sn2	0.76			
Willingness-to-buy			0.81	0.840	0.637
	wtb1	0.83			
	wtb2	0.72			
	wtb3	0.77			

Notes: n=582. a, item reverse coded; b, item removed for measurement model. One item per construct was fixated to 1. Goodness-of-fit indices: χ^2/df=3.006, CFI=0.890, IFI=0.891, SRMR=0.064, RMSEA=0.054, PClose=0.020.

Table 7. Inter-correlation matrix.

	Oe	Cs	Nr	Ev	Ag	SN	Att	PBC	Int
Oe	**0.617**								
Cs	0.287***	**0.599**							
Nr	-0.008	-0.247***	**0.649**						
Ev	0.422***	0.235***	-0.180***	**0.75**					
Ag	-0.099†	0.142*	-0.291***	-0.048	**0.68**				
SN	0.119*	0.014	0.042	0.035	-0.078	**0.728**			
Att	0.118*	0.001	0.045	0.125**	-0.022	0.760***	**0.81**		
PBC	0.072	0.146*	-0.093	0.161**	0.073	0.469***	0.541***	**0.541**	
Int	0.177***	0.008	0.03	0.192***	-0.107*	0.692***	0.792***	0.503***	**0.798**

Notes: Oe, Openness to experience; Cs, Conscientiousness; Nr, Neuroticism; Ev, Extraversion; Ag, Agreeableness, Sn, Social Norm; Att, Attitude; PBC, Perceived behavioural control; Int, Intention.
***p<0.001; **p<0.010; *p<0.050; † p<0.100.

As all constructs were measured using multi-item, self-report scales from the same respondents there may be common method bias within the data. Participants were informed that there were no right or wrong answers and that all data entries are treated anonymously and confidential to ensure honest answers (Podsakoff *et al.*, 2003). To check on the influence of common method bias we applied common latent factor (CLF) method as recommended by Podsakoff *et al.* (2003) which showed that none of the

regression weights were affected by adding the CLF with deltas ranging from -.024 to .024 (threshold: < .200). Thus common method bias shall not be a matter of concern.

In the final step of our analysis we conducted SEM for BFI, TPB and Wtb constructs to assess initially stated hypotheses. We found that none of the BFI personality traits showed a significant effect on the attitude towards OGS. A total of 53 percent in variance of attitude was explained by BFI and SN. Oe, Ev, Ag and Nr all showed positive estimates towards attitude. However beta values never exceeded the .05 threshold and none of these effects were significant (see **table 8** and **figure 6**). Our initial test of the TPB construct was confirmed in the final model as well, as attitude ($R^2=0.53$) was strongly influenced by SN ($\beta=0.69, p<0.000$). PBC did not have a significant effect on attitude ($\beta=0.23, p=0.13$). A total of 59 percent in the variance of Wtb could be explained by the model in which attitude was the strongest predictor ($\beta=0.59, p<0.000$), followed by SN ($\beta=0.21, p=0.004$) and PBC – again – did not yield a significant effect ($\beta=0.08, p=0.232$). Due to the overall unsatisfying quality of the PBC construct we repeated this analysis withouth the PBC construct. While this had little effect on overall model fit ($\chi^2/df=3.184, CFI=0.88, SRMR=0.074, RMSEA=0.061$) it did increase Beta values for both SN on attitude ($\beta=0.75, p<0.001$) and attitude on Wtb ($\beta=0.66, p<0.001$). The effect of SN on Wtb however drastically decreased ($\beta=0.18, p<0.010$). Furthermore the effect of extraversion on attitude exceeded the 0.1 threshold and became significant ($\beta=0.13, p<0.01$). A total of 59 percent of variance in attitude and 65 percent in Wtb could be explained by the model.

Table 8. Test results for hypotheses.

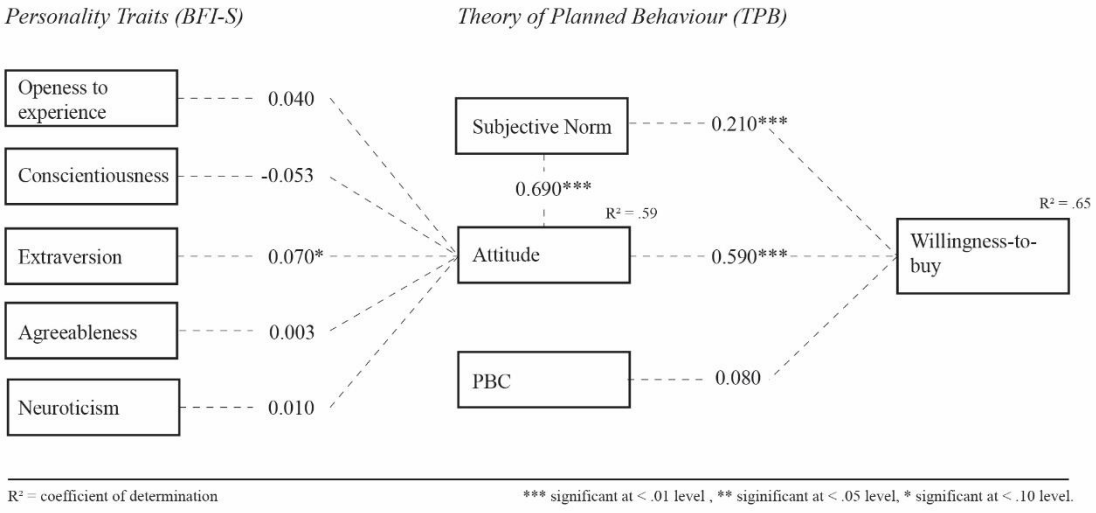
Hypothesis	Path	Beta	p	Result
H1	Oe -> Att	0.04	0.423	rejected
H2	Cs -> Att	-0.05	0.327	rejected
H3	Ev -> Att	0.07	0.091	rejected
H4	Ag -> Att	0.003	0.932	rejected
H5	Nr -> Att	0.01	0.806	rejected
H6	Sn -> Int	0.21	0.004	supported
H7	PBC -> Int	0.08	0.233	rejected

H8	Att -> Int	0.59	< 0.000	supported

Notes: Oe, Openness to experience; Cs, Conscientiousness; Nr, Neuroticism; Ev, Extraversion; Ag, Agreeableness, Sn, Social Norm; Att, Attitude; PBC, Perceived behavioural control; Int, Intention. Goodness-of-fit indices: *$\chi^2/df=3.073$, CFI=0.882, SRMR=0.069, RMSEA=0.055*.

In accordance with the argumentation of some researchers (Carman, 1978; Williams, JR, 1979) we tested for a competing model in which BFI were allowed to directly influence Wtb as opposed to the indirect influence through the factor attitude. Subsequent chi-square tests showed little improvement in fit (*$\chi^2/df=3.069$, $\Delta\chi^2=17.14$, $\Delta df=5$*).

Figure 6. Final Structural Equation Model.



Finally we tested for path differences between the groups by using multigroup structural equation modelling (MGA). Due to its small sample size we removed group D (generally no internet shopping; n=20) from this analysis. The only significant differences between groups were found for the influence of attitude on Wtb. We can report that the standardised path coefficients between groups with prior experience significantly differed (group A[13]: *$\beta=.81$, $p<0.05$;* group B*: $\beta=.55$, $p<0.05$).* A similar effect was observable when comparing group A with group C (*$\beta=.68$, $p<0.05$).* These findings are in accordance and reflect the findings on mean value differences (see **table 5**).

[13] Groups: (A) prior experience with OGS including perishables, (B) prior experience with OGS excluding perishables, (C) no prior experience with OGS.

Discussion

Given the scant nature of literature on personality traits in OGS behaviour this study set to add to this research gap. As pointed out earlier our results can be described as mixed. While we were able to replicate the predictive power of TPB constructs on behavioural intention, none of the personality traits resulted in significant effects towards the attitude on OGS. This is somewhat surprising as our initial assumption clearly reflected given relationship and seemed to be underpinned by academic literature. Al-Swidi *et al.* (2014) showed that SN significantly moderates the relationship both between attitudes and buying intention as well as PBC and purchasing intention. It is noteworthy that this study focussed on buying intention on organic food products. It is possible that personality traits are somewhat abstract to measure OGS adoption which would be in line with the presented findings on consumer values (Hansen, 2008) and the measurment of its influence via aggregated variables (e.g. Bosnjak *et al.*, 2007). While other researchers found significant influence of personality traits (Bosnjak *et al.*, 2007) towards OGS the effects remain fairly small and a preference for scales such as consumer values or hierarchical approaches (Mowen, 2000) may be recommendable. Our findings are also in line with research by Grankvist and Kajonius (2015) who phrase: "(…) *values explained more variance than traits of the variable under a relatively high degree of cognitive control (...)*". We did find relationships within the TPB aspects of the model that are in line with previous research (Hansen, 2008). In an earlier work Hansen *et al.* (2004) emphasised the importance of SN´s influence in the context of the internet as a social communication platform. We assume a customer who frequents social surroundings with prior OGS usage experience to be more likely to develop usage interest. Similar findings have been reported with regard to other research disciplines such as pro-environmental behaviour (Bamberg and Möser, 2007) and consumer decision making (Melnyk *et al.*, 2019). This can be seen as another indicator on the importance of intital purchasing behaviour as experienced groups showed generally higher influence between attitude and willingness to conduct OGS. There is furthermore significant difference in the mean value levels of attitude towards OGS depending on the prior usage experience, which is again in line with previous research (Mortimer *et al.*, 2016; Bosnjak *et al.*, 2007). The effects found in this study are consistend with previous research results as we found low influence of PBC in the context of food shopping (Al-Swidi *et al.*, 2014), strong influence of SN on Wtb (Choi and Geistfeld, 2004; Hansen, 2008; Lim *et al.*, 2016) as well as

attitude on Wtb (Hansen, 2008) and the importance of prior experience[14] (Bosnjak *et al.*, 2007; Ajzen, 2002). Both our study and other research findings present high proportions of explained variance in Wtb and purchase intention respectively, again hinting at the solid prediction power of the TPB approach. The attitude and Wtb significantly differed between experience levels as the multigroup analysis showed. It furthermore seems that the perceived control over given behaviour was perceived as non-problematic. This may be characteristic for the product and may furtherly be explained by the fact that online shopping has been a part of most consumer's daily lives for over a decade now and there simply remains little influence of perceived restrictions by the technology itself.

Theoretical and Practical Implications

As we were not able to confirm any of our proposals regarding personality traits we would emphasize the importance of further research towards personality traits and consumer values and their predicition power. Further research may link and combine existing studies with emphasis on situational factors (e.g. Nilsson *et al.*, 2015) in combination with personality traits and consumer values to provide deeper understanding of the influence of these traits as reflected in actual decision and purchasing behaviour. A combination with neuro-economic methods (e.g. Benn *et al.*, 2015) may provide valuable insight on a more subliminal level. As technology progresses new research opportunities for OGS inevitably arise. We therefore suggest focusing on technology and digital driven environments – potentially with regard to personality traits and consumer values – such as same day delivery, drones and click and collect models to improve practical aspects of OGS and reflect other faccets of adoption that may be related to personal values and traits.

This study furthermore renders some interesting implications for practioners as well as they may be interested in focussing their advertising activities towards peer groups as we found social sourroundings as highly influencial on the perception of OGS. We also find that the intention to conduct OGS highly increases with experience so initiating customers to their first purchase appears to be of upmost importance. This may be particularly important as Li *et al.* (2015) find that the late majority of adopters to new distribution channels constitute the largest share in revenue. Consumers may be motivated through the usage of "customers-recruit-customers" programs or rural delivery services as

[14] Bosnjak *et al.* (2007) found that the inclusion of prior purchasing frequency increase the coefficient of determination from .35 to .73.

prominently illustrated by Dutch company Picnic in Northern-Westphalia. This may increase customer awareness and hence the potential to influence others. We furthermore argue on in the implementation of situational aspects within marketing and service strategies. These activities may also specificially address certain customer groups (families, flat shares, etc.) that are more likely to profit from OGS usage or address and adapt advertising strategies towards customers in specific situations (Hand *et al.*, 2009) that may positively influence the predisposition towards OGS. Precisely targeted online advertising may increase the chances to reach both of these customer segments.

Limitations and Future Research

This study is subject to a number of limitations: First the gathered sample is not representative of German consumers. Specifically with regard to geographical OGS restrictions. We furthermore did not include measurement of situational factors and hence temporary willingness to use OGS as well as product-related intends (e.g. perishable vs. non-perishable products) to commence OGS. Another limitation can be seen in the sample size as Hirschfeld *et al.* (2014) argue that some items yield unstable loading patterns with sample sizes below 1,000 participants. A larger sample size therefore could help stabilise and validate our findings. We furthermore find that personality traits – at least in our sample and in contrast to consumer values (Hansen, 2008) – do not fit as predictors of OGS adoption. Future research may address some of the topics left unanswered by this study. As Germany is amongst the lower rates of OGS adoption on an international scale further comparative and cross-cultural studies (specificially with an emphasis on well-developed regions like Asia and Northern America) may reveal interesting insight into different mind-sets towards OGS usage (e.g. Choi and Geistfeld, 2004). We would also like to stress the necessity of further evaluation on the predicitve power of personality traits towards consumption behaviour and intentions specificially in comparison with related constructs such as consumer value theories. Integration of further established measures such as Technology Acceptance Model (TAM) and mixed-methods application as suggested earlier provide promising research opportunity in a dynamic economic environment.

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Appendix

Appendix 1: Overview of socio-demographic variables.

	n	percent	mean	sd
OGS experience				
yes including perishables	69	10.2		
yes excluding perishables	113	16.7		
no	476	70.2		
generally no internet shopping	20	2.9		
Age			29.63	11.92
18-28	473	69.8		
29-39	109	16.1		
40-49	37	5.5		
50-60	55	8.1		
60+	3	.4		
missing	1	.1		
Sex				
male	233	34.4		
female	441	65.0		
diverse	4	.6		
Country				
Germany	650	95.9		
Other	28	4.1		
Civil status				
single	509	75.1		
married[a]	143	21.1		
separated	13	1.9		
civil partnership	9	1.3		
widowed	2	.3		
missing	2	.3		
Living environment				
urban	183	27.0		
suburban	154	22.7		
small-town	186	27.4		
rural	155	22.9		
Grocery Shopping Responsibility				
myself	300	44.2		
common	259	38.2		
roommate/partner	28	4.1		
parents	85	12.5		
other	4	.6		
missing	2	.3		

Education		
Hauptschule[b]	2	.3
Mittlere Reife[c]	22	3.2
Abitur[d]	258	38.1
Fachabitur[e]	70	10.3
Abgschlossene Berufsausbildung[f]	81	11.9
Höhere Berufsausbildung[g]	14	2.1
Bachelor	108	15.9
Master	48	7.1
Diploma	53	7.8
PhD	22	3.2
Employment status		
employed	223	32.9
self employed	14	2.1
apprenticeship	15	2.2
pupil	2	.3
student	413	60.9
unemployed	4	.6
missing	7	1.0
income (in euro)		
< 500	175	25.8
501 – 999	153	22.6
1,000 – 1,499	66	9.7
1,500 – 1,999	51	7.5
2,000 – 2,499	50	7.4
2,500 – 2,999	37	5.5
> 3,000	79	11.7
missing	67	9.9

Notes: N = 678. [a] includes people married but living separately; [b] conforms with Lower Secondary Education; [c] conforms with Secondary school leaving certificate; [d] conforms with Secondary school leaving examination. [e] conforms with british AVCE. [f] completed vocational training. [g] higher vocational training.

Intermission

In late 2019 rumors of a virus outbreak spread around the world and by March 2020 the Coronavirus (COVID-19) outbreak had been declared a pandemic by the World Health Organization (WHO; 2020).

To decrease the overall spreading of the virus, many authorities around the world issued restrictions on daily life activities such as stay-at-home policies. Not only did the COVID-19 pandemic have a significant impact on the perception and outlook for online grocery shopping services, it also heavily disrupted the original research plan for this dissertation.

So far, the authors provided the fundamentals of online grocery shopping services in Germany, examining both the supply and demand-side adoption. In doing so, we identified certain preferences as well as obstacles to the usage that were reported in chapter II.2 and II.3. The original research set-up of this thesis proposed neuro-economic assessment of the actual behavioural patterns via eye-tracking measurement, while using OGS services. These patterns have only been partially explored but provide great insight into the user experience at the digital point-of-sale. Benn et al. (2015) report the relative uselessness of manual searches for OGS pages, which results in consumers browsing webshop department by department rather than searching for specific items. Other studies have highlighted the potential of eye-tracking, measuring consumer education processes from nutrition labels (Graham et al., 2012; Siegrist et al., 2015), and customers' visual attention to label design (Merdian et al., 2021).

Due to the hygiene restrictions issued in light of the COVID-19 pandemic, none of these laboratory-based studies were possible. At the same time, demand for the OGS segment rose, and people started queuing up at supermarket storefronts. The existence of the pandemic itself may have greatly impacted consumer benefit perception of OGS services, rendering some of the published implications and recommendations less actionable. Due to these changes, and the issued restrictions for laboratory experiments, this thesis ressorts to analysing the shifting landscape in OGS research amidst the pandemic. To do so, the next part of this dissertation provides a comprehensive overview of the past twenty years in OGS adoption research and some remarks on the future development of this market segment and research streams, post-pandemic.

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Part III Mapping the Shifting Landscape of Online Grocery Research amidst COVID-19

Chapter III.1 Setting the Table for Research in Online Grocery Shopping Adoption: A Smart Review of the Past Twenty Years

Philipp Piroth, Marc Sebastian Ritter, Edith Rüger-Muck and Gerhard Raab

Declaration of Contribution

This article resulted from a collaboration with MSR, ERM and GR. The areas idea and conception, conduction of the study and writing of the article have been mainly covered by PP. I would like to acknowledge the following contributions. The idea was developed by PP. The conception and data gathering were covered by PP in collaboration with MSR and ERM. Data-Analysis was conducted in collaboration with MSR and writing of the initial draft of the article was covered by PP, MSR and ERM. Final version was written in close collaboration with MSR, ERM and GR.

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Setting the Table for Research in Online Grocery Shopping Adoption: A Smart Literature Review of the Past Twenty Years

Abstract

This article summarises and synthesises the current academic body on demand-side adoption of digitalisation in food retailing to highlight and sharpen future research directions and methodologies. Studies from the last twenty years (2000 – 2020) of interdisciplinary research on digitalisation in food retailing were taken into account for language processing and qualitative analysis. The authors report that academic interest in established marketing measures and their application towards Online Grocery Shopping is on-going. The adoption process is under investigation from a diverse range of perspectives that developed from streams in innovation adoption and psychological and economical consumer behaviour. The authors propose experimental research set-ups to understand the inter-connection between triggers and motivators towards adoption. Neuro-economic measures (such as Eye-Tracking) may help to deepen the scientific understanding of consumer reaction towards digital transformation in retailing generally, and with food items as strongly culture-bound products in particular. This article derives remaining knowledge gaps and directions for future research in this economically attractive and dynamically changing research environment.

Keywords: *online grocery shopping, systematic review, consumer adoption, food retail, digitalisation retail*

Introduction

Digitalisation, as "*one of the most significant on-going transformations of contempory society*" (Hagberg, Sundstrom, and Egels-Zandén 2016, 694), has manifested itself within almost every area of business. Some market segments such as "*printing, publishing, music and entertainment have strongly reacted to digitalisation*" (Elms, Kervenoael, and Hallsworth 2016), while grocery retail hesitates to be mass-digitalised. Now, food is a complexer good than it may initially seem as it is a transnational product highly integrated into social norms and rituals (Lupton 1994), has a high need for haptical inspection pre-purchase (Kühn, Lichters, and Krey 2020), extensive and variying logistical requirements (Hübner, Holzapfel, and Kuhn 2016) and, last but not least, has a direct relation to body functionality (Capaldi 1996). This highlights the need for universal availability and distribution of food products – a need that got publicly challenged with the COVID-19 shop visitation restrictions put in place by many administrations around the globe, creating irrational impulsive buying and stockpiling behaviour (Hao, Wang, and Zhou 2020) among consumers, thus accelerating demand of OGS services.

While online grocery shopping (OGS) is described as a "*discontinous innovation*" (Hansen 2008), and as such requires substantial behavioural adaptation (Robertson 1967), subsequent adoption remains highly differing on an international scale and academically underexplored (Martín, Pagliara, and Román 2019). The critical cooling requirements in grocery deliveries have put forward the need for adapted retailing concepts that found their (preliminary) preference in the installation of omni-channel infrastractures (Ishfaq et al. 2016). This can be illustrated by pure online retailers opening up outlets in larger cities (Garcia 2019), while stationary retailing is supplementing its existing market presence with OGS services. Still, in many countries stationary grocery retail defends its market share and relevance. This may be due to its unique shopping experience (Everts and Jackson 2009), customer acceptance of the status quo (SEITZ et al. 2017), national infrastructure (Nielsen 2018, 251) as well as personal beliefs on an individual motivation level and household grocery shopping responsibility configurations and routines on an operational level. Food products account for "a large proportion of consumer spending" (Ramus and Asger Nielsen 2005, 336), rendering the market segment economically attractive. When inspecting the share of consumers that indicated intention to buy groceries online within the next twelve month, global gaps in adoption patterns become graspable: While Asian countries (e.g. China 88 %; Thailand 87 %; Vietnam 85 %) show large acceptance rates, European countries remain on a moderate level and strongly varying (e.g. UK 57 %; Germany 40 %; Belgium 25%) with an global average at 48 per cent

(pwc 2018, 8). As intention not necessarily translates to actual behaviour these rates remain of indicative nature. This literature review synthesises the academic body on OGS adoption from a consumer perspective. Publications from a time frame of the last twenty years (2000 – 2020) were considered. Ever since the turn of the millenium, scientific interest has steadily increased with offspring in various disciplines and, thus a broad corpus of research has been created. A corpus that currently remains fragmented and poorly aligned. With an increasing relevance of OGS services in the context of the COVID-19 pandemic this article aims to serve as a baseline on the current status of the field, provide future research directions for academia and actionable recommendations for practioners.

Literature Review and Theoretical Framework

As our research limits itself to consumer-side perspective on the OGS adoption process reviews regarding supply-side issues (e.g. Hübner et al. 2016; Melacini et al. 2018) will not be further discussed. This study takes inspiration from the approaches of three other systematic reviews (see **Table 9**):

- Thematic- and theoretically we rely on two earlier literature reviews conducted in the domain of OGS by researchers Grunert and Ramus (2005) and Martín et al. (2019).
- Methodologicaly we apply recommendations by Asmussen and Møller (2019) who propose a framework for smart literature reviews via language analysis as has also been applied in the Martín et al. (2019) study.

In 2005, an initial literature review on OGS was published by researchers Grunert and Ramus who combine and discuss well-established measures and frameworks from consumer behaviour literature in the context of online food shopping. They propose a largely ready-to-measure framework by combining three established scales: The Theory-of-Planned Behaviour (TPB; Ajzen 1991) to assess beliefs and intention, lifestyle constructs (e.g. Grunert et al. 2001) to encapuslates demographics and media usage and the Engel-Kollat-Blackwell (EKB; Engel, Blackwell, and Kollat 1978) model that describes consumer behaviour during the shopping proces itself along a five-stage process. TPB is an iteration of the earlier theory of reasoned action (TRA) and consists of the dimensions social norm, perceived behavioural control (proposed as consisting of personal ability and resources) and attitude as well as the willigness to buy a certain product or use of a service, respectively. Their model has been extensively applied in the current literature corpus, however their initial framework seems rather focussed

on explaining the individual adoption process. Furthermore, TPB among other consumer behaviour scales measures intention-to-use as its dependent variable, blinding out the discrepancy between intention and actual behaviour and "*takes consumers' beliefs as given*" (Grunert and Ramus 2005, 393).

We took methodological guidance from the guidelines for smart literature reviews provided by Asmussen and Møller (2019). They propose that "*manual exploratory literature reviews are soon to be outdated*" as the method is time-consuming and only result in few analysed papers (Asmussen and Møller 2019, 2) in an ever-growing literature corpus. Natural Language Processing (NLP) via Latent Dirichlect Allocation (LDA; Blei, Ng, and Jordan 2003) offers a solution to analyse larger amounts of documents as an "*unsupervised, probabilistic modeling method*" (Asmussen and Møller 2019, 5) that is able to extract latent topics from research articles. This approach is also taken by Martín et al. (2019), who use bibliometric analysis and aforementioned topic modeling on a sample of n = 144 documents to identify trends and existing research gaps in OGS research. While their sample is limited to the Scopus database the researchers conduct NLP and LDA procedures to extract underlying latent topics. They highlight the "*high dispersion*" of articles (Martín et al. 2019, 311) indicating broad and diverse publication distribution across academic disciplines. Furthermore, they report that OGS topics are tightly linked with issues of technology acceptance and, in accordance with the earlier study by Grunert and Ramus (2005) they also propose further evaluation of the EKB model to fill "potent gaps" (Martín et al. 2019, 328) that remain in OGS research.

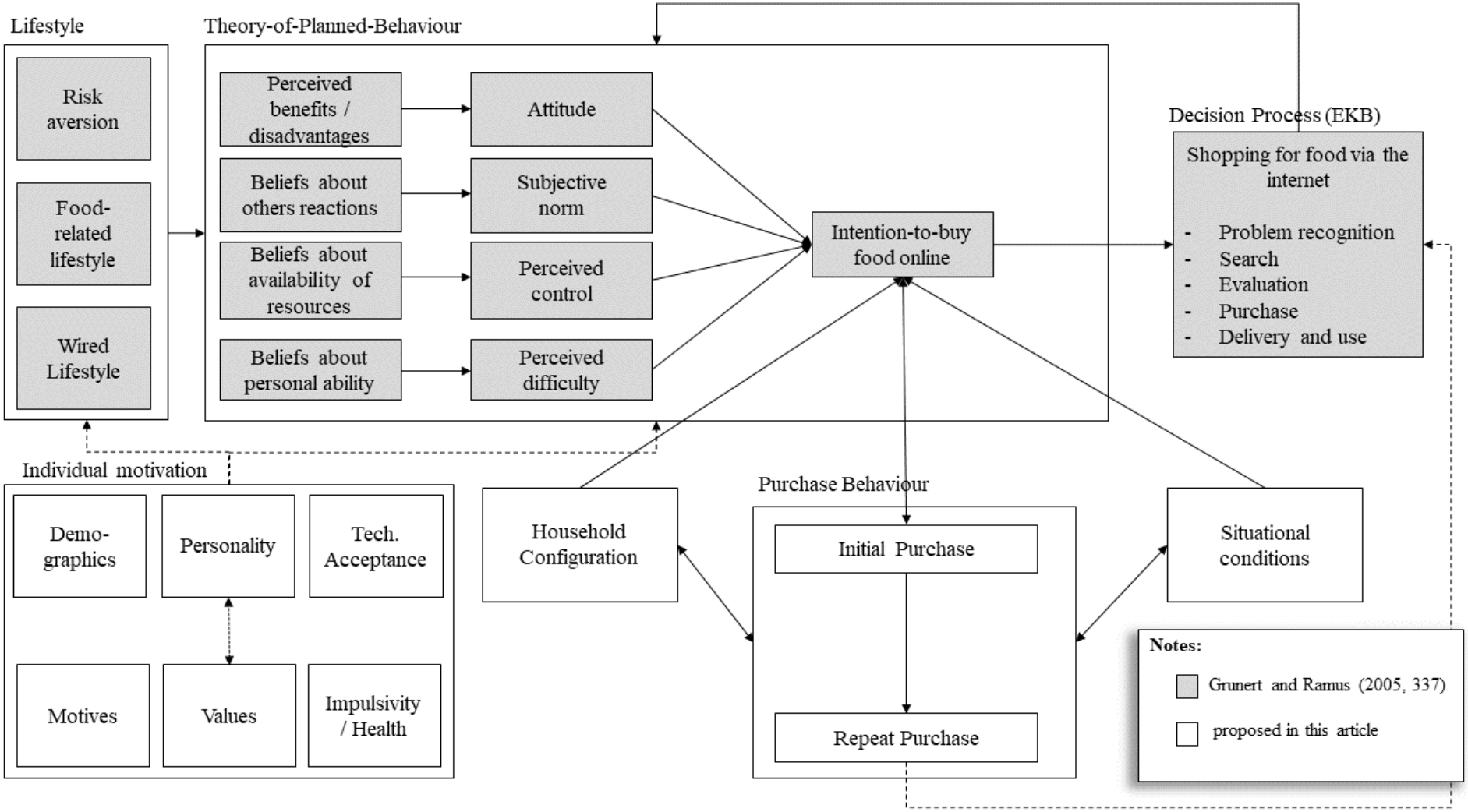
Table 9. Existing Literature Reviews on Online Grocery Shopping Adoption.

Year	Author(s)	Method & Scope	Findings
2005	Grunert and Ramus	Thematic segmentation of OGS determinants into the categories medium, product, customer, company, and environment. The article includes established publications on general online shopping adoption and consumer willingness.	The study discusses literature on online shopping adoption and specifies a theoretical framework based on well-established constructs such as lifestyle, theory-of-planned behaviour and the Engel-Kollat-Blackwell model for consumer behaviour.

2019	Asmussen and Møller	Review of language analysis tools and their application in smart literature reviewing.	LDA enables topic extraction from documents and is therefore applied in this study.
2019	Martín et al.	Bibliometric analysis and Latent Dirichlet Allocation procedures on a total of *n=144* documents on the keyword "e*grocer*" and "e*retail*" from the Scopus database in the period from 1962 – 2018.	The authors report existing gaps in OGS literature and statistical assessment of their dataset identifying prolific author(s), institutes, publication outlets and research area. They link initial research interest to the year 2000, cluster research topics and identify remaining research gaps.

The framework provided by Grunert and Ramus (2005) will be utilized in a slightly altered and updated version as a baseline in this study (see **Figure 7**): We include a number of up- and downstream research areas in the updated framework. Initial and repeat purchases have been added as purchase behaviour and situational conditions as well as household configuration were included as influencers of actual usage. Furthermore, individual characteristics that exert influence either directly or indirectly (via resulting lifestyle preferences) on the willingness to use OGS were added. This theoretical base was chosen as other researchers were successfully able to adjust and apply it in both qualitative (e.g. Ramus and Asger Nielsen 2005) and quantitative (e.g. Quevedo-Silva et al. 2016) research designs.

Figure 7. Enhanced and updated model of the theoretical framework proposed by Grunert and Ramus (2005, 337).



Methodology

Data Collection

This study uses systematic analysis of the available corpus on OGS adoption literature published between 2000 and 2020. The scope of this article was to identify the relevant topics and research streams in the domain of OGS adoption research from a consumer perspective. Data was collected using the search phrase "online grocery shopping adoption" – seperated via AND operators (where applicable) – from the following databases: Google Scholar (998 entries), Science Direct (534), Crossref (200), Scopus (30) and Web of Science (16). Harzings Publish or Perish software (Harzing 2007) aided in the data collection and enabled a high level of data consistency in the raw data material, initially consisting of a total of *n = 1,778* data entries.

Selection Procedures

The created data-set underwent a series of specific adjustments along a four stage selection process (as outlined in **figure 8**). Besides the (rather technical) procedures in the first selection step, the process was conducted by two researchers independently, differing classifications were discussed and resolved. For the selection process we used the current iteration of Microsoft Excel. The adjustment procedure followed these stages:

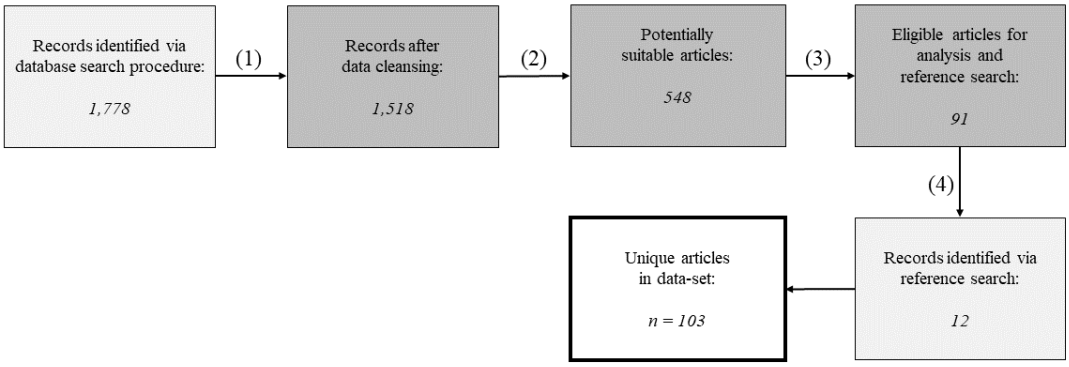
(1) First, we performed a number of technical reductions by removing duplicates (-58), non-English literature (-5), non-journal documents like book chapters and undergraduate theses (- 26) and corrupted data entries (-171; e.g. empty data fields).

(2) Next, the remaining articles were screened for suitability on the scope of this article based on their title and keywords. A large proportion of data entries was removed due to either being focussed on a supply-side perspective or focussing on the overall topics of adoption and online shopping without any (online) food related context.

(3) The data-set was further trimmed down upon inspection of the abstract. Other literature reviews (-6, incl. the two OGS-related reviews presented in an earlier section) were removed from the data-set at this point.

(4) All papers that reached this selection step were eligible for analysis including reference search to determine the degree of concept exhaustion in our data-set. Reference search revealed an additional twelve articles.

Figure 8. Sequencing of the Search and Selection Procedures applied in this study.



Thus, the final data-set consisted of a total of *n = 103* unique articles on online grocery shopping adoption that were included in the bibliometric analysis of this article. The data-set is made available alongside this article.

Data Analyses

In preperation of the qualitative synthesis, we ran a series of bibliometric analyses using Microsoft Excel. Illustrations were created using matplot packages in Python to visualise the specific context and conditions of the data-set. Additionally, we executed a LDA topic mining process in the Python progamming environment to extract latent topics in this research domain as outlined by Martín et al. (2019) and following recommendations by Asmussen and Møller (2019).

Results

Contexutalising the data-set: Some bibliometric analyses

This article first provides contextual understanding of the data-set by quantifying publication patterns and thematic research clusters. As laid out in the previous section a total of *n = 103* articles were selected for bibliometric data analysis. These analyses are visualised in **figure 9**.

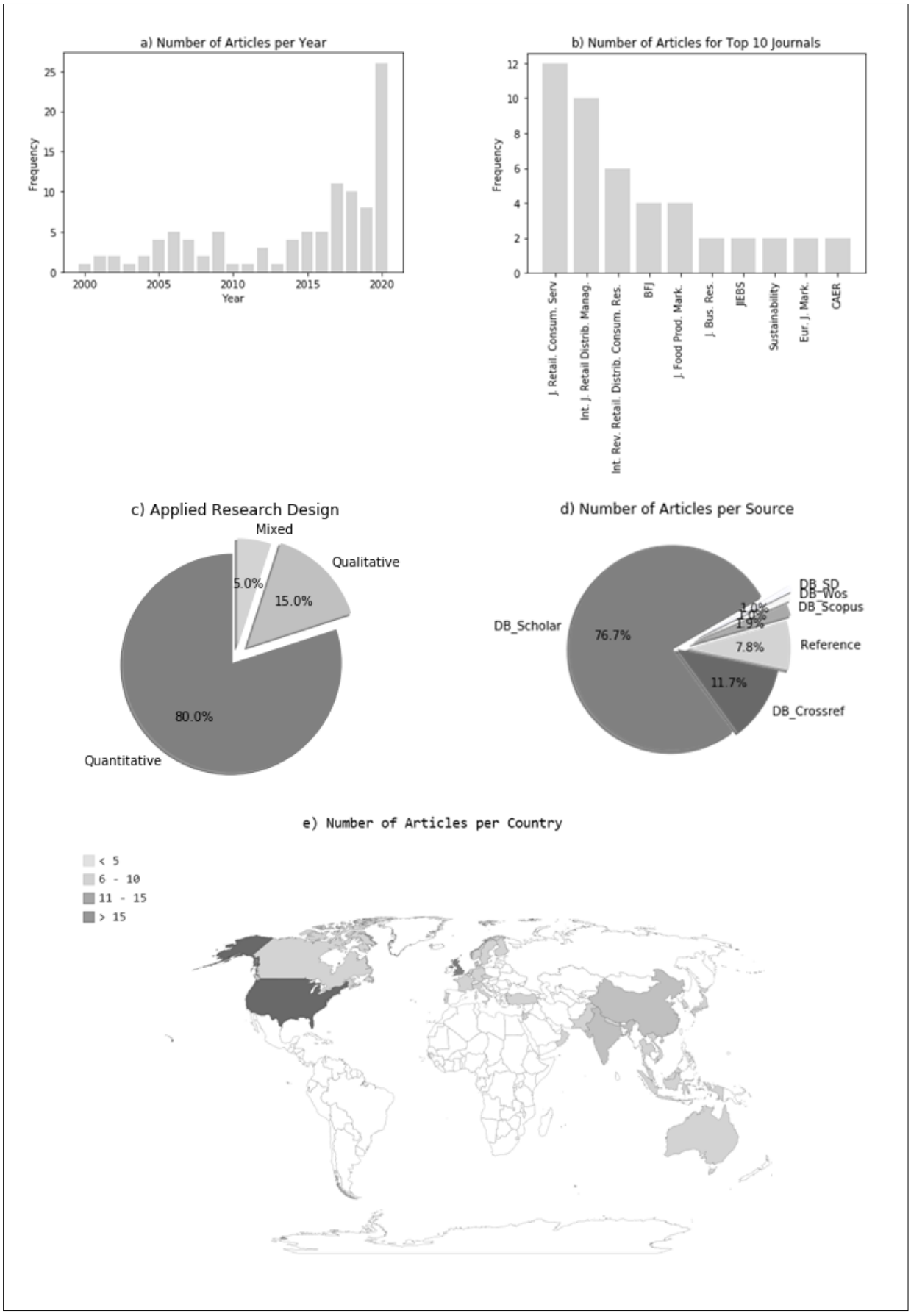
The findings indicate that research interest has steadily increased over the observed time period. The vast majority of studies in our data-set apply a quantitative approach (81 articles) and a number of articles focussed on Europe (46), Asia (34) and America (19). Looking at the individual country of origin of the research sample populations however, we can report that

most studies focus on the USA (17), followed by the UK (15), China (7) and India (6). Suprinsingly, only six studies in our sample are cross-country studies.

In addition to the characteristics of the data-set we also provide analysis based on reference patterns between articles that can be accessed in **web appendix A** created with the online tool Litmaps.co (Litmaps 2021) to show the origin and development of ideas in OGS research over the twenty year period analysed in this article.

This analysis provides some insightful understanding as it hightights the origin of concepts that have manifested and shaped OGS adoption research e.g. innovation diffusion theories (Robertson 1967) and consumer psychology (Ajzen 1991). These research strings define large parts of OGS adoption literature.

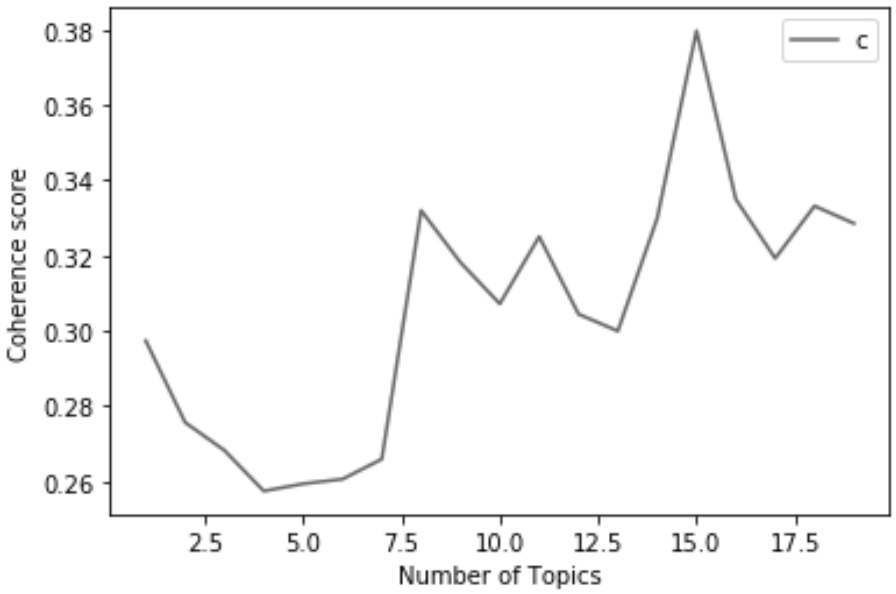
Figure 9. Visualisations of bibliometric results of the data-set for n=103 articles.



Exploring and modeling latent topics

In the next step, we conducted an LDA procedure as outlined by Martin et al. (2019) in the Python programming environment. LDA proposes that every document sustains of a number of topics which are in turn a mixture of words distributed over documents. The text analysis process was run on all provided abstracts which were first pre-processed using tokenization and lemmatization (extracting only nouns and verbs, while removing numbers and special characters). We furthermore removed general and custom stop words that frequently occur in academic abstracts (such as names of subsections, etc.) and applied stemming to reduce words to their root form. Despite its relatively easy application LDA results are often tricky to interpret as mechanical and human understanding of suitable topic clustering is rarely synonymous. Upon inspection of both coherence and perplexity measures a model with 15 extracted topics was chosen as the optimal solution (see **table 10**, **figure 10**, and **web appendix B**).

Figure 10. Plot of coherence score c suggests an optimal number of fifteen topics.



We can report a similar topic distribution as described by Martín et al. (2019) with a focus on technology acceptance. Despite our elemination of retail-centered articles, topics relating to the service providers capabilities still appear in the data-set (see topic 1 and 8) highlighting the tight link between attractiveness of the offer and efforts in providing adequately digitalised services and effective logistics. The LDA results do somewhat resemble the proposed structure of the research area however and even detected the COVID-19 pandemic as part of a topic (topic 12).

Table 10. Latent Topics extracted via LDA procedures.

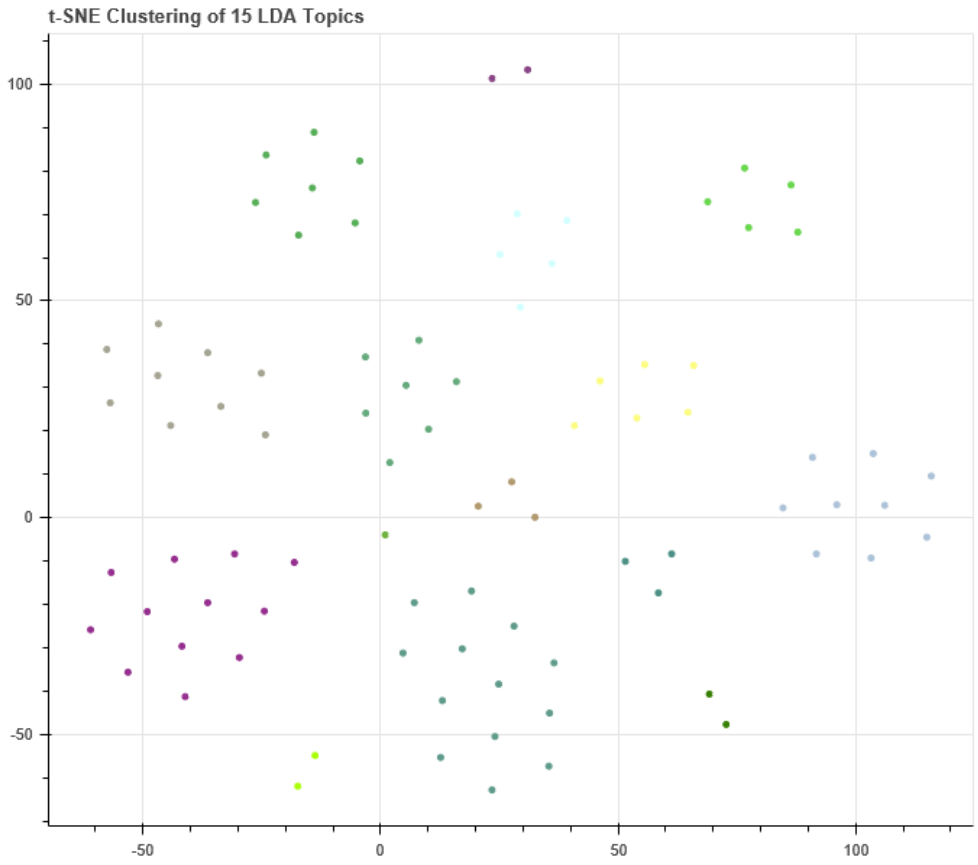
Topic	Keywords
1	effect, retailer, behavior, impact, intention, level, trust, behaviour, household, age
2	cross, shopper, convenience, collected, identify, survey, format, price, intention, context
3	intention, perception, store, understand, theory, market, advancement, based, time, adopt
4	based, assessment, criterion, retail, considered, time, today, distance, connected
5	acceptance, impact, behavior, supply, usefulness, bias, ease, city, purchase, approach
6	understanding, purchase, store, drawing, surrounding, month, period, based, end, change
7	experience, attitude, marketing, approach, personality, norm, brand, influence, willingness, behavior
8	class, store, work, compatibility, made, decision, experience, advantage, behavior, effect
9	produce, innovation, quality, product, design, purchase, value, service, factor, store
10	store, approach, choice, value, time, information, influence, product, need, purchase
11	effect, attitude, experience, product, good, complexity, suggest, based, household, purchase
12	based, order, risk, delivery, shop, time, behavior, focus, frequency, covid
13	switching, develop, education, related, income, past, highlight, pull, push, mooring
14	loyalty, behaviour, satisfaction, relationship, context, importance, understanding, role, process
15	purchase, customer, store, market, influence, business, find, mode, involvement, change

Notes: To establish the optimal number of topics we compared topic models between two and 20 possible topics in one per step iterations (see **figure 10**). 15 topics were identified as the optimal solution with *coherence = 0.38* and *perplexity = -6.98*. LDA was performed with the following hyperparameters: $\alpha = 0.9$, $\beta = 0.1$, *passes = 10*, *decay = 0.5*, *chunksize = 2000*.

To illustrate the topic distribution across the text corpus we plotted a t-distributed stochastic neighbour (t-SNE) chart as introduced by researchers van der Maaten and Hinton (2008). Two-dimensional plotting of high-dimensional data however remains a topic of controversy amongst involved scholars (Schubert and Gertz 2017; Wattenberg, Viégas, and Johnson 2016) and proper interpretation remains complex.

Yet, the data entries show a reasonable distribution and classification within and across their assigned topics (see **figure 11**).

Figure 11. t-SNE Clustering of LDA topics where each dot represents an article and its topic classification.



The topics and their composition can be explored in **web appendix B** as provided by the plyLDAvis package in the Python environment.

Synthesis

In this section we aim to aggregate the findings of the studies in our data-set to lay out the scope of each individual research stream. An individual selection of studies was chosen to highlight some of the main findings per research area, a comprehensive overlook of the studies can be found in the data-set associated with this article. For ease of digest this section is organised according to the dimensions proposed earlier (see **figure 7**).

Individual motivation

Demographics and Motives. Individual motivation consists of research on the influence of socio-demographics (Hood et al. 2020; Morganosky and Cude 2000, 2002), critical factors

(Raijas and Tuunainen 2001) and consumer preferences (Kim, Park, and Lee 2017; Picot-Coupey et al. 2009; Ramus and Asger Nielsen 2005) in OGS. Convenience, besides timesaving can be considered to be the most influential motivational drivers for using OGS and stand at the forefront of consumers perception when they consider their daily grocery procurement (Morganosky and Cude 2000; Ramus and Asger Nielsen 2005; Verhoef and Langerak 2001). Throughout the considered literature these factors have constantly been identified to assert influence on the perception of advantageousness and are critical in creating positive beliefs about OGS usage. Convenience includes independence from opening hours, ease of ordering, no queuing, salvation of physical burden and the possibility to shop anonymously without leaving one´s house (Kim et al. 2017; Picot-Coupey et al. 2009; Sreeram, Kesharwani, and Desai 2017). Some of these aspects can also be considered to be major advantages for disabled or less mobile people (Ramus and Asger Nielsen 2005) establishing early indication on situational conditions as influencers of personal motivation. OGS is considered to be advantageous for heavy or bulky goods. However consumers hesitate to use OGS for perishable goods or "important food" (Morganosky and Cude 2002; Robinson et al. 2007). Some studies specifically examine relative advantages of OGS in direct comparison with stationary offerings in the context of tandem usage between both channels (Cervellon, Sylvie, and Ngobo 2015; Davies, Dolega, and Arribas-Bel 2019; Kim et al. 2017; Picot-Coupey et al. 2009). Usage may vary largely with living location as rural stores exhibit a larger catchment area for click and collect services compared to urban stores (Davies et al. 2019). In summary the following aspects are constantly identified as individual motivators to adopt OGS usage:

- Convience (Harris et al. 2017; Huang and Oppewal 2006; Kim et al. 2017; Morganosky and Cude 2000, 2002; Ramus and Asger Nielsen 2005; Verhoef and Langerak 2001)
- Time Saving (Anesbury et al. 2016; Morganosky and Cude 2000, 2002; Picot-Coupey et al. 2009; Verhoef and Langerak 2001)
- Efficient and selective shopping (Kang et al. 2016)

Disadvantages which could act as mental barriers towards the adoption are, for instance, the risk of receiving inferior quality groceries, incorrect orders, bad service quality, the loss of recreational aspects, the user interface of the webpage and inherently needed IT skills, privacy concerns and trust (Kervenoael et al. 2007; Ramus and Asger Nielsen 2005; Robinson et al. 2007). Especially inferior quality of products or services can lead to a major drawback in the adoption process and may force consumers to frequently re-evaluate their decision (Hand et al.

2009; Robinson et al. 2007). To summarise on the associated disadvantages of OGS, the following aspects frequently appear:

- Satisfaction with status quo (SEITZ et al. 2017; Teller, Kotzab, and Grant 2006)
- Lack of shopping experience (Huang and Oppewal 2006, 347)
- Search Concerns (Kühn et al. 2020; Raijas and Tuunainen 2001)
- Service Concerns (Ramus and Asger Nielsen 2005)
- Technology Concerns (Harris et al. 2017)
- Cost (Ramus and Asger Nielsen 2005)

These facets shed light on consumers expectancy and the subsequent formation of positive or negative beliefs towards OGS. Yet, these advantages and disadvantages are not able to fully explain individual affinity to adoption and subsequent consumer behaviour. *Values and Personality.* Literature reports differing results on how personality and consumer values may help predict the willingness-to-conduct OGS. Personality traits were only able to explain small proportions in attitude towards OGS, and effect sizes remained insignificant in the context of OGS. While personality traits may be somewhat abstract to directly measure OGS adoption, Hansen (2008, 134) finds consumer values as more reliable indicators for adoption patterns: While self-enhancement showed a positive influence on the attitude towards OGS, conservation showed a negative effect. *Impulsivity and Health.* Despite evidence that impulsivity may play a vital role in the ensamble of an OGS shopping basket (Munson, Tiropanis, and Lowe 2017), research in this area remains scarce. Ten years earlier Robinson et al. (2007) argued that the absence of impulsive shopping makes the service more economical. While it can be assumed that OGS enables consumers with better possibility to compare products (for instance via digital shopping lists) and conduct the grocery shopping with little distraction, this ist not reflected in the stability of OGS baskets. Internet commerce offers consumers with easy comparability of products and their associated costs (Kang et al. 2016, 3610), however doing so appears to be not prevelant in OGS. This may hint at certain behavioural patterns in food item decision making, such as habitualisation of product choices and the perception of grocery shopping as a chore. These results are however in contrast to the findings reported by Huyghe et al. (2017), which rule out differences in order lead time as an alternative explanation for observed differences in unhealthy (vice) purchases across online and offline shopping channels.

Milkman, Rogers, and Bazerman (2010) report differing purchasing patterns between should (e.g. vegtables) and want (e.g. ice-cream) food items depending on the delay between order and delivery. Consumers engaged in less spending, the further in advance they complete their online

grocery order. Furthermore, for orders placed between two and five days before the delivery, the should/want food item ratio favoured want products the closer order completion was to delivery date (Milkman et al. 2010, 28). Anesbury et al. (2016) furthermore, report that half of the shoppers in their sample (and even consumers new to the service) spent less than ten seconds making a purchasing decision from a category and commonly purchased products available from the first category page displayed in the retailer´s online grocery store. In their study, participants completed their shopping baskets approximately eleven minutes quicker than in physical stores and did not appear to be interessted in bargain purchases. In fact, they did not even consider many of the options available (Anesbury et al. 2016). *Technology Acceptance.* The TAM and TPB scales share a common origin in the earlier TRA approach which offers an explanation why this research area largely overlaps other areas such as TPB and lifestyle. Several studies are grounded on the original TAM construct (Bauerova 2019; Bauerová and Klepek 2018; Driediger and Bhatiasevi 2019; Sreeram et al. 2017) and its various iterations to analyse consumer adoption in OGS. Driediger and Bhatiasevi (2019) report significant influence of perceived usefulness and perceived ease of use on the intention to use OGS for Thai consumers and similar findings were reported in a Czech-based study by Bauerová and Klepek (2018) highlighting the importance of technology acceptance in the context of online food retail. With regard to the perception of the offered electronic service quality (eServQual) by OGS service providers in Malaysia, Muhammad, Sujak, and Rahman (2016, 383) found significant positive correlation between all eServQual variables and OGS adoption. Subsequent multiple regression analysis reveals system availability and privacy as significant influencers of OGS adoption. Research in this area is undergoing theoretical discussion as both Bauerova (2019) and Singh and Söderlund (2020) provide modified theoretical constructs for assessing the experience with OGS. Based on the TAM framework, Brand, Schwanen, and Anable (2020) identify and describe five customer segments depending on usage preferences.

Lifestyle

Risk. Perceived risk in OGS usage has been studied by Mortimer et al. (2016) and Saleem et al. (2018) indicating a significant effect of perceived risk and full mediation on the effect of trust on repurchase intention. Consumers may want to reduce potential risks associated wutg grocery retailing interaction (Ramus and Asger Nielsen 2005). This also opposes most of the motivational aspects to use OGS. Ramus and Asger Nielsen (2005) and Kervenoael et al. (2007) both argue that e-grocers have failed to create trust and use the possibilities of the internet as a

two-way communication channel to express preferences, concerns and establish trust. *Food-related Lifestyle.* Kang et al. (2016) report that food-related lifestyle variables differed between adoption and post adoption. Four years later, Wang et al. (2020) find that food choice motives had a significant effect on OGS attitude. This dimension also incorporates food-related trends such as preference for imported groceries and snacks (Zheng et al. 2020). Food-related lifestyle has also been used to conduct consumer segmentation analysis: Hand et al. (2009, 1213) propose a three-cluster solution with a health-and-kids-focused segment, highlighting the influence of situational conditions in the adoption process. *Wired Lifestyle.* The originially proposed constructs of a wired lifestyle to measure familiarisation with computer technology was not advanced in our data-set, despite one article directly based on the original framework (Quevedo-Silva et al. 2016). On the other hand, we find large application of technology acceptance (as outlined earlier) and frequently applied consumer behaviour measures such as the TPB.

Theory of Planned Behaviour

A number of articles in our data-set apply the core TPB construct to measure OGS adoption both qualitative- (Ramus and Asger Nielsen 2005) and quantitatively (Hansen, Møller Jensen, and Stubbe Solgaard 2004). Hansen et al. (2004) report that in comparison the TPB construct with an inclusion of a path from social norm to attitude yielded the highest prediction power of OGS usage adoption. Furthermore, subjective norm, perceived behavioural control and attitude exert influence on the willingness-to-use OGS. Satisfying prediction power of these established and adjusted measures in general is reported in many research contexts such as advantages and disadvantages (Hansen 2005; Harris et al. 2017), social influence (e.g. Chakraborty 2019; Driediger and Bhatiasevi 2019), consumer values (Hansen 2008) and personality traits (Piroth, Ritter, and Rueger-Muck 2020). Most of these studies also acknowledge the large impact of an initial purchase and previous purchasing history as discussed in the context of risk (Mortimer et al. 2016). Besides the large application of the TPB construct other researchers have applied alternative measures to include political, economical and especially cultural differences in service adoption (Kurnia 2008) or focus on eServQual aspects (Kervenoael et al. 2006).

Situational Conditions

Initial consumer interest in OGS has been found to be often grounded in changes within the professional or private life of a customer (Hand et al. 2009; Robinson et al. 2007). Situational variables can be considered as dominant triggers to start, as well as to stop or diminish the frequency of OGS usage (Robinson et al. 2007). They may include, but are not limited to the birth (Burningham et al. 2014) and every-day life with children (Ayadi and Muratore 2020), changes in the workplace as well as injuries and sickness. This highlights the potential of OGS for specific target groups such as families, elderly or mobility impaired people (Bezirgani and Lachapelle 2021). Situational conditions may influence both the general willingness to use a service as well as the advantageousness of an individual shopping decision, e.g. food items being bought with a specific purpose or for a certain occation (such as dinner with friends). Very recently, the influence of situational conditions and OGS usage usage were prominently demonstrated by the on-going COVID-19 pandemic (Grashuis, Skevas, and Segovia 2020). The late 2019 outbreak of this novel virus resulted in reports of unparalleld demand in OGS services partially as a result of stockpiling buying behaviour even for fresh food (Hao et al. 2020). Shortages in OGS delivery spots were reported from all over the world. Hui and Wan (2009) discussed a similar surge in OGS usage in Singapore during the 2003 SARS outbreak. COVID-19 has been and is likely to remain a major driver of OGS adoption as each confirmed case increases the probability that consumers purchase food online, particularly younger people (Gao et al. 2020). The pandemic is likely to have changed the mindset of a broad consumer base as stay-at-home policies applied in many countries may have increased the perceived benefit of usage. COVID-19 therefore provides a fruitful ground to study the individual forces and motivation behind OGS adoption under changing cirumstances.

Household Configuration

Researchers van Droogenbroeck and van Hove (2017) propose that OGS adoption – unlike many other innovations – is related rather to household-level characterstics. This argumentation seems reasonable given the fact that the benefit of usage may vary across customer segments and in relation with their individual situation. Etnographic and qualitative studies conducted by Kervenoael, Hallsworth, and Elms (2014) and Elms et al. (2016) find different motivation for internet or in-store usage which illustrate micro-decision scenarios set in specific household configurations and shoppping practices to illustrate conditions in every-day situations. Household specifics and their interaction have also been the subject of some articles with

quantitive research designs (Hood et al. 2020; van Droogenbroeck and van Hove 2017). Among the frequently observed variables in household configuration are household size, existence of dependent children, car ownership, social class and shopping responsibility.

Decision Process

Research application on the decision process is proposed via the widely-applied EKB model, however decision behaviour remains underexplored. It appears obvious that the product category plays a vital role as (particularly perishable) food as a high-touch product comes with a need for haptical inspection prior to purchase (Kühn et al. 2020) that "*should not be underestimated*" (Geuens, Brengman, and S'Jegers 2003, 241). Research has adressed emerging technologies at the stationary level (Fagerstrøm, Eriksson, and Sigurðsson 2017) and positive attitude towards digitalisation in stationary retailing may be linked with stronger OGS preference. In a conjoint-measurement analysis Fagerstrøm et al. (2017) report quality and real-time information as the primary influencers of buying intention. While consumers have no problem using mobile apps for online shopping in general, their usage in OGS was found to be limited. Wu and Teng (2011) furthermore differentiate information viewing, adding product to the basket and the actual purchase of the product as the three phases of consumer decision behaviour at the point-of-sale (PoS). Improving task-orientation in the OGS process has been discussed in the context of recommendation systems (Wu and Teng 2011; Yuan et al. 2016) where researchers Yuan et al. (2016) find repeated purchases, large orders and frequent purchases as significant features of OGS usage.

Purchase Behaviour

Initial Purchase. It is assumed that an initial purchase is likely to occur once the individual perceived benefit overweighs the required resources of using the service, if situational circumstances and household conditions (van Droogenbroeck and van Hove 2020a) faciliate usage. Once the initial purchase has taken place "*it must be assumed that"* a consumers beliefs towards the service "w*ill change*" (Grunert and Ramus 2005, 394) as a result of the perceived outcome. *Repeat Purchase.* After initial utilisation of OGS services, satisfaction or dissatisfaction will set-in and determine further purchasing intention of a consumer. While Hand et al. (2009) argue that usage intention fades as the initial trigger ceaces, ten years later researchers van Droogenbroeck and van Hove (2020b) report that most participants in their

qualitative study kept using the service beyond disappearance of the intitial trigger and rather focussed on the innovation characteristics. Singh (2019) studies reasoning to switch or stay with online grocery retailing based on 1,004 consumer reviews applying netnography and identifies service excellence, customer return-on-invest, aesthetics and playfulness as influencing factors on a frictionless and pleasurable customer experience that may result in different behavioural responses such as repurchasing, recommendation or intention to switch. Singh (2019, 1313) argues "*that online grocery shoppers do not care much about the visual appeal of the website but are more task-oriented, although they do look for both utitlitarian and an enjoyable experience* (…)". The initial set up, potentially including pre-set lists of groceries, loyalty cards, customer accounts for synergising stationary and online retail as well as privacy concerns may act as switching barriers and may require time-intense engagement by consumers (Kervenoael et al. 2007; Ramus and Asger Nielsen 2005). At the same time, repurchasing behaviour decreases with high perceived complexity, while the attitude towards OGS services increases repurchase intention (Hansen 2006). Push- and pull-factors of OGS service proprietors and their competition excert direct influence on switching intention (Singh and Rosengren 2020). Product assortment seem to increase consumers ease of use and usefulness, while entertainment and economic value are essential in shaping consumer satisfaction and loyalty (Sreeram et al. 2017). With regard to economic value, Wagner, Pinto, and Amorim (2021) explore the advantageousness of subscription-based OGS services. On the other hand, reverting back to traditional shopping practices appears to be particularly easy as many consumers never completely stop to shop in stationary outlets and consider OGS as a complementary service, rather than a full-fledged alternative in food shopping (Hand et al. 2009; Robinson et al. 2007).

Discussion and conclusions

In early research, a strong focus on identifying socio-demographics and household situations is noteable whereas market research and industry studies often focussed on identifiying personal characteristics. Throughout the mid 2000s', situational factors, acting as start and stop triggers towards OGS adoption were introduced into the literature.

The considered literature reveals many (often nationally) isolated research results that draw from consumer psychology (particularly Ajzen 1991; Childers et al. 2001; Schwartz 1992), innovation adoption (Robertson 1967) and the social integration of food (Lupton 1994). The quantitative relationships in OGS adoption have been regularly evaluated during the past twenty years, while qualitative studies are essential in providing tangiable and actionable context. The

COVID-19 pandemic has accelerated demand for OGS and is likely to have changed the perceived advantagesousness for a broad customer base. Further investigation into the usage behaviour will however be necessary if the retailing industry is willing to serve this increased demand with innovative concepts to foster usage experience. The importance of efficient and profound online grocery retailing, specifically in times of economic and private lock-down, should be a priority for the retail industry and may help society deal with the policies applied in many countries across the world. These changing circumstances also open up market opportunities for smaller companies enabling local food supply and subsequent environmental impact (Shahmohammadi et al. 2020). We expect that some consumers will likely continue using OGS after the pandemic-related usage increase – if their preferences and expectancies will be met by the industry. Meeting these expectations however comes with cost intense investments. Upcoming reserarch will need to adress both the remaining issues as well as the changing circumstances in a post COVID-19 market environment.

In this context further investigation should also be directed at impulsivity within OGS as literature reports differing findings, for instance in the context of stockpiling behaviour as a accompaniment of the pandemic. Objectively measuring and evaluating consumer choice behaviour and decision making at the POS however often remains "tricky" and neuro-economic research methods seem to offer a partial solution there: Eye-Tracking, for instance, has been applied to measure the search and information behaviour (Benn et al. 2015; Bialkova, Grunert, and van Trijp 2020; Zhang and Seo 2015), as well as in consumer health awareness and education (Graham and Jeffery 2011). Testing online stimuli such as customer reviews, price reductions, social and community features and advertising via neuro-economic measures may help understand onling food shopping. We furthermore expect neuro-economic research to help clarify the changing search and information patterns caused by digital transformation in food retailing.

Theoretical and Practical Recommendations

OGS offers the opportunity for efficient customer relationship activities to increase consumer retention and foster repurchasing behaviour. This may be of particular importance with new customer segments (e.g. elderly people) with differing expectations entering into service usage. As grocery shopping is a routine job it seems to be particularly prone to enable efficient marketing opportunities to stimulate consumer commitment. Implementing further technological advancements to enhance transparency (e.g. implementation of real time delivery

information) and personalising the shopping experience (e.g. filtering of products for diabetic consumers) may support broader acceptance of OGS in society (Piroth, Rüger-Muck, and Bruwer 2020) and help in reducing the perceived risk of infrequent consumers (Mortimer et al. 2016). Retailing should focus on adequately digitalising their service offers and effectively synethesising digital transformation across retail channels. With its rapid increase in demand during the COVID-19 pandemic the need for further integration of online food shopping in society is expected. Retailers, as well as academics, face promising challenges and research opportunities to help adequately digitalising food retail. Retailers might consider to put more effort into aspects like positive privacy, consider dynamic local household contexts and use communication channels that empower customers to express preferences to create trust and long term relationships as advocated by Kang et al. (2016). Eventually, combinational approaches of the existing research designs present in current literature promise insightful information on digital food retail adoption. Conjoint-Measurement may help identify switchting and substitution patterns between stationary and online shopping and hence enable practioners to tailored distribution and marketing service activities.

Limitations

Eventually, this study is subject to a number of limitations: First, it is noteworthy that despite a systematic and rigourous process applied to the selected literature, still subjective preference, arrangment and theoretically-derived focus on specific topics may lower the overall generisability of this article. Furthermore, we did only include abstract data in our language processing analysis using full text data or larger data-sets from single databased however may provide detailed insights. Second, we did not go below the research surface on supply-side activity, that are very likely to influence usage adoption (such as same day delivery, etc.) as they still – to a measuarable degree – exist in consumer-side adoption literature. On-going technological advancements in this direction (e.g. autonomous delivery bot “Scout” by Amazon) and future developments may alter the given recommendations in this article.

Future Research Recommendations

This article agrees with Martín et al. (2019) that there is still need for further comparative studies on OGS adoption and its antecedents with particular emphasis on cross-cultural evaluation. Changes in overall OGS benefit perception may have been greatly induced by the

COVID-19 pandemic incentivizing frequent usage to a broader customer base (e.g. during stay-at-home policies). Research on digital advancements and integration of OGS services into every-day life should be further evaluated to provide increasing value for customers and retail, while helping understand the adoption process to digital transformation in high-touch product groups.

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Appendix

Web Appendix A can be accessed here.

(Available at: shorturl.at/pAFN8)

Web Appendix B can be accessed here.

(Temporarily stored at: https://www.alexgehlen.com/web-appendix-ppiroth)

Chapter III.2 Computer Says No: On Trying to Order Food Online in Germany during COVID-19

Philipp Piroth

Declaration of Contribution

Idea, conception, data analysis and interpretation as well as writing of the manuscript were covered by PP.

This article is currently under revision.

Computer Says No: On Trying to Order Food Online During COVID-19 in Germany

Abstract

This article analyses the development of the COVID-19 pandemic, governmental restrictions and alterations in retailing that changed consumer behaviour and increased demand in online grocery shopping services. This article faciliates review of articles in academic and public media outlets and reflects the findings with the thoughts and experiences of the author as a consumer trying to order food online during the COVID-19 pandemic. Online grocery shopping services did not withstand the sudden increase in demand occuring in the early stages of the pandemic. Properly digitalising both stationary and online service offerings will help integrate a broader customer base. This article offers an original viewpoint on the current developments in online grocery shopping usage from a multidisciplinary perspective. It concludes on suggestions for future improvement of service quality and availability.

Keywords: *Online Grocery Shopping, Shopping behaviour, food retail, COVID-19, eating behaviour*

Introduction

In late 2019, rumors of a novel lung disease spread around the globe and less than half a year later the COVID-19 pandemic had the world in its grip. To reduce the spreading of the virus, many authorities around the world issued stay-at-home policies which greatly impacted consumer shopping behaviour. This article offers a viewpoint on the current state of online grocery shopping (OGS) in Germany. It first lays out the development of COVID-19 in Germany and presents both personal experience and resulting thoughts of the author, enriched with relevant statistics and academic studies. With this publication we add to the thoughts formulated by Martin-Neuninger and Ruby (2020) on changing consumer behaviour during the pandemic, however this article further argues towards adequate digitalisation to further integrate OGS services in a broader consumer base. The author would not only like to spark discussion amongst the involved scholars within consumer behaviour and economics, but also

considers enhancing the resilience within local food supply systems as discussed in literature (e.g. Hobbs, 2020). To this end, this article includes successful business cases operated in Germany and concludes with some thoughts on future OGS activities both in research and practice.

Crisis and Groceries: Food Shopping during Covid-19

Food is a complex product: it is highly integrated into social rituals, and its consumers hold vastly differing expectations and associatiations depending on their societal, cultural or socio-economic upbringing and experiences. It is a transnational product with little necessary cost required in trialling new food, and therefore fosters variety seeking. An average grocery shopping basket includes a variety of different products, each with individual requirements regarding its cool chain and varied consumers' need for haptical inspection prior to the purchase (Kühn et al., 2020). Habitualisation and prior experience in food buying extends to the market place as well. Everts and Jackson (2009) recite Augé (2009) and his argumentation on supermarkets as *non-lieux* – non-spaces – which are spaces of transition "where people rush through in postmodern restlessness" and are "associated with the loss of a strong sense of place: places which once had been the centre (…) of sociality and everyday life."

As a result of the pandemic, governments all over the world issued restrictions that limited the routines of daily life, such as stay-at-home policies and customer traffic limitations and shopping process alterations. Stores deemed as "*systematically relevant*" (Die Bundesregierung, 2020) remained open during these restrictions.

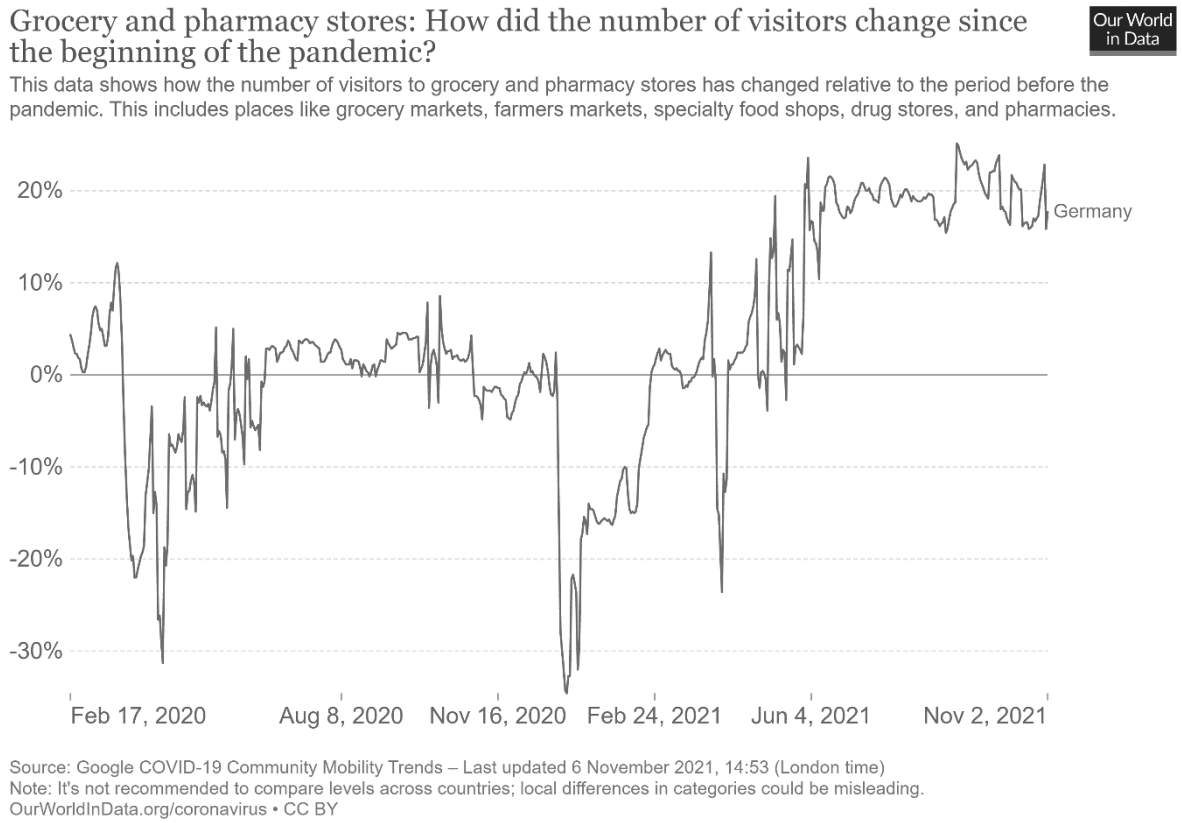
Amongst those relevant stores, supermarkets found themselves to be under heavy demand with large queues along the storefront. What could have been predicted from the outside, became grim reality once inside: Each one of the permitted customers (spread individually per 20 square meter(s)) were viciously roaming the floors in search of any-number-layered toilet paper. Impulsive buying behaviour patterns in times of crisis are nothing new and stockpiling of food items was globally observed (Wang et al., 2020; Ahmadi et al., 2021). Stockpiling decisions can be assorted to rational purchases (e.g. non-perishable food items, medical supply) and rather irrational product choices (e.g toilet paper). This has also put a spotlight on impulsivity in OGS service usage that had already been indicated in earlier research (Milkman et al., 2010; Munson et al., 2017). Impulsive buying patterns in OGS may contribute to unhealthy eating habits and obesity. Researchers Jilcott Pitts et al. (2018) examined the research landscape on the connection between OGS usage and healthy decisions. It is reported that decreased healthy

purchasing decisions are connected to the lack of displayed nutritional information and general scepticism towards buying fresh produce online. Contrary to these findings, Huyghe et al. (2017) report potential of OGS to decrease vice purchases.

The hero we need? Online grocery shopping services during COVID-19

Changes in consumer behaviour have been reported by Martin-Neuninger and Ruby (2020) and in a qualitative study based on Finish newspaper articles by Eriksson and Stenius (2020). Both articles were published shortly after the initial stages of the pandemic. Martin-Neuninger and Ruby (2020) lay out grocery shopping behaviour prior to the stay-at-home policies, then explore shifting experience due to the issued restrictions and alterations within stores. These included: customer traffic limitations to allow keeping a distance of 1.5 to two meters between people, requirements to wear a medical face mask, recommendations to pay cashless and further employee protection via perspex surfaces. As a result of stockpiling behaviour, supermarkets restricted sales of common household purchases, effectively limiting the purchasable amount of certain products per customer (e.g. toilet paper, yeast). As a result of the alterations in the buying process, many consumers may have referred to simpler heuristics (such as branding and pricing) in their decision making (Martin-Neuninger and Ruby, 2020). Consumers may also be more price-sensitive with "in-come elastic products to decline more sharply" (Hobbs, 2020). Eriksson and Stenius (2020) structured information on consumer behaviour based on a qualitative analysis of thirty Finnish newspaper articles. The authors were able to identify six thematic consumer reactions as reported in the publications: panic-buying, changes in cooking behaviour, increased sensitivity towards the shopping environment, switching to online grocery shopping, interest for new service concepts and care-less in-store behaviour (Eriksson and Stenius, 2020). As a consequence of the changed circumstances, many worldwide felt the time had come to start, or intensify use of OGS services, rather than visiting the stationary store (Our World in Data, 2021; see also **figure 12**). This is impressively illustrated in the Our World in Data (2021) data-set from the *Google COVID-19 Mobility Reports,* showing that visit counts were down to just below -30 per cent during the stay-at-home policies in Germany. Since early 2021 store visits seem to be stabilising above their respective pre-pandemic periods (being at slightly above +20 per cent around the time this text was written).

Figure 12. Relative visits to German grocery stores throughout the COVID-19 pandemic. Source: Our World in Data (2020)



The heavy reductions in customer store visits resulted in "unprecedented demand" (Retail Detail, 2020) of OGS services. Increased interest in service usage had been reported from an earlier SARS outbreak in Singapore (Hui and Wan, 2009) and the service had already been found to be particularly beneficial during situational circumstances such as sickness, birth of a child or career changes (Hand et al., 2009).

Being one of those same customers in Germany however, exposed another grim reality - OGS services were fully booked for weeks. Now, it should be noted that whilst Germany does have the highest supermarket density in Europe, the rural infrastructures are largely weak (Dannenberg et al., 2020). Furthermore, the main operational mode of OGS in Germany is via home delivery, rather than the distinct click-and-collect infrastructure as in France. Germany falls short in OGS adoption both on a European and global scale. As of 2020 the online share in food retail in Germany remains at a mere two per cent (HDE, 2021). On the other hand, fast-moving-consumer-goods (FMCG) were the strongest growing segment at an increase of 44 per cent during the pandemic. Dannenberg et al. (2020) accurately state that the COVID-19

pandemic opened a “window of opportunity” for OGS to upheave from its niche position, yet the service failed to reach its full potential in light of the pandemic.

Food for Thought: How to adequately digitalise future food retail in Germany

So while sitting staring at the grayed out calendar entries indicating unavailability of the service, hope for the future arises. Short-term retail should be inclined to refine their current service offering. This should be done with regard to decreasing usage obstacles of OGS platforms by increasing service transparency (e.g. live food-tracking). It remains questionable why OGS services still offer lower service transparency than other online food services (e.g. *Lieferando*). Solutions such as physical customisable dash-buttons that place a digital order upon pressing, could help increase accessibility for elderly consumers who may face some barriers to digital adoption. Diverse, yet tailor-made digitalisation should be extended to the stationary service offering, hopefully increasing the potential for channel synchronisation.

In the mid-term, an alignment of niche and established OGS services promises the serving of a vaster and broader consumer base. The segment has already shown that innovative concepts in niche markets (e.g. *kaufnehkuh.de*, group buying of meat) are well suited to serve the increasing trend for more sustainable food. Increasing engagement in community supported agriculture (CSA) in Germany can be reported. Aligning and increasing visibility of these efforts may help vulnerable groups during critical situations such as a pandemic. With regards to distribution, the impression arises that sometimes traditional structures can too facilitate effective digitalisation: The Dutch company *Picnic* serves parts of Northern-Westphalia via a *milkman principle* (includes fixed delivery times per village, personal contact with delivery driver, etc.) offering high transparency and a sense of place and shopping experience. German retailer Edeka invested in the company, and see the service as their “online arm” (Edeka CEO Markus Mosa on the 3rd of May 2021; Wirtschaftswoche, 2021). The service is particularly efficient in serving the rural areas with weaker infrastructure and lower OGS availability. Technological advancements in the future may alter the efficiency of existing distribution structures, as robots take on the job of deliveries (e.g. US-american delivery service *doordash*; D'Antino, 2020). Mid- to long-term further investments into the infrastructure of OGS services will be necessary to serve an increasing demand.

Discussion and Implications

Grocery shopping routines were heavily disrupted by governmental restrictions resulting in rational and irrational stockpiling behaviour and a dramatically increased demand in OGS services. Despite many outlets claiming a "new normal" of OGS services after the pandemic, in Germany OGS services did not fulfill the demand, nor their potential. Due to disrupted supply chains and impulsive buying patterns, many OGS service providers were not able to serve the ever growing demand. Yet, OGS services can play a vital role in decreasing the potential for infection as it effectively decreases the necessary amount of contacts. A higher flexibility within retail structures would be desirable and has been practiced successfully in shadow stores that remain open only to personnel and solely serve digitally placed orders. Of course, accessible supermarkets still need to remain open, but the overall (sudden) demand spikes may be more evenly distributed across the various channels. In the long run, this should go hand in hand with local food platforms offering sustainable alternatives that may help in increasing the overall resilience in food systems and supply. Empty shelves may foster consumers' willingness to engage in community supported agriculture (CSA) as the trust in stable food supply may decrease (Hobbs, 2020).

Retail will need to undertake further investments in their OGS coverage and infrastructure and are well-advised to support and form partnerships with local and niche ventures. With an increasing interest in sustainable food, OGS may play a role in decreasing overall CO2 emission as it lowers the overall amount of necessary trips (van Loon et al., 2015). OGS still offers much potential in the German market and innovative concepts should be highly encouraged to attract and serve a broader consumer base. The author would like to close with a recommendation for future research into innovative concepts and their applications. Impulsivity should also be further explored to mitigate unhealthy food decisions. All the above will help OGS services reach their full potential in serving growing consumer demand.

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Part IV Discussion, Conclusion and Future Research Recommendations

Discussion

Within this section we will comprehensively revisit the individual findings of the previous chapters and discuss their contribution towards the overall topic of OGS adoption in Germany. The findings from each research are synthesised to provide a holistic picture of the research contribution in this dissertation.

Online grocery retail structures: Medium rare or well-done?

Grocery retail is a highly competitive market environment with low overall margins and dense market structures. In many countries a few large grocery retailers account for large proportions of market share. With the entrance of established online retailers (such as Amazon) however, grocery market structures were challenged by digital order processing and convenient home delivery. This ushered in a transformation towards omni-channel approaches, where deliveries are operated out of larger warehouses, mainly within metropolitan areas. Consumer response towards the digitalisation of grocery retail remains largely differing around the globe.

Industry experts agree on the high necessary investment costs to effectively operate OGS services, particularly due to broad and differing requirements in packaging and adherence to the individual cooling chain procedures. Despite this problematic value constellation, many stationary retailers entered the OGS segment in the past fifteen years to compete with the digital contenders. The industry experts agree that the adequate digitalisation of grocery retail is still behind in many areas, despite the fact that German consumers generally show willingness towards OGS service usage and digital devices (e.g. smart shopping carts) within the stationary shopping environment (Donath, 2018). Digitalisation offers a wide range of ways to interact with and engage the consumer - from social interaction within the online shop, to targeted product recommendations based on individual living and / or health situations (e.g. diabetic consumers, etc.).

A Mixed Bag of Beans: Consumer Benefits and Obstacles in Online Grocery Shopping

Consumers in Germany value the convenience and time-saving aspects of OGS services and see particular benefit in buying non-perishable food items and heavy bulk (e.g. bottled drinks). This extends to niche or import products that are hard to obtain via the average shopping trip. This behaviour is in line with earlier research findings on continued tandem usage of stationary

and digital offers (Hand et al., 2009). Furthermore, life-stage specific benefit perception could be observed: While young consumers see the advantages of OGS services they are less inclined to use those as they often live in urban areas with high supermarket density lowering the overall advantageousness of the service – especially when considering the higher price level. Elderly consumers on the other hand perceive the home delivery as particularly relieving, but also value the shopping experience associated with the grocery buying process. The highest level of advantageousness was found among households with dependent children as they likewise benefit from convenience and time-saving. Yet, they showed concern with the delivery timing chain on short notice.

These facets highlight the consumers' need for transparency in the service offering (e.g. live tracking in restaurant deliveries), reliable infrastructure and a certain level of shopping experience. To this end, this thesis reports that none of the big five personality traits were found to extend influence on OGS adoption for German consumers. Yet, OGS usage intention is strongly connected with the influence of peer groups and attitude towards the service. Early research had found correlations between consumer values and shopping intention (Hansen, 2008), offering some insight on the practical reliability of these scales that already underwent earlier academic comparison (Grankvist & Kajonius, 2015).

Grocery shopping is highly integrated into daily routines amongst household members (Elms et al., 2016) and so there is discussion on-going as to whether OGS adoption should be measured as such, rather than on an individual basis (van Droogenbroeck & van Hove, 2017). The individual focus persisted for many years in OGS research after the introduction of behavioural approaches into the field in 2005. It seems likely that OGS adoption may be primarily household-related, however individual experience may in turn influence a household's switching behaviour, or foster initial usage as indicated in the findings from chapter I.3.

A Whole Lot to Digest: Online Grocery Shopping in Times of COVID-19

The year 2020 denotes strong changes in OGS benefit perception as the COVID-19 pandemic greatly increased willingness to use the service in order to avoid supermarket visits (Our World in Data, 2021). This resulted in a tremendous demand for the service, which German OGS service providers were not able to meet. Services were fully booked weeks in advance in the initial stages of the pandemic, a time where restrictions such as stay-at-home policies were introduced.

These early stages were also characterised by intense panic buying and stockpiling (Islam et al., 2021). Since early 2021, store visits seem to be stabilising above their respective pre-pandemic periods (being at slightly above +20 per cent as of November 2021; Our World in Data, 2021). Whether OGS will become the *next new normal (*as predicted by consulting agencies) remains to be seen. Diverse digitalisation however, will definitely help in establishing the service in a broader consumer base.

Whilst the pandemic opened a "*window of opportunity*" (Dannenberg et al., 2020) for OGS services in Germany, the service did not fulfill its potential due to the aforementioned problems in availability. These problems are particularly prevalent in rural areas where grocery retail infrastructures are often weak (Dannenberg et al., 2020). Despite successful business cases such as the Dutch company *Picnic* that serves parts of Northern-Westphalia via a local *milkman principle* (meaning relatively fixed delivery times and spots and a personal connection with the driver; Gassmann, 2018) the industry itself is moving ponderously.

Other successful business cases in OGS highlight the potential of the service to serve contemporary consumer trends and ensure food supply in critical situations. This offers plenty of opportunity in niche markets, as documented in long-tail effects in OGS (Richards & Rabinovich, 2018). Smaller but also promising examples can be found in *kaufnekuh.de* or local community supported agriculture (CSA) projects that foster group buying behaviour in food purchases (e.g. Wang & Tsai, 2017).

Unfortunately, these individual niche services lack overall alignment that may enable broader consumer awareness and usage. Advancements in technology will furthermore continue to re-shape the OGS market environment as the industry is looking for new methods of delivery via robots or unmanned aerial vehicles (Ramos et al., 2021). Until the distribution can be efficiently carried out by machines, humans fulfil this role and services that carry out grocery shopping tasks for customers are emerging in most larger German cities (Kapalschinski & Kolf, 2021). Their fleets are operated via bicycle delivery (so-called *riders*), however the services were quickly criticised for problematic working conditions (Au, 2021).

Conclusion

Despite broad general acceptance of OGS, the service remains under-developed within Germany as of this moment in time. This can be partially explained by the high supermarket density in Germany and high acceptance of the status quo (Seitz et al., 2017). Yet, the tight

market structures in food retail in Germany may promote niche offerings to serve certain target segments. With this research piece the author contributes to the understanding of German consumers' digital food buying behaviour. Both established retailers and new market participants will profit from adequately digitalising their service offerings – both online and within stationary stores. Advancements should be expected in the direction of consumer interaction on OGS platforms via chatbot usage (as illustrated in the restaurant industry; Leung & Wen, 2020), personalisation of the online basket (via recipes, etc.) and better overall alignment between the digital and stationary service offering. Introducing smart technology within stores will also be beneficial and can help in consumer health awareness while shopping. This will need to go hand in hand with ensuring that the involved data structures are protected and are used to create customer value. Integration of OGS services into daily-life routines may be even more accessible, with physical dash-buttons offering programmable basket lists and automatic ordering.

All these improvements will help increase the overall market share of these services while ideally also contributing to more sustainable (both in terms of packaging waste and overall CO_2 emission) food consumption. A strong local food supply and easier accessibility of online grocery shopping also increases the resilience of food systems in critical situations as prominently illustrated during the COVID-19 pandemic. Food consumption is necessary to maintain body functionality and food supply therefore is of essential importance – particularly in times of crisis. This vital purpose renders further research into the adoption of digitalisation fruitful.

Limitations and Future Research Recommendations

As in most academic publications, this dissertation does not come without its limitations: First, throughout the time frame of this thesis, changed circumstances due to the pandemic, required deviation from the original research set-up (see also chapter Intermission). Strong changes in consumer perception are a likely result of the pandemic rendering some of the early recommendations less actionable. As the dissertation focuses on the German market circumstances, the application of these results is inherently limited by its geographical boundaries.

This thesis added to some of the existing knowledge gaps in German OGS research, however further research remains necessary. This is particularly true for actual usage behaviour in OGS

services. The author would also encourage further investigation of impulsive buying patterns in OGS - research on this previously has been highlighted in the context of impulsive stockpiling behaviour as a result of the pandemic. Whilst OGS offers a certain level of convenience in food purchasing, it should not encourage unhealthy grocery decisions.

Research in OGS still lacks cross-country studies to explore inter-cultural differences. This is interesting with regards to both cultural differences in the perception of digitalisation, and differing behaviour in food purchasing decisions. Conjoint-Measurement approaches may help in understanding the exact thresholds of benefit configurations that are required for consumers to begin, or intensify, usage of OGS services.

OGS adoption research therefore remains a fertile ground, as it studies retail digitalisation processes in a complex product environment. Researching how the user experience of OGS services can be improved will help to make the service more accessible for a broader consumer base and help in establishing the services more widely. Looking to the future, it is likely that they will remain complementary and will not replace the current stationary structures. With up-comming innovations and retailers' continued efforts in providing the right service offering, the transformation to an effective multi-channel grocery retail environment seems promising and will require continued academic evidence.

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