On-demand medicine delivery services in Germany

An empirical analysis of consumer adoption

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Abstract (English)

On-demand medicine delivery services are taking the next step toward a new e-pharmacy era and last-mile experience of e-commerce. Despite the fact that researchers and marketers are interested in the topic of on-demand delivery services empirical research on customer behavior in this field is limited. Consequently, this research aims to investigate the relation of consumer perceptions, attitudes, and values in the context of e-pharmacy, especially in on-demand medicine delivery services, and complement previous insights on consumer behavior. Empirical results gained through a mixed-methods study with qualitative expert and consumer interviews and a quantitative study with 194 online study respondents provide an overview, identification, and segmentation of consumers in the medicine purchasing environment. Based on the exploratory empirical findings of this study, researchers and marketers may understand the differentiation between consumer groups and their intentions and behaviors towards online medicine purchases. According to the findings, convenience factors like time-saving, urgency, and desired times of delivery as well as ease of use and the consumers' perception of quick delivery services are significant and important antecedent factors for consumer adoption. Further factors like the desired location of delivery, changes in consumers' life situations, and having friends or family using on-demand delivery services also positively impact adoption. This research presents companies and marketers with various practical and theoretical implications for increasing customers' willingness to adopt on-demand medicine delivery services and supports relevant strategy development through empirically verified insights.

Keywords: quick delivery, on-demand medicine, e-pharmacy, consumer adoption, consumer behavior, adoption intention

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Abstrato (Português)

Os serviços de entrega de medicamentos estão a dar o próximo passo para uma nova era de farmácia eletrónica e na experiência *last-mile* de comércio eletrónico. Apesar de os investigadores e comerciantes estarem interessados no tema dos serviços de entrega, a investigação empírica sobre o comportamento dos clientes neste campo é limitada. Esta investigação visa estudar a relação das perceções e valores dos consumidores no contexto dos serviços de entrega de medicamentos. Os resultados empíricos obtidos através de um estudo de métodos qualitativos e quantitativos proporcionam uma visão geral, identificação e segmentação dos consumidores no ambiente de compra de medicamentos. Com base nos resultados empíricos exploratórios deste estudo, os investigadores e comerciantes podem compreender a diferença entre grupos de consumidores e as suas intenções e comportamentos em relação às compras de medicamentos online. De acordo com as resultados apurados, fatores de conveniência como a poupança de tempo, urgência e tempos de entrega desejados, bem como a facilidade de utilização e a perceção dos consumidores de serviços de entrega rápida, são fatores antecedentes significativos e importantes para a adoção por parte dos consumidores. Outros fatores como o local de entrega desejado, mudanças na vida dos consumidores, e ter amigos ou familiares a utilizar serviços de entrega também têm um impacto positivo na adoção. Esta investigação apresenta empresas e comerciantes com várias implicações práticas e teóricas para aumentar a vontade dos clientes de adotarem serviços de entrega de medicamentos a pedido.

Palavras-chave: Entrega rápida, medicina a pedido, *e-pharmacy*, adoção do consumidor, comportamento do consumidor, intenção de adoção

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Título da Dissertação: Serviços de entrega de medicamentos a pedido na Alemanha - Uma análise empírica das intenções dos consumidores

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Glossary

e-commerce – electronic/online commerce

e-pharmacies – electronic/online pharmacies

ODMDS – on-demand medicine delivery service

ODSPs – On-Demand Service Platforms

PDSG – Patientendaten-Schutz-Gesetz (Act on Protection of Electronic Patient Data)

OTC – over-the-counter

USP – unique selling point

IFAP – Institut für Ärzte und Apotheker GmbH

SEO – Search Engine Optimization

SEA – Search Engine Advertising

1 Introduction

1.1 Context and Background

Over the last decades, the Internet has made tremendous developments in technology and applications. At the beginning of the computer era, the computer network could only be used for communication via email and only a very few people had access to the new technology of communication. Due to the commercialization, easy access, and affordability, the spread of mobile applications, especially smartphones, increased to 62,6 million people in Germany using smartphones (Gawron & Turok, 2015). For the vast majority, smartphones are an important and useful companion in the everyday life, changing the interaction in commercial environments and ways of communication with businesses (Statista, 2022c).

Great accessibility and increasing consumer demand for convenience led to the rapid growth of e-commerce and further enabled the development of e-pharmacies and made it difficult for traditional stores to further satisfy consumer demands. Further accelerated by COVID19 the growth of e-pharmacies causes a major disruption to the traditional pharmacy market (Ma, 2021). E-pharmacies provide a great convenience for consumers to purchase medical products and pharmaceutical information through online channels as well as the possibility to consult experts seven days a week for 24 hours. Furthermore, delivery services of e-pharmacies enable people with difficulties in visiting traditional pharmacies to purchase medical products by themselves through online channels. Currently, an increasing number of people prefer to purchase their medicine and medical products online and perceive home delivery to be much more convenient. This trend is even further amplified by the COVID-19 pandemic (Ma, 2021).

1.2 Problem Statement

The market of fast delivery services has boomed in recent years, shown by the rise of ultra-fast grocery delivery services and the immense gain in funding for those innovations. The next industry of fast delivery is rising and conquering a huge market: fast-delivered medicine to your door in 30 minutes (Pratty, 2021). An essential issue for online pharmacies and especially the fast delivery service providers is to discover the levels of consumer motivation and purchasing intentions of people shopping online as well as general factors and specific consumer characteristics influencing the adoption of fast delivery services by German consumers. In common literature, both the terms fast and on-demand delivery service are considered the same, and the on-demand delivery is perceived as fast delivery within 30min after the order.

Actual on-demand delivery as per the definition of the term “on-demand” could be a different business model for the future is further discussed in the latter part of this dissertation.

The "Act on Protection of Electronic Patient Data in the Telematics Infrastructure (PDSG)", which came into force on October 20, 2020, regulates the introduction of e-prescription for the regulation of prescription medicine and paved the path for the digital health movement in Germany. Still, the infrastructure in Germany is not yet mature and developed enough to provide the right environment for such an innovation (Bundesministerium für Gesundheit, 2022). Consequently, offerings for delivery services on prescription drugs are currently very limited in the market forcing the current market players to mainly focus on non-prescription, so-called over-the-counter drugs (OTC). Therefore, this dissertation solely focuses on OTC drugs. The scope of products considered relevant for this dissertation range from drugs like analgesics, cold and cough medication, digestives and intestinal remedies, skin treatment products, as well as vitamins and minerals. Both products exclusively sold in pharmacies and available elsewhere are included. Not considered relevant are prescription medicines and homeopathic remedies (Statista, 2022a).

The introduction of e-prescriptions will certainly disrupt the market and lower the barriers to ordering prescription drugs online. Pharmacies that do not offer their own delivery service will lose many customers to on-demand delivery players in the future.

1.3 Research Gap

So far, there is no value-adding literature that describes consumer behavior, perceptions, and values of on-demand medicine delivery services (ODMDS). Moreover, there is no published paper available that connects these consumer aspects with a systematic recommendation framework that supports practitioners and academia to design optimal marketing activities. Current studies only focus on the e-pharmacy environment, corresponding market dynamics, and the respective consumer behavior without researching the upcoming topic of ODMDS and the related consumer intentions. This is due to the fact, that the business model of ODMDS is quite new and has only developed throughout the year 2021. The resulting question evolves, can the findings on e-pharmacy be applied to ODMDS? Are there any differences in consumer behavior towards e-pharmacy and ODMDS? Can new findings and insights be discovered through this study?

1.4 Research Goal and Research Question

As previously described, studies on ODMDS are currently scarce, therefore this study aims to elaborate insights on consumer intentions, analyze them statistically as well as present a prediction model on probabilities of imaginary potential personas with certain characteristics to adopt these services. Furthermore, this dissertation will provide sophisticated managerial implications and recommendations for practitioners and marketers on how to interpret and use the findings. To investigate the above-mentioned topic, the following research question is presented.

What are the drivers making consumers adopt on-demand medicine delivery services in Germany?

1.5 Dissertation Outline

This dissertation is structured as follows: Chapter 2 presents an academic literature review of the current state of the e-pharmacy market and on-demand drug delivery services, derived hypotheses, and the general theoretical foundation. In Chapter 3 the applied methodologies for qualitative and quantitative research and the findings are presented. Chapter 4 will show the data analysis and results, including sample profile and descriptive statistics of research. In Chapters 5 and 6 the implications, conclusion, limitations, and future research are presented.

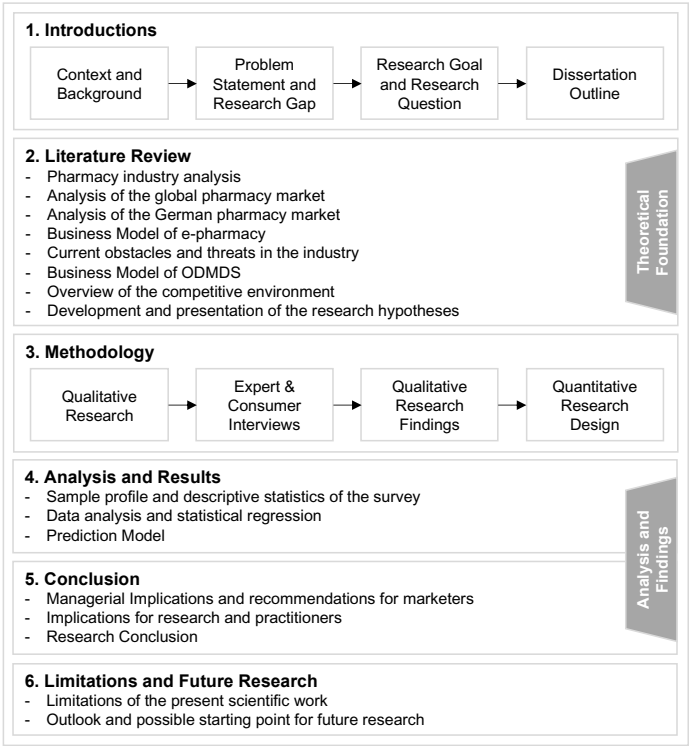

Figure 1: Structure of the dissertation

2 Literature Review

Basing a research approach on extensive literature research and review is an effective way to construct a sound and sustainable research design that will positively affect the research outcome (Randolph, 2009). As the theoretical foundation must be based on sound literature, a literature review is needed to identify applicable and highly qualitative papers. Therefore, secondary data in the form of a systematic and normal literature review has been collected and further used in the analysis and framework building by following an inductive approach. The advantages of using a literature review are that it enables transparency whilst doing a systematic search in a state-of-the-art database, like ResearchGate and Google Scholar (Nakano & Muniz, 2018).

The dissertation structure and methodology have been developed according to Saunders et al. (Saunders et al., 2019) with defining and setting boundaries for online pharmacy and on-demand drug delivery and perusing the goal of discovering the drivers and motivations of consumer adoption of on-demand delivery services. In this section, an in-depth industry analysis is presented showing the current state of the e-pharmacy market and on-demand drug delivery services followed by an academic literature review to derive research hypotheses. The research of this dissertation strives to discover and investigate factors influencing the consumer motivation and intentions of adoption of on-demand drug delivery services in Germany. This should give a complete view of the studied topic in addition to the limited existing literature.

To this date, the literature on this specific sector is very limited. Most of the studies focus on online pharmacies in general without studying aspects of fast and on-demand delivery services. The depicted literature from the literature review spans from 2001 to 2021. For the search for applicable papers the following selection criteria were set:

- The studies had to include the search variables (“Online pharmacy”, “Internet pharmacy”, “E-pharmacy”, “on-demand medicine”, “on-demand drugs”, “quick medicine”, ”quick drugs”)
- Contribute valuable input based on the abstract, introductions, and conclusion
- Availability of the paper
- English or German language used.

These papers were further analyzed for their applicability and then used in the literature review in this chapter. In addition to papers and other studies on online pharmacies, several expert interviews were conducted with people from the industry of fast drug delivery to get further sophisticated insights into the business models and consumer behavior perceived from the business side.

2.1 Industry Analysis

2.1.1 Global Market

The global revenue of online pharmacies is predicted to reach US$22.5[1] billion in 2022. The market is estimated to grow at a CAGR of 11.44% with a projected market volume of US$34.7 billion by 2026. The largest market in global comparison is China with US$5.99 billion in revenue in 2022, followed by the USA (US$3.69 bn), the United Arab Emirates (US$1.22 bn), Japan (US$1.14 bn), and Germany (US$1.03 bn). The user penetration is expected to be 21.54% worldwide in 2022 and is projected to reach 27.74% by 2026 with a global average revenue per user of US$13.73 (Statista, 2022b).

The biggest disruption threat to the global but especially European markets was the acquisition of *Pillback* by *Amazon* in 2018, relaunching "Amazon Pharmacy" as an online pharmacy in the USA in 2020, and trying to expand to Europe. The trademark for *Amazon Pharmacy* in the UK was already granted registered status in 2020 waiting for business roll-out. It is only a matter of time before *Amazon* tackles the German market and gets the required certifications passing the registration process although there are big differences comparing the health systems of Germany and the USA. *Amazon* already has profound customer insights into the market and Germany is the largest European market for *Amazon*, therefore the German market will be of high interest albeit hard to convince (Simon-Kucher & Partners, 2021). Conducted research found that 41% of *Amazon* users in the UK would consider buying medicine from *Amazon Pharmacy*, even 47% of Amazon Prime users. In Germany comparably only 17% of Amazon users and 25% of Amazon Prime users would consider buying medicine from *Amazon*. The introduction of e-prescriptions could amplify this increasing trend in the future. Consumers in France have been found to have more openness, with 21% of normal and 29% of Prime users claiming to potentially use the *Amazon Pharmacy* offer (Simon-Kucher & Partners, 2021).

[1] 1 EUR equals 1.07 USD (27th May, 2022)

2.1.2 German Market

This dissertation focuses solely on the pharmacy market in Germany therefore the following chapter analyzes the German market in more detail.

The online pharmacy revenue in Germany is predicted to be worth US$1.03 billion in 2022 being the fifth biggest market for online pharmacies worldwide. The German market is estimated to grow at a CAGR of 6.54% with a projected market volume of US$1.33 billion by 2026. Due to the Covid-19 pandemic, the German online medicine market experienced an enormous increase in consumers ordering medicine online. The number of consumers increased by more than 15% from 2019 to 2020 and is expected to reach a total number of consumers in Germany of 29.06 million users by 2026. The user penetration will be 32.46% in 2022 and is expected to hit 34.84% by 2026 with an average revenue per user of US$45.62 (Statista, 2022a).

The growth rates for online pharmacy sound tremendous, however, the market for online medicine will account for only a very small percentage of the whole market in the year 2022. Furthermore, according to experts, the market for on-demand medicine delivery (ODMDS) is expected to grow in the future but will reach its limits relatively quickly for OTC as mentioned before, most of the service providers in Germany are currently waiting for the e-prescription to further develop and for the government to provide proper infrastructure to effectively work. In case the infrastructure is properly developed to pave the way for broad medicine delivery for prescription drugs, the potential market value would be more than 7 times bigger for medicine delivery companies derived from the drug sales in the German Pharmacy Market in 2019 as seen in Figure 2 (Germany Trade & Invest, 2020).

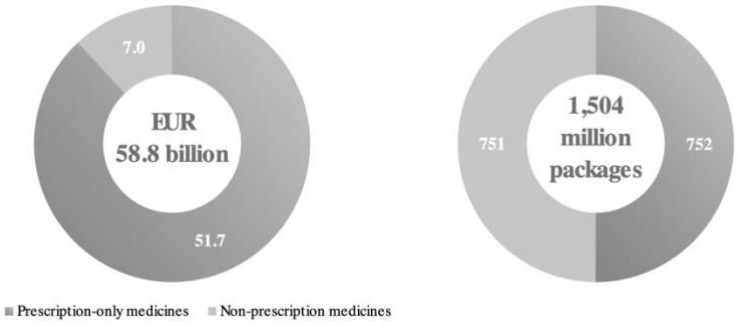

Figure 2: Medicine Sales in the German Pharmacy Market 2019

Source: German Medicines Manufacturers' Association, 2002, as cited in Germany Trade & Invest, 2020

Experts say although the on-demand service is bringing a big transformation and new competition into the market, it is unlikely that this service will dominate the pharmacy market soon and disrupt the whole industry (cf. Appendix I).

2.2 Business Model E-Pharmacy and On-Demand Medicine Delivery

2.2.1 Overview

If not mentioned differently, most of the information stated in this chapter is based on the conducted expert interviews to be found in Appendix I as pointed out previously.

The traditional brick-and-mortar pharmacies are facing more and more problems keeping up with the ever-increasing demand for medicine and medical products. This trend is exacerbated by the pandemic. Hence, companies started the e-healthcare movement and extended their operations to offer medicine and medical products on the internet. Online pharmacies make medicine products available everywhere and get medicine delivered directly to consumers' homes. Nevertheless, people are getting lazy and require even more convenient solutions. They cannot wait for the products to be delivered the next business day but like to have their order be delivered immediately and can do this every day at any given time. Moreover, consumers nowadays enjoy direct access via the internet to every kind of scientific knowledge and materials, online experts, and support to educate and consult themselves about sickness, diseases, treatments, and prevention (Bodkin & Miaoulis, 2007). Consequently, through access to online consultation, there is no consultation in the traditional pharmacy required anymore (Suffescom, 2022). Recently, there is a hype around all kinds of quick and on-demand delivery services formed over the last years. This trend was further pushed by technological developments, changing consumer behavior, their demand for immediacy, and the Covid-19 pandemic. On-demand delivery services, especially for groceries, got highly accelerated (Delgosha & Hajiheydari, 2020).

With the increasing consumer demand for more convenience in the purchase process and immediacy, mobile applications for e-pharmacy were developed and the business model of on-demand medicine delivery services has begun to evolve. The business model was built upon the fact that consumers mostly go to the pharmacy when sick. Therefore, this step was eliminated without having consumers pay extra fees for the delivery service (see Appendix I).

While grocery delivery companies operate their own warehouse and act mostly independently, the medicine delivery model is different. Companies like *Mayd* and *First A* enter strategic partnerships with local pharmacies and deliver products directly from pharmacies to customers. The companies only provide the service through their application and hire riders employed by the company to perform the delivery (cf. Appendix I). Companies selling OTC medicine require a pharmacy registration in Germany to be allowed to store those according to the German Medicinal Products Act AMG §43-46 (Bundesministerium der Justiz, 2021). Current service providers miss those registrations to store medicine independently. Therefore, the current business models are based on partnerships with local pharmacies as only those with registration and licenses are allowed to store OTC medicine (Bundesministerium für Gesundheit, 2021).

Further key aspects of the ever-increasing expansion of on-demand medicine delivery besides the possibility and ease of purchasing the medicine from one's home are reduced product prices and the eliminated need for consumers to physically go to the pharmacy (Suffescom, 2022). Pricing is a sensitive issue with OTC medicine because, unlike prescription medicine, they are not reimbursed by healthcare and insurance, and consumers need to pay it for themselves (Bundesministerium der Justiz, 2021).

This is how the service currently works: Consumers are required to download the smartphone application of the selected service provider and provide them with all the required personal information, payment details as well as delivery details including their address, to check the availability of the service in their area. After that one can select the products required, place the order, and can wait comfortably for delivery within 30min to the doorstep.

2.2.2 The Competitive Environment in Germany

The offerings for on-demand medicine delivery are highly expanding across Europe, especially in Germany. Launched at the beginning of 2021, the Berlin-based start-up *Mayd* was the first player in the ODMDS market and is still one of the strongest incumbents with current total funding of €43 million. Besides *Mayd* there are a couple more mentionable players like *First A* founded in September 2021, *Kurando* (former Phaster), *Cure*, and *Aponia* were all founded later in 2021 or 2022. *Mayd*, as the biggest incumbent already operating in 7 big cities in Germany and *First A* as the current largest competitor operating in 5 cities now, expanding quickly to other regions, both keep schtum about their valuation (Lomas, 2022). As of the beginning of 2022, already 7 ODMDS players were existing in Germany including the service

provider *Medikamento* which is currently only focusing on micro-markets like e.g., Hamburg's Schanzenviertel or Prenzlauer Berg in Berlin, and *Gesund.de* only offering same-day delivery by now (Schesswendter, 2022). They only distinguish themselves marginally in product assortment, the minimum order values, areas of delivery, and slightly different rider employment models. Other than Gesund.de all players offer quick delivery within 30min while *First A* even offers on-demand delivery at any desired time.

2.2.3 Hypotheses to Consumer Acceptance

After a careful analysis of the market environment, this section presents the hypotheses made based on literature and conducted interviews both with industry experts and consumers and aims to understand the underlying reasons for consumer decisions on buying medicine online from ODMDS. The primary goal is to study the behavior of consumers and the respective drivers to adapt to ODMDS. To investigate the correlation of different factors on consumer behavior and their adoption an adapted perception-based model of online pharmacy shopping attitudes and behavior by Wiedmann et al. is applied. As derived from the literature this model is most applicable to online pharmacy shopping behavior. The adapted model (see Figure 3) divides different consumer values and perceptions formulated in the hypotheses into four dimensions: Financial, functional, individual, and social dimension (Wiedmann et al., 2010).

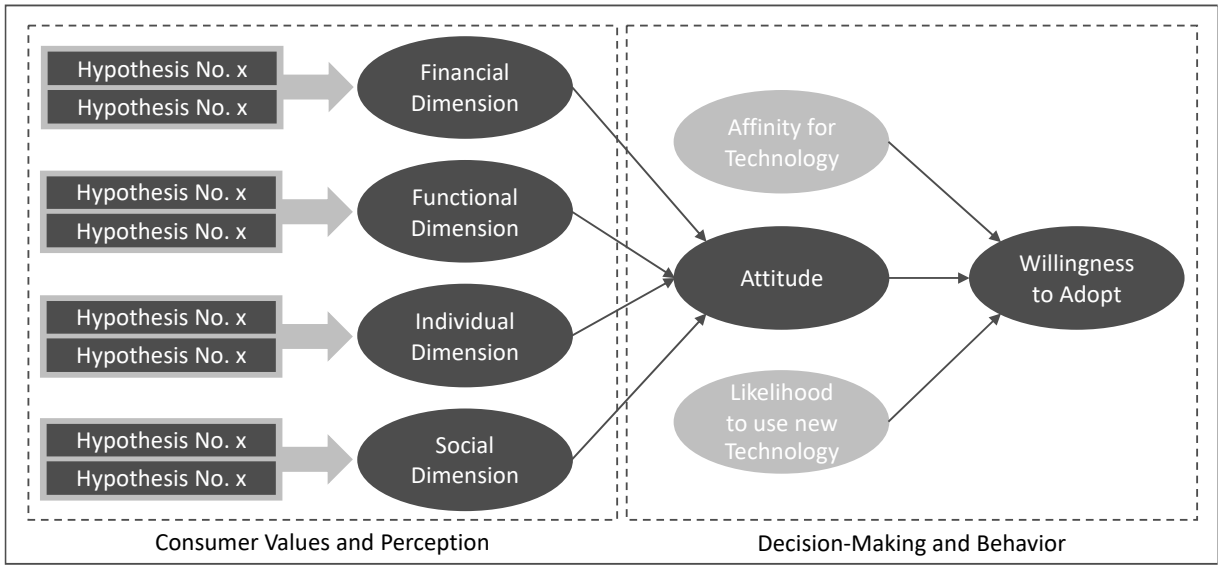

Figure 3: Adapted perception-based model of online pharmacy shopping attitudes and behavior
Source: cf. Wiedmann et al., 2010

Financial Dimension

Prices: Price is one of the major factors in the buyer's decision-making process, especially regarding online medication (Alba et al., 1999; Gurău, 2005). Online pharmacies typically have lower overhead costs compared to traditional pharmacies, enabling them to offer lower prices to consumers. Increased competition on the internet further causes lower prices for medicine (Chaturvedi et al., 2011; Crawford, 2003).

H1: Competitive product prices are a major driver for the adoption of on-demand medicine delivery services

Functional Dimension

Product assortment: A further factor driving consumers to use online pharmacy services has been found to be the product assortment to choose from a wide range of different brands (Fittler et al., 2018; Lostakova H et al., 2012) as well as a wide range of medications for different required usabilities (Wiedmann et al., 2010).

H2: Product assortment regarding brands is a major driver for the adoption of on-demand medicine delivery services

H3: Product assortment regarding functionality is a major driver for the adoption of on-demand medicine delivery services

Expert consultation: Research shows that most the people consult the internet as a first instance to get health and medical information and consultation (Jacobs et al., 2017). One factor influencing consumer behavior and the perceived quality of products and services is the availability of expert consultation with online pharmacies (Brebner et al., 2001). Several online pharmacies offer professional consultation on the internet, the difficulty here is that consumers are being used to a personal medical or pharmaceutical staff delivering medical advice and consultation (Kolesar & Galbraith, 2000).

H4: Sufficient opportunities for an expert consultation is a major driver for the adoption of on-demand medicine delivery services

Comparability: Easy and free access to information through the existence of online pharmacies fosters the opportunity to compare products to find the most suitable product as well as the best price available online (Crawford, 2003; Prashanti et al., 2017; Singh et al., 2020). Additionally, consumers gain the ability to collect information without having any kind

of pressure, especially sales pressure being at the point of sale in a traditional pharmacy (Wiedmann et al., 2010).

H5: Opportunity to compare products is a major driver for the adoption of on-demand medicine delivery services

Knowledge: Knowledge and expertise in the use of technology make people more comfortable in using respective applications as it reduces the perceived complexity and risk (Pauzi et al., 2017; Wiedmann et al., 2010).

H6: Knowledge/expertise in respective technology/applications is a major driver for the adoption of on-demand medicine delivery services

Convenience: The drivers of online medicine purchases are the flexibility to order at any desired time, to any desired point of delivery from anywhere Gurău, 2005; Lostakova H et al., 2012; Singh et al., 2020), especially, when living far from the next pharmacy (Chaturvedi et al., 2011). According to research, consumers mainly order online to save time and physical effort by not having to visit a pharmacy as well as the availability and speed of products on online channels (Aithal & Shabaraya, 2018; Paytrail, 2018).

H7: Possibility to order medicine whenever you like is a major driver for the adoption of on-demand medicine delivery services

H8: Possibility to order medicine wherever you like is a major driver for the adoption of on-demand medicine delivery services

H9: Distance to the nearest pharmacy is a major driver for the adoption of on-demand medicine delivery services

H10: Time savings through on-demand medicine delivery service is a major driver for the adoption of on-demand medicine delivery services

Individual Dimension

Perception: Perceived trustworthiness, affinity toward technology, and perceived ease of use have been found as additional factors and determinants impacting consumers' intentions for adoption in the online purchasing context (Crawford, 2003; Ma, 2021). Davis defined the customer's perceived ease of use as "the degree to which a person believes that using a particular system would be free from effort" and claims that if a technology or service is easy to use, the entry barriers would disappear (Davis, 1989).

H11: Personal affinity toward technology is a major driver for the adoption of on-demand medicine delivery services

H12: Personal affinity toward applications is a major driver for the adoption of on-demand medicine delivery services

H13: Individual perception toward on-demand medicine delivery services is a major driver for the adoption of on-demand medicine delivery services

H14: The technology being free of effort for consumers is a major driver for the adoption of on-demand medicine delivery services

H15: General likelihood to adapt to new technology is a major driver for the adoption of on-demand medicine delivery services

Anonymity: One important reason to order medicines online is the relative anonymity and privacy over online channels. In an online setting, some consumers might ask rather sensitive questions they would not have the courage to ask face-to-face in a traditional pharmacy or even purchase products they would have not considered purchasing offline at all because of perceived intimidating situations (Chaturvedi et al., 2011; Gurău, 2005). Patients encounter "assumed anonymity" because the online setting makes them feel more private and intimate (Crawford, 2003).

H16: Relative anonymity in the online purchasing process is a major driver for the adoption of on-demand medicine delivery services

Judgment: Derived from multiple consumer interviews, people feel judgment from other customers in the pharmacy and the pharmacists when talking about their symptoms and asking for specific products that are perceived as sensitive topics to them (cf. Appendix III).

H17: Judgment in the traditional pharmacy by the pharmacist or other customers is a major driver for the adoption of on-demand medicine delivery services

Urgency: Derived from industry expert interviews, people tend to order online when having an immediate demand for drugs and medical products, for example, condoms or pregnancy tests (cf. Appendix I).

H18: Urgency is a major driver for the adoption of on-demand medicine delivery services

Changes in the life situation: Research has shown the influence of social and situational factors (e.g. current sickness or limitation, changing family structure, remote work, and

other factors limiting a pharmacy visit) on consumers being drawn to online solutions for simple purchasing requirements (Wiedmann et al., 2010).

H19: Changes in the life situation are a major driver for the adoption of on-demand medicine delivery services

Social Dimension

Pandemic habits / Covid19 – Pandemic: Another major driver for consumer adoption to purchase medicine online and the ongoing growth of online medicine sales remains to be the impactful Covid19-pandemic. Due to safety concerns, more and more consumers let their medicines be delivered from online purchases to their homes (Miller et al., 2021; Ramesh et al., 2015).

H20: Changes in customer behavior due to the pandemic is a major driver for the adoption of on-demand medicine delivery services

Influence: Opinion leaders such as influencers or industry experts are influential people on media and social networks. They are either frequently asked for advice or spread messages about things they are supposed to be of great value to others. Due to their positive opinion about online services, they might increase the popularity of these services and applications (Wiedmann et al., 2010).

H21: Influence by opinion leaders is a major driver for the adoption of on-demand medicine delivery services

Recommendations: Derived from multiple consumer interviews, people tend to adopt the fast delivery service when getting recommendations from friends and family to use the service as well as other people that already used the service and left reviews about it (cf. Appendix III).

H22: Getting recommendations about on-demand medicine delivery services from friends and family members that already using on-demand medicine delivery services is a major driver for the adoption of on-demand medicine delivery services

H23: Having service reviews available is a major driver for the adoption of on-demand medicine delivery services

H24: Having product reviews available is a major driver for the adoption of on-demand medicine delivery services

3 Methodology

This section is defined around the aim to follow a structured and scientifically sound approach to answering the research question. To gather representable findings with a valid and reliable outcome, two methods of research were used in this study. The scope of this research and the respective research question developed from it determined the methodology for the research design and the collection of data. Hence, this thesis research is based on mixed methods applying both qualitative and quantitative research to this project to gather data. Even though it was unacceptable in the past to apply both approaches to research studies as it was perceived of resulting in a conflict in ontology and epistemology, it has become prevalent and an accepted technique in the studies of social and behavioral research to support answering research questions (Bazeley, 2003). The first part is based on qualitative research exploiting expert insights and consumer behaviors. The second part consists of a quantitative approach to conducting an online survey.

3.1 Qualitative Research

Since the business model of on-demand medicine delivery is quite new and only developed during the year 2021 there are very limited articles and research about this topic. Even though there are many critics of qualitative research as being subjective, too generalizing, and difficult for later researchers to duplicate (Bazeley, 2003), qualitative studies have many advantages as exploiting insights as well as developing hypotheses (Mayring, 2016). To acquire additional empirical data, support and validate the limited existence of literature on ODMDS and eradicate the possible disadvantages of solely using a literature review, exploratory qualitative research with semi-structured interviews was necessary. On this account, two expert interviews, and ten consumer interviews were conducted.

3.1.1 Qualitative Research Design

For the interviews, the method of guideline-based interviews was applied both for the expert interviews and the consumer interviews. It is a form of semi-structured, less structured, or problem-centered interviews and aims to achieve an explorative approach. It is highly efficient in acquiring time-efficient and experience-based expert knowledge (Flick, 2009). This method derives value out of a research and methodological pragmatic approach in equal parts. The method's theoretical goal is to "reconstruct subjective views in a specific aspect" (Flick, 2009, p. 168).

It offers the opportunity to ask for situative deductions or motives of actions in an open format and achieves interpretations of situations while basing it on previously encountered situations and gained experiences (Hopf, 2012, p. 350). Coming from this standpoint it is highly advantageous to use the semi-structured concept for the interviews to achieve the needed openness and subjective opinion of the interviewees and gather information and in-depth insights into consumer behaviors (Flick, 2009). The usage of a guideline-based interview approach leads to a highly detailed contribution of information and the possibility of follow-up questions depending on the answer provided while asking structured and identical questions to each interviewee (Gall et al., 2003).

Important in consumer interviews is to let the interviewees talk and seek their understanding and beliefs to learn about their behavior as well as avoid expressing the interviewer's own opinion and interpretations. The interviewer assumes the role of an attentive listener and should not intervene only with supportive gestures and leading questions to keep the conversation going.

All the interviews were conducted according to the standardized process based on Bogner & Menz, as follows: Opening, introduction with an author introduction, interview topic and recording consent, interview questionnaire with open questions and follow-up questions, and closing (Bogner & Menz, 2014). There were 10 interviews conducted in total with a duration of 18 to 23 minutes per interview. During the selection of interviewees, the goal was to reflect the average German age of 44.5 years (Statista, 2020). The average age of participants found was 36.2 years ranging from the youngest being 24 years old to the oldest being 64 years old and everyone currently residing in Germany. Three interviews were conducted in person, and the other 7 interviews were online via video call. As advised by Bryman and Bell, the interviews were recorded with a sound recording application on the smartphone to reproduce and reflect the statements in detail in the content analysis (Bryman & Bell, 2015).

3.1.2 Qualitative Research Findings

A detailed description of the interviewees as well as their awareness of the existence of online medicine delivery services, their first time using an online pharmacy, the services used, and their purchasing behavior toward ODMDS (“Adopter” and “Non-Adopter”) can be found in Appendix II. Additionally, comprehensive content analysis with codification can be found in

Appendix III. Within the content analysis, every consumer statement validating or developing another hypothesis is cited and inductive and deductive codes were developed accordingly.

Expert interviews

The two expert interviewees are industry specialists considering their roles as Strategy Associate and Senior Growth Manager in two different major German-based startups that are currently building ODSPs for medicine in Europe. Those two interviews were conducted to enrich the academic content on on-demand medicine delivery as well as develop and support possible hypotheses of this dissertation (Babbie, 2011) and get more insights into the industry and business. The unstructured summary of those semi-structured interviews can be found in Appendix I.

Consumer interviews

Half of the interviewees have already adopted on-demand medicine delivery whereas the other half have never used such a service. Eight out of ten interviewees have at least once ordered medicine online either via an online pharmacy or on-demand delivery service. However, only one, the oldest interviewee, has never heard about on-demand medicine delivery and is not aware of such a service. The services mentioned for online pharmacies in Germany were *Docmorris* and *Shop-apotheke*, and mainly *Mayd* and *First A* for on-demand delivery services. The combined summary of the consumer interviews can be found in Appendix III. Apart from supporting some hypotheses derived from literature, consumers made several statements that led to the development of new hypotheses.

The main reasons mentioned by most of the interviewees were convenience and expert consultation as demonstrated by the following quotes: "When ordering I do not want to leave the house and when I know what to order it is way more convenient to just go online" and "The biggest problem right now is that people actually lacking the knowledge about medical stuff and drugs […], I would need some expert opinion". Therefore, mainly the following hypotheses could be approved during the consumer interviews:

H4: Sufficient opportunities for an expert consultation are a major driver for the adoption of on-demand medicine delivery services

H7: Possibility to order medicine whenever you like is a major driver for the adoption of on-demand medicine delivery services

H8: Possibility to order medicine wherever you like is a major driver for the adoption of on-demand medicine delivery services

A further driver and inductive code not found in the literature but derived from interviews were judgment in the pharmacy by pharmacists and other customers and the immediate demand for medicine.

H17: Judgment in the traditional pharmacy by the pharmacist or other customers is a major driver for the adoption of on-demand medicine delivery services

H17: Immediate demand is a major driver for the adoption of on-demand medicine delivery services

Surprisingly price and product assortment was never the main reason mentioned for using the services even though it has been given great importance by literature. The distance to the next pharmacy was found to be irrelevant to the consumer decision, as most participants mentioned they live close to a pharmacy. The pandemic, as mentioned in the literature, was found to be important to some participants as the lockdown and the risk of infection were relevant factors for their decision. Despite the limited number of participants in this qualitative research, it can be concluded that convenience, expert consultation, judgment, immediate demand, and the Covid pandemic are relevant to consumers' adoption.

3.2 Quantitative Research

3.2.1 Quantitative Research Design

The conducted survey consisted of two sections, the hypotheses to be investigated and the descriptive statistics of participants. Within the part of the descriptive statistics, personal information such as age, gender, country, city residence, income, education, and current living situation was collected to know more about the participants' demographics and better analyze the survey results. For testing the hypotheses, a 7-point Likert scale ranging from “very unimportant” to “very important” was used for respondents to evaluate elements (Davis, 1989) as well as asking for respondents' affinity towards technology and application on a scale from “very low” to “very high”.

The survey has been closed after 15 days with a total number of 194 respondents. Adjusting the dataset for missing data and unrealistic information resulted in 144 respondents. In the further course, the term “Adopter” represents all the respondents already using ODMDS, whereas all respondents who have never used ODMDS are referred to as “Non-adopter”. All variables used can be found in Appendix IV.

4 Data Analysis and Research Results

The output of the survey conducted on Qualtrics in the form of a Microsoft Excel spreadsheet file is analyzed in the statistics and data science software RStudio. The crucial parts of the R script can be found in Appendix VI. As already mentioned before, the data set consists of 144 observations with Adoption as binary response variable (non-adopter = 0 and adopter = 1) and 38 further covariates. In this chapter, the data is explored, and various analyses will be performed in the form of pivot tables, stargazer plots, correlation matrices, and influence plots. After the data exploration, appropriate covariates are selected to set up a suitable regression model. Since the dependent variable is binary in nature, a linear regression model is not applicable for this study. Therefore, a binary regression as part of binomial regression models is used to analyze the nonlinear relationship within the data, whereby the most used models are logit and probit. The Logit model assumes that the underlying dependent variable follows a logistic cumulative distribution, i.e., $F(x) = \frac{exp(x)}{1+ exp(x)}$. In the probit model, the underlying dependent variable is assumed to follow a normal cumulative distribution, i.e., $F(x) = \Phi(x)$, where $\phi(x)$ is the normal density function. Because these models confine the prediction probabilities [0;1] and therefore imply appropriate marginal effects over the full range of independent, explanatory variables these models are preferred by many researchers (Wooldridge, 2012). The betas of the probit and logit models cannot be interpreted directly because of the more complicated and non-linear characteristics of the models. One approach, commonly used in econometric data analysis that estimates probit and logit models replaces each explanatory variable with its sample average. This method is referred to as "partial effect at the average" (PEA) or "marginal effect at the mean" (MEM). However, there are at least two problems with the use of PEA. If there are discrete explanatory variables, the averages represent no one in the given sample as well as if some continuous explanatory variables appear as nonlinear functions the decision of whether to average the variable or the function is difficult. Therefore, an approach averaging the individual partial effects across the sample is applied, leading to the average partial effect (APE), also known as average marginal effect (AME) (Wooldridge, 2012).

The Akaike information criterion (AIC) is a mathematical approach for evaluating a model's fit to the data it is built on. The AIC is used in statistics to compare various models and determine which model best fits the data. The AIC is computed from the number of independent variables used in the model and the model's maximum likelihood estimate, showing how

effective the model is in reproducing the given data. According to AIC, the best-fitting model is one that explains the most variation with the fewest possible independent variables while avoiding overfitting the model (Bevans, 2021). By adding more explanatory variables to the model step by step giving the model the best improvement, finally, the model with the lowest AIC needs to be found (Wooldridge, 2012).

All interpretations are based on the assumption that the survey was completed by the respondents to the best knowledge, honesty, and belief.

4.1 Sample Profile and Descriptive Statistics

In total, 194 responses were recorded through the survey of which there were 144 usable responses. Responses, such as incomplete ones, or responses from residents outside of Germany were excluded from further analysis. 38.19% of the respondents are female and 61.81% are male. Nearly all the participants are residents of Germany, except one from Austria which is still included in the sample as the Austrian market is very similar to the German one regarding customer behavior. Most of the respondents are young adults between 25 and 34 years with 56.94% (count=82), 16.67% (c=24) of respondents being between 18 to 24 years, and 11.81% (c=17) between 35 and 44 years old. Approximately 27.08% (c=39) of respondents have a bachelor's degree, 38,19% (c=55) of respondents have a master's degree and 21.53% (c=31) completed professional or technical training. The income is distributed so that 27.78% (c=40) of respondents earn between 1500 and 2999 Euro and 29.86% (c=43) of respondents earn 500 to 1499 Euro. Among the 75% (c=108) of respondents that ever ordered any non-prescription medicine via an online pharmacy, 65.28% (c=94) respondents are aware of ODMDS, however, only 23.61%(c=34) have already adopted and used such a service. A complete summary of the descriptive statistics can be found in Appendix V.

The correlation matrix (Figure 4) shows moderate to low correlation among the various variables, which is good for the regression model, as a strong correlation of variables leads to multicollinearity and later misinterpretation of the model. Thus, when studying easy countable things higher correlations are to be expected. Nevertheless, it needs to be kept in mind that these correlation coefficients are not well suitable for dependency metrics for binary variables.

The only variables showing a strong correlation above a correlation coefficient of 0.8 are *"Affinity_technology"* and *"Affinity_Applications"* with a correlation coefficient of 0.86 and *"Affinity_TechnologyApplications"* and *"Likelihood_NewTechnology"* with 0.834 respectively. To prevent misinterpretation in the model, later, the variables *"Affinity_Applications"* and *"Likelihood_NewTechnology"* were removed from further analysis. Interestingly, both *"Affinity_TechnologyApplications"* and *"Likelihood_NewTechnology"* are moderately strong negatively correlated with age, which makes sense as older people are mostly perceived to be not as affine to technology and applications and rather persistent to adopt new technologies.

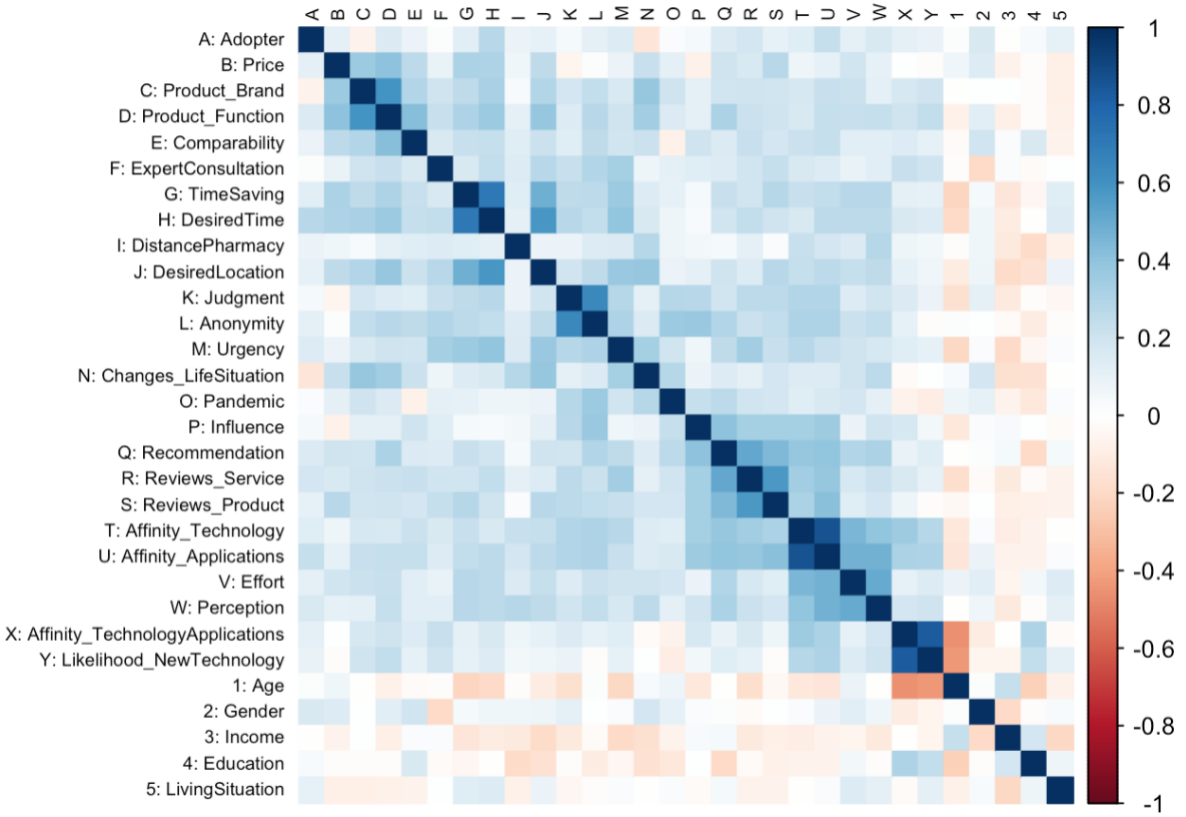

Figure 4: Correlation matrix

4.2 Data Analysis

The graph displayed in Figure 5 shows all the consumer drivers derived from consumer interviews and literature. If more than half of the respondents perceive a variable to be important (5 or higher on the Likert scale, green color), the driver can be assumed as a legitimate assumption. Three convenience and time-related variables (urgency, desired time of delivery, and time-saving), as well as ease of use and perception toward such services, can immediately be noticed as very important to consumers, as shown by the significant importance level above the fixed 50% importance threshold and the strong importance assigned by 75% or respectively

more of the respondents. This supports the hypotheses *H14: Urgency, H7: Desired time*, *H10: Time-saving, H13: individual perception towards on-demand medicine delivery*, and *H14: Technology being free of effort* and shows a strong tendency of variables to be legitimate factors influencing consumers' adoption of ODMDS. 60% or even more respondents also perceive the variables changes in life situation, desired location of delivery, product function, and price to be important for their decision and adoption of ODMDS. This supports the hypotheses *H16: Changes in life situation*, *H8: desired location*, *H3: product assortment regarding functionality*, and *H1: Prices.*

The only outlier is *H21: Influence by opinion leaders*, which is clearly above the 50% threshold with more than 65% of the respondents not perceiving influence to be important (3 or lower on the Likert scale), thus already indicating that this hypothesis is no key driver for adoption. Consequently, *H21: Influence by opinion leaders* is not accepted.

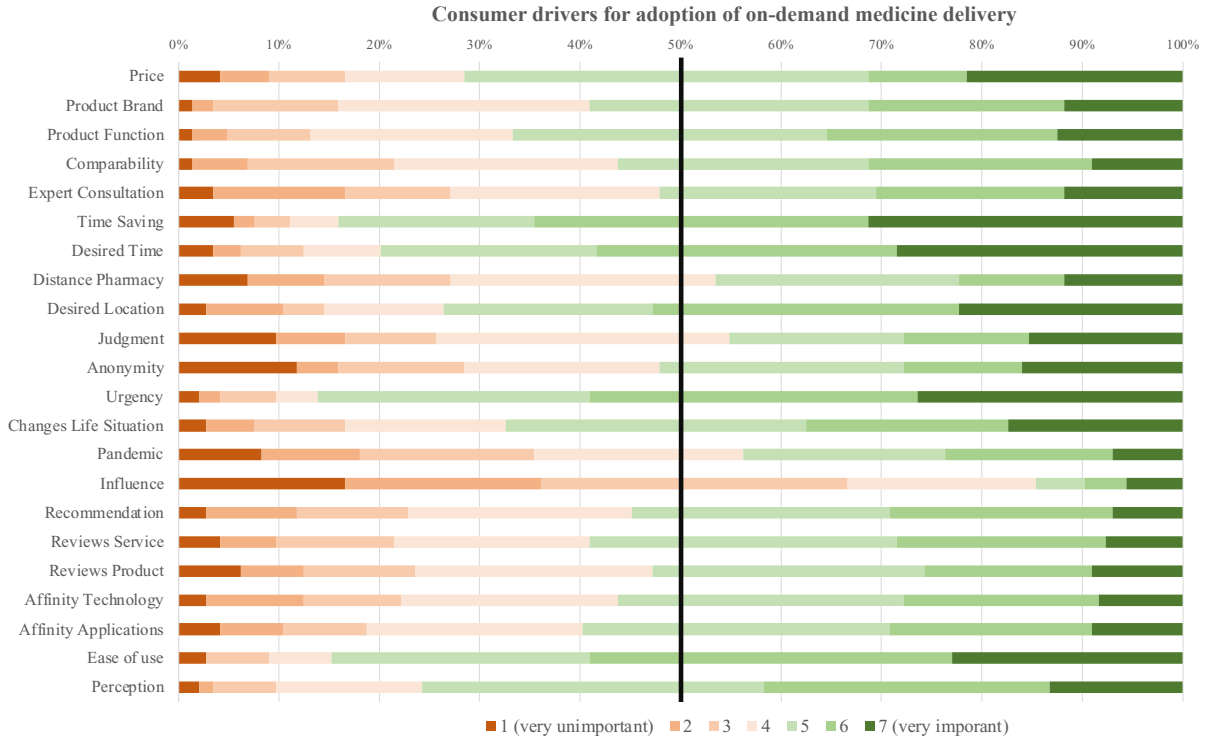

Figure 5: Drivers for on-demand medicine delivery adoption

The results of exploratory analysis (Figure 6) of the influence of gender on adoption show that among adopters 52.94% are women and 47.06% are men, while 33.64% of women and 66.36% of men are among non-adopters. This indicates a slight tendency that women are slightly more likely to adopt on-demand medicine delivery. However, it needs to be considered that the number of female respondents (55 women) is lower than the male ones (89 men).

When exploring the influence of age on adoption in Figure 7, it shows that 58.82% by far the most adopters are between the age of 25 to 34 years (Age group 3) and 17.65% of the adopters are between 35 to 44 years (Age group 3). Among people between the age of 18 to 24 years (Age Group 2) old the percentage of adopters drops down to 11.76%, even more for people between 45-54 years (Age Group 5) and 55-64 years old (Age Group 6) to 2.94% and 8.82% respectively.

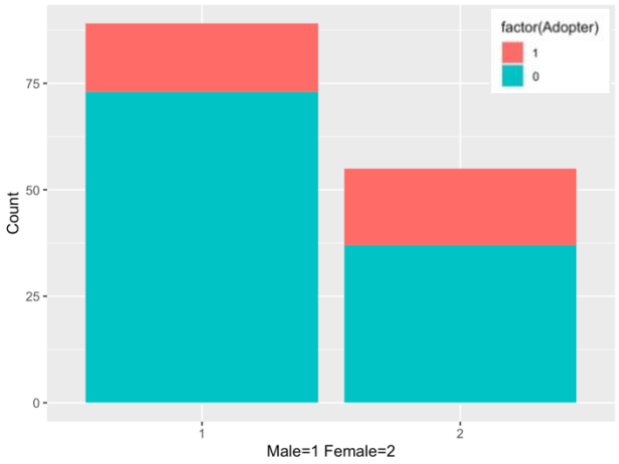

Figure 7: Influence of Gender

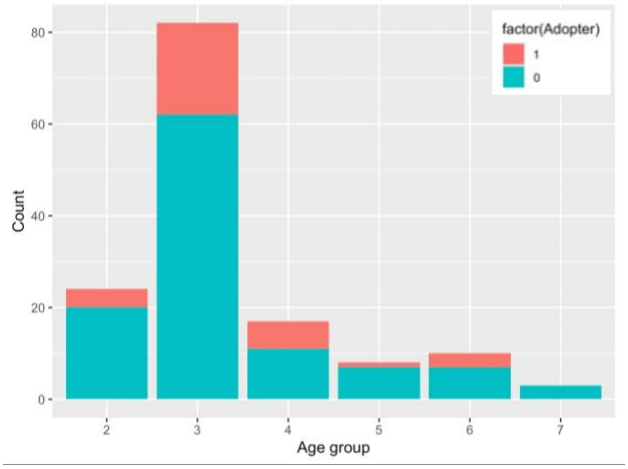

Figure 6: Influence of Age

Worth mentioning is the fact that more than 70% of the respondents younger than 35 years are aware of ODMDS and have already purchased through such a delivery service.

It needs to be noted, that the data is biased in sampling and coverage because it does not show the representative age distribution of Germany. The data set includes mostly younger respondents, as approximately 74% of the sample are younger than 35 years whereas the German population younger than 40 years only accounts for 35.69% (Statista, 2021).

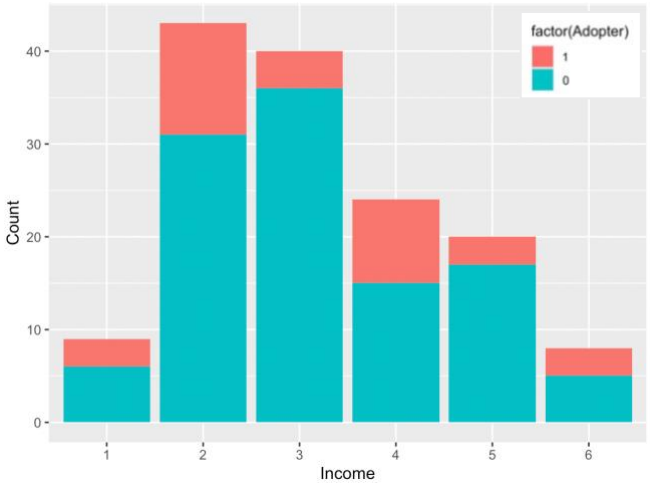

Figure 8: Influence of Income

After an initial visual check (Figure 8), no clear tendency can be identified that higher or lower income leads to a higher probability of adoption. It is noticeable that especially the groups with low income (Group 2: 500-1499€) and medium-high income (Group 4: 3000-5999€) have a significantly high number of adopters with 35.29% and 26.47% respectively. 11.76% of the people with medium-low income (Group 3: 1500-2999€) are adopters. The very low (Group 1: <500€), high (Group 5: 4500-5999€), and very high (Group 6: >6000€) income groups all share the same amount of adopters among them with 8.82%.

Irrespective of the small sample size, it could be interpreted that income does not have a significant impact on the adoption of ODMDS. However, what should further be considered is the social desirability bias that is very common with highly sensitive and personal information like income. Respondents tend to answer questions about income in a certain way that makes them feel better and least ashamed (Hariri & Lassen, 2015).

Regression

Before continuing with the regression models, it needs to be mentioned that there were already several models tested and compared before (not included in the Appendix) to come up with the final and best-fitting model. To achieve this, a forward selection approach was used and an initial model with all descriptive variables was set up as the backward selection method would have been too complicated with more than 30 variables. Logically, step by step statistically significant variables were added and statistically insignificant variables were removed from the initial model comparing the AIC.

As described in Chapter 4, the logit and probit regression models were computed. The outcome of the relevant computed models can be seen in Table 1. Following the previously described approach, the best-fitting model is “probit.model 4” with an AIC of 96.429, and all the variables included are statistically significant.

	Dependent variable: Adopter					
	logit.model1	**logit.model2**	**logit.model4**	**probit.model1**	**probit.model2**	**probit.model4**
Age	0.337			0.190		
Gender	1.070 *	1.339 **	1.454 **	0.641 **	0.779 **	0.858 **
Income	0.063			0.025		
Education	0.041			0.032		
LivingSituation	0.139			0.075		
FriendsFamily	3.238 ***	3.3.73 ***	3.660 ***	1.790 ***	1.866 ***	2.076 ***
Product_Brand	-0.551 *	-0.477*	-0.574 **	-0.319 *	-0.294 *	-0.344 **
Product_Function	0.828 **	0.616 *	0.756 **	0.444 *	0.342 *	0.442 **
TimeSaving			-0.818**			-0.488 **
DesiredTime	0.989 ***	0.807 ***	1.395 ***	0.523 ***	0.438 *	0.807 ***
Changes_LifeSituation	-0.698 ***	-0.652 ***	-0.861 ***	-0.391 ***	-0.362 ***	-0.505 ***
Reviews_Service		0.352 *	0.368 *		0.210 *	0.223 *
Perception	0.499 *	0.585 **	0.789 ***	0.298 **	0.333 *	0.458 ***
Constant	-12.920 ***	-12.059 ***	-11.446 ***	-7.036 ***	-6.657 ***	-6.520 ***
Akaike Inf. Criterion	102.241	100.250	97.032	107.590	100.296	96.429

**p<0.1; **p<0.05; ***p<0.01*

Table 1: Logit and Probit regression models

It can be noted that the variable *Reviews_Service* is statistically significant for the difference between adopters and non-adopters at a 90% level (*) shown by the asterisk next to the respective coefficient. *Gender*, *Product_Brand*, *Product_Function,* and *TimeSaving* are statistically significant for the difference between adopters and non-adopters at a 95% level (**). *FriendsFamily*, *DesiredTime*, *Changes_LifeSituation,* and *Perception* are statistically significant for the difference between adopters and non-adopters at a 99% level (***).

$$\begin{aligned} Adopter = \phi(&-6.520 + 0.858 \times Gender + 2.076 \times FriendsFamily - 0.344 \times Product_{Brand} \\ &+ 0.442 \times Product_{Function} - 0.488 \times TimeSaving + 0.807 \times DesiredTime \\ &- 0.505 \times Changes_{Lifesitaution} + 0.223 \times Reviews_{Services} + 0.458 \times Perception) + \mu \end{aligned}$$

Equation 1: Probit.model4

Concluding from this, gender, having friends or family that already used the service, product assortment regarding brands and functions, time-saving, desired time of delivery, and changes in life situation are considered of significant importance for ODMDS adoption.

Applying the average partial effects, the following derivations can be computed. To analyze the influence of several characteristics on the probability of adoption the sample population is split into subgroups and analyzed separately. Firstly, the population is split by income into three

groups of income created through the survey. Those groups include low income (Income groups 1 and 2 below 1500€), medium income (group 3 between 1500€ and 2999€), and high income (groups 4, 5, and 6 above 2999€) and were combined group-wise to get close to a proper and sophisticated sample size per subgroup. Neither the outcome for medium income nor high income is statistically significant, hence cannot be interpreted. This could be caused by an insufficient amount of data and the relatively small sample size of the subgroups to provide a reliable and statistically significant model fit. Further groups were created with samples including living with a partner (group 1), with family (group 2), with friends (group 3), and living alone (group 4). Furthermore, the population is split up by education levels into three groups, group 1 (Secondary school, high school, and vocational and professional training), group 2 (Bachelor's degree), and group 3 (Master's degree and doctorate).

Holding all variables constant, on average having friends or people in the family that already using or used ODMDS will increase the probability of being an adopter by 38.4% at a 99% significance level (***) compared to not having those friends or people in the family. Whereas holding all variables constant, on average having friends or people in the family already using ODMDS and earning a low income will decrease the probability of being an adopter to 26.7% (**) while having friends or family using the service and living with your partner will also decrease the probability of being an adopter to 30.12% (***) which makes logical sense, as the partner could just go to the pharmacy and get medicine urgently rather than ordering it and one being completely dependent on delivery service. Including education into consideration and holding all variables constant, on average having friends or people in the family already using ODMDS and having a lower education level (Group 1) decreases the probability of being an adopter to 37.52% (***), which is in line with the lower-income probability for adoption as a lower level of education and lower-income are correlated mostly. Holding all variables constant, on average having friends or people in the family already using ODMDS and having a higher education level (Group 3) only slightly decreases the probability of being an adopter to 38.34% (***) compared to the general average sample in the population.

Holding all variables constant, on average being a man instead of a woman will increase the probability of being an adopter only by 13.32% (*). Comparing this with the subgroups again shows, that holding all variables constant, on average being a man earning a low income instead of a woman earning a low income will increase the probability of being an adopter by 43.08% (***) while holding all variables constant, on average being a man and living with a partner

will increase the probability of being an adopter to 21.29% (*) and even higher to 22.06% (**) on average being a man and having a higher education.

Prediction

Given the best-fitting regression model found and based on the given data following predictions can be made for various personas. The first persona that can be predicted, a male persona, having friends or family members that already ordered via ODMDS, is both not very sensitive to the product assortment of brands and functions of medicine, finds a time-saving aspect of delivery very important, wants to receive their delivery at their desired time, is highly influenced by changes in their current life situation, values reviews about the delivery service very high and has a generally very bad perception of delivery services has a probability of only 1.1% to be an adopter. If this imaginary persona would be female the probability of adoption would even shrink to 0.08%. Whereas the same female persona with a bit more sensitivity to the product assortment of brands and functions of medicine, not valuing the time saving of delivery at all and having a very good perception towards those services and all other variables staying constant has a probability of 98.37% being an adopter, even 99.86% when being male. An imaginary female persona, having friends or family members that already ordered via ODMDS, has both for product assortment on brands and function a bad perception, thinks time-saving is a major advantage of ordering on-demand, wants to receive their delivery at their desired time, is highly influenced by changes in their current life situation, values reviews about the delivery service very high and has a generally very good perception of delivery services has a probability for being an adopter of 38.11% even 71.07% for a male persona. If this female persona would find product assortment to be very important in their purchasing decision process, the probability of adoption would rise to 57.33% holding all other variables constant. Would this persona be male, the probability would even rise to 85.15% with all characteristics and variables constant compared with the previous female persona. Finally, it can be concluded that having friends or family members that already ordered via ODMDS, having higher sensitivity and importance of the product assortment of brands and functions of medicine, consider timesaving of delivery not to be important, wanting to receive the delivery at a specific desired time, being highly influenced by changes in their current life situation, valuing service reviews very much and having a very good general perception towards these services will give a very high likeliness of an imaginary persona to adapt to on-demand medicine delivery services.

5 Conclusion

5.1 Managerial Implications

This section seeks to validate the findings and provide practical insights for on-demand medicine delivery services and recommendations. The primary goal of these recommendations is to provide an understanding of the consumers and optimize marketing efforts for customer retention as well as customer acquisition by drawing the benefit of the identified adoption drivers. The given results show that the perception-based model of online pharmacy shopping attitudes and behaviors by Wiedmann et al. (2010) adapted to ODMDS is mostly validated. Some of the variables of the financial, functional, individual, and social dimensions were accepted as impactful factors while others were found to be insignificant. Referring to the adapted model, companies might focus marketing activities on the conceptualized and empirically proven propositions of this study to improve targeting and optimize marketing efforts based on the various segments and consumer values and perceptions.

Before diving into the recommendations and implications it is important to mention that the quantitative data collected through the survey, the qualitative results obtained from interviews with experts and consumers, and the literature findings all supported each other regarding their content, which is increasing the significance and credibility of the findings. Nonetheless, only three deductive codes derived from the literature were rejected and 15 out of 18 were accepted and found to have an impact on adoption however, 8 of them did not strongly influence the adoption but were still accepted to be of lower influence. Nevertheless, four out of five inductive codes derived from the qualitative expert and consumer interviews were accepted. Based on the exploited research, this dissertation is one of the first articles that investigate the influencing factors on consumer adoption of on-demand medicine delivery services in Germany. This illustrates once again that there is still a gap in the current literature and that there is still a lot of research to be done solely in the field of ODMDS and consumer behavior, especially in Germany. Nevertheless, these findings provide useful information for further research and for market players to develop and further optimize their customer-oriented products.

The influence and importance of convenience factors (delivery at any desired point in time (H7), desired location (H8), and time-saving(H10)) as adoption drivers for consumers are validated through gathered data and in accordance with previous research findings in the literature. This proves the existing unique selling point (USP) of existing market players mainly focusing on convenience to be valid, nonetheless, it proves the relevance for the target groups as well. Another part of the USP of on-demand players is the factor of urgency in demand as people tend to order medicine online when having an urgent demand, such as condoms or pregnancy tests but as well for urgently required medicine that is also validated through gathered data. Usually, it takes one to four days to get medicine to the customer by delivery, therefore this advantage for on-demand delivery should be further exploited. Combined with the thrive of consumers for high ease of use, the lowest effort, and its validated hypothesis (H14) these further stress market players to put effort into seamless user experience and to make the customer journey as convenient, easy, and short as possible for customers so entry barriers will disappear

Further drivers identified were social and situational changes in the life of consumers like changing family structure, remote working, as well as more unfortunate situations like current sickness or limitations in movement of any type that draw people further to more convenient solutions even when it comes to important purchases like medicine. This emphasizes once more the enormous influence of convenience and shows that marketers should more and more try focusing on older target groups as those are mostly limited in movement and reaching for convenient and easy solutions even though not adequately represented in this study. Older people can rather be reached through partnerships with elderly homes, testing, and medical centers than the traditional marketing channels. In addition, older people are usually dependent on prescription medicine, therefore preparations should already be made for the implementation of e-prescription in Germany and precautions taken to achieve an optimal market entry and gain as much market share as possible.

Next to convenience and urgency, another crucial influence on consumers validated in this study is the fact of having friends or family members already using ODMDS. This makes consumers more likely to adopt those services as also the general perception of on-demand

delivery services among people having friends and family members using the service is better (48% have a good to very good perception) compared to those not having friends or family member using the service (38.30%) even more emphasized by the 54% adopters among the people having those friends and family members, compared to the 7% among those not having them. Here it would be advisable to introduce or promote "friends-refer-friends" marketing programs to make use of the impact that friends and family members can have. Personal recommendations as an advertising activity are still underestimated in their impact as referred customers bond with the company on an emotional level with a personal contact. Customers who are referred by friends spend on average more in the long run and produce 25% more profit for companies per customer (Köpper, 2014). During a "friends-refer-friends" campaign the company can observe the satisfaction level of customers. If many customers refer the service to others, satisfaction with the service is higher than if the campaign is not well received and thus the service must be further optimized. Influence, on the other hand, was found not to be of significant impact on customers thus it would not be profitable to advertise ODMDS with influencer marketing. Furthermore, this emphasizes the importance of word of mouth in this industry as one of the oldest but still most efficient marketing activities solely based on the offered service quality without any marketing effort of the company. This was validated by the moderately high agreement by respondents that recommendations are of importance when considering adoption.

According to literature and interviews, product price is perceived to be both a driver as well as a barrier, which is validated by the survey outcome as more than 70% of people give product prices importance. The specialty in Germany is the IFAP-Arzneimitteldatenbank, a database displaying market prices for medicine used for pharmacy pricing. On that account, there is not much leeway with medicine prices which confirms the biggest risk in the industry: profitability. Due to the IFAP pricing, the industry does not have the highest margins even though average order values are comparably high to grocery delivery services, therefore the only measures that can be controlled are rider cost and marketing cost. Marketing cost advice was already given while talking about referral programs and word of mouth. Although, as marketing costs mainly consist of customer acquisition the optimization of SEO and SEA is crucial to be successful in the highly competitive market. A competitive market would also mean that there is still a lever to attract more customers by reducing prices, assuming there would still be profitable margins. Further market research could help companies to find the price premium that customers are willed to pay for more convenience. The rider costs are mostly dependent on the number of

riders that are hired from external partners. Through data-driven analytics, the demand could be computed and predicted to hire just as many riders as required per delivery demand per day.

Another noteworthy finding is consumer perception of on-demand delivery services. It is significantly proven that consumers that have a generally good perception of ODMDS have a higher likelihood to adopt it. Additionally, consumers are more likely to adopt on-demand medicine delivery services when the application and service are considered easy to use with low effort. Once consumers can easily and efficiently use the application of the service, they also perceive the service as more useful and are indirectly influenced in their behavior and adoption. Therefore, product managers and developers need to pay attention to the attributes influencing service perception and ease of use including the basic principles of reducing application loading times, maintaining consistency in the surfaces, making the application responsive, highlighting key features, and using pictures and logos.

The Covid-19 pandemic clearly accelerated the industry and helped enable players to enter the market due to lockdowns and people being afraid of infection. However, less than half of the respondents in the survey considered the pandemic to be an important influence factor within purchasing decision process. Regardless of lockdowns and pandemics, the most important thing in the future will be that people continue to buy.

5.2 Summary

This dissertation presents a thorough examination of the factors that influence consumer adoption of on-demand medicine delivery. Factors established in current literature, such as convenience motives (flexibility, time-saving, and urgency), friends and family using the service, changes in the life situation, as well as the more traditional drivers like product assortment prices, comparability, service reviews, and general perception have a significant impact on consumer acceptance of quick commerce in the e-pharmacy environment. Concerning the demographics, only gender has an impact on the adoption probability whereas age, income, and education are irrelevant to the purchasing decision. It cannot be judged on the location and residency yet, as most of the delivery players only just launched in big major cities and Germany and just now looking to expand.

Established on the outcomes and analysis of the gathered data, a statistical prediction model has been developed to predict the probability of adoption of imaginary personas and therefore

extend the existing literature by providing exploratory insights to consumer drivers of on-demand delivery for medicine based on collected quantitative and primary qualitative data. This study further expands on previous consumer research by embedding further collections of drivers into the investigation. Furthermore, it compares demographic characteristics to consumer drivers, providing another unexplored dimension necessary to take the findings to the next level of depth.

The findings of this study lead to the identification of several managerial implications that are valuable for every manager working in the field of ODMDS in Germany. It does so by providing a profound understanding of consumer behavior, values, and perception and how to address their needs and wants effectively supported by the developed prediction model. This can help managers to be more effective and successful with customer acquisition and customer retention.

5.3 Limitations

Although this research valuably contributes to the theoretical and practical elements of on-demand medicine delivery services, it has considerable limitations. To begin with, this is not an experimental study and everything that was done was to show correlations between the tested variables without proving causation. Furthermore, the empirical results required to test the hypotheses were collected at one specific time even though consumer attitudes and perceptions change and develop over time. Hence, a retrospective examination over a longer timeframe would be required to measure the adoption of on-demand services and gain more understanding of consumer intentions and get sophisticated insights.

During the conducted research several biases were encountered. As already mentioned before, during the sampling and coverage of the survey conducted, the sample suffered from sampling and coverage bias as it does not show the representative average age of Germany and additionally included a lot of respondents from a certain area. Moreover, social desirability bias could very likely have influenced the responses concerning sensitive and personal information.

As previously mentioned, the given literature is very limited as on-demand services are quite new and upcoming business models, and thus, a very low number of adopters can be found now.

Regarding the statistical analysis part of this thesis, the ordinary least squares assumptions have been neglected due to the volume restrictions of this dissertation and the simplicity of the research. Linearity, Exogeneity, and homoskedasticity have not been tested on the models computed. Solely the OLS assumption of multicollinearity was checked throughout the analysis of the correlation matrix. Furthermore, the sample size and number of useful responses are quite limited and could be extended in future research to get statistically more meaningful insights and create more exploratory and statistically significant subgroups in the sample even though the sample was sufficient to get insights for this dissertation. Lastly, this research only focused on the German market, which is caused by the upcoming start-up scenes of on-demand delivery players mainly in Germany, confining the research only to German consumers and their behavior and attitudes. Implementing the conclusions of this study in different countries would be inaccurate due to the presence of different technological standards and several cultural differences. The findings of this study should be compared and extended with insights and outcomes from comparable studies in different countries. Lastly, it is not possible to compute with all factors possible in the statistical model. Thus, other factors can be studied, like innovativeness, others' perceptions of a person, the influence of purchasing frequency, and different demographic information including more sophisticated and statistically significant subgroups.

5.4 Future Research

Replicating this study, a couple of years later will most probably bring completely new and different outcomes due to the fast pace of the quick commerce industry, the current technology development, and consumer behavior that might change during this time fundamentally.

Today the concept’s application within the ODMDS domain is only just now beginning its journey and some service providers are only beginning to gain snowballing traction. The research conducted within this work is rather of a pilot nature and some questions still need to be tackled by future researchers and practitioners. Does the service need quick delivery within 30min or is a desired time of delivery may be more valuable and convenient for consumers? Do service providers need to offer both of those options to make customer journeys as convenient as possible? The consumer survey showed a slight tendency towards on-demand delivery for a specifically chosen point in time, however, this was not pursued further and leaves space for more interesting research.

Appendix

I. Expert Interviews

Expert Interview No.1: Senior Growth Manager at a German-based startup that's building an on-demand medicine delivery platform in Europe

- The pandemic highly accelerated the demand for on-demand delivery with Gorilla as an example
- People are getting lazy and more convenient solutions required
- Target is people living in urban areas, rather than city centers
- People like to have everything delivered within 30min with quick delivery and cannot wait for the products be delivered even the next day
- Delivery service open every day from 8 AM to 12 AM midnight
- No delivery fees, people can just get their meds whenever they want, without really paying extra for the delivery service and be convenient
- Launched in October in Berlin, Germany with non-prescription medications and waiting for the law on e-prescription to be approved to extend the offering and further satisfy the market
- Built a marketplace in Berlin, Germany as a test and opened a warehouse and offer baby products as well, with diapers, baby food as well as self-care products added to the traditional medicine products
- Online pharmacies require per law an opportunity for consultation for a non-prescription product – the legal requirement for online pharmacies
- Before ordering on the app, there is the opportunity to ask questions to a real pharmacist and chat or call with them
- The pharmacist is a partner from the partnership pharmacies
- When expanding to new cities, the stock is held in the partnership pharmacies including marketing materials, like flyers, stickers etc.
- Business model building upon the fact that going to the pharmacy is usually required when you are sick, so try to save this step for people and make it more convenient
- Top selling products are pregnancy tests and condoms, so the products that people tend to be more afraid and embarrassed to buy in the traditional local pharmacy, so our plus point is the customers anonymity when it comes to sensitive products
- Focusing as well on the situations where products are required immediately, like for example when your baby is sick you cannot really leave the house to purchase medicine, so you order online or you are running late for something and still need to get shampoo or condoms before you leave, so while getting ready and doing other stuff you can order this stuff to be there in 30 mins

- Demand growing, expansion in summer to Austria and France and will be in 50 cities in Germany
- Competitors in Germany: mayd, First A, kurando
- Another factor we are building up on is the allergy season and people having hay fever so they do not want to leave the house, so for convenience, they order their required products online

Expert Interview No.2: Strategy Associate at a German-based startup that's building an on-demand medicine delivery platform in Europe

- Business focused on OTC medicine and free-choice products
- The strategy further focused on going into the prescription market
- According to our calculations, the OTC market value is at around 5 billion
- Prescription drug market at 45 billion
- Market for on-demand delivery is expected to grow a lot in the near future over the next 3-5 years even though without the e-prescription it will be rather limited to only OTC medicine
- Will not completely disrupt the pharmacy market but will still play a big role in the future and brings transformation in this very classic and conservative industry
- Waiting to enter that market when law in Germany passed
- General difficulties with all market player to connect Gematik (Gesellschaft für Telematikanwendungen der Gesundheitskarte mbH) systems of the government to provide e-prescription with the pharmacy's software and platform
- Currently, no solution to directly send e-prescription from doctor to pharmacy (through customer) and directly get the medicine
- Doctors lacking software for e-prescription
- Customers lacking awareness about e-prescription
- Seamless user experience big market driver, the biggest challenge is to make the customer journey for a customer as short and convenient as possible
- Research showed that there are approximately 20million Germans with sicknesses now and it takes 1-4 days to get the medicines to them
- Our desired patient value chain: a patient has health complaints, goes to the doctor (might even be per video call and remote), gets the prescription, and organizes the medicine delivery completely from home
- Medication management is planned through health data that is digitally collected
- The overall requirement to get that done in Germany is to unite all relevant players in this value chain and get them digitalized and ready for this change

- Our current business model is only based on partnerships with pharmacies as only they are allowed to store OTC medicine having several licenses for it
- To extend this business model, a long-term Germany-wide pharmacy partnership is required to be able to store medicine – the problem with it is a law that a company cannot tell the customer from which pharmacy the customer has to order and give him kind of a choice – our company is just mirroring the products and prices of the pharmacies
- IFAP-Arzneimitteldatenbank (Institut für Ärzte und Apotheker GmbH) – database for medicine, market prices for medicine, used for pharmacy pricing
- Threats and risks in the market: regulations, competition, target group and profitability
- The big risk with OTC medicine is profitability as it has not highest margins because of IFAP, even though order values of ODMDS are comparably high to grocery ones
- Factors are the rider and marketing cost
- We hire the riders from external partners, meaning we can just book riders
- Also, in the highly competitive market already, marketing costs mainly customer acquisition costs are very high – optimization of SEO and SEA required
- Difficult to extend target group, currently 25 – 35 years old, focus further on older people
- Trying to reach older people through partnerships with e.g. elderly homes, testing centers rather than traditional marketing activities
- Competitors considered in the market: specific medicine delivery services as well as Amazon and Volt that are being a threat
- Top products: products for colds as well as Covid19 (rapid tests, nasal spray, pain killers etc.)
- In the future expected to have a growing demand for beauty products
- Drivers of adoption are rather the pain points in the customer journey
- Long waiting times in pharmacy
- Physical exposure in pharmacies, being required to go somewhere to get your medicine
- Online product availability is higher
- Demand for acute symptoms and pain relief without willing to go to the pharmacy but rather immediately order the required products even without consultation
- Opening hours of pharmacies are limited
- Customers seem to be very dependent on the weather situation –online orders go up with bad weather appearing.

II. Consumer Interviews Descriptive Statistics

Customer	Age	Awareness about the existence of on-demand medicine delivery services	First time using online pharmacy	Online medicine delivery services used	Consumer purchasing behavior towards on-demand medicine delivery services
C1	24	Yes	January 2022	Mayd	Adopter
C2	25	Yes	2019	First A, Docmorris, Shop-apotheke	Adopter
C3	32	Yes	December 2021	Mayd	Adopter
C4	59	Yes	2018	Docmorris, Shop-apotheke	Non-Adopter
C5	22	Yes	2020	Shop-apotheke	Non-Adopter
C6	48	Yes	-	-	Non-Adopter
C7	32	Yes	2019	Docmorris, Shop-apotheke	Non-Adopter
C8	30	Yes	2020	Mayd, Docmorris	Adopter
C9	26	Yes	December 2021	First A	Adopter
C10	64	No	-	-	Non-Adopter

III. Consumer Interviews Analysis

Dimension	Code	Reference - Consumer Interview Statements (citations)
Financial Dimension	Price	C1: Pharmacists usually don't tell you the price until the last moment and convince you of a product already, even though in the end it is way more expensive than the amount I wanted to spend. Always checking for the functionality, I need and the cheapest price of those products because I am very price sensitive
		C6: Possibly finding the best price available
		C8: I can compare prices and possibly find the best ones as with the online pharmacies
		C10: I perceive products online mostly cheaper than in the pharmacy
Functional Dimension	Comparability	C2: Open view about what else is there in comparison to a pharmacy where you actively need to ask what else is out there because they only usually suggest you one specific product and brand. I do not like people suggesting me stuff in the pharmacy, I do feel like I want to have my own decision on brands
		C5: I could easily compare active ingredients of products as well as compare brands
		C8: I do not like that pharmacist mostly already select a specific brand for you even though there might be mostly more brands with the same functionality, so for me there is relatively few choices then
	Expert consultation	C2: Chatbot would be sufficient leading me through kind of a questionnaire because I do not need human interaction with this, so why not automate it
		C3: Medication is important, and I would need to have some kind of expert opinion on my choosing and would not even feel judged through online consultation without face-to-face
		C5: I would want to have an expert I could talk to when ordering my stuff and have consultation about side effects and interactions with other medications
		C6: I need seriousness, which would be provided by an existing online service and consultation opportunity
		C9: All the products have the same ingredients, so how should I know what exactly to get and what helps the best, so online I would really need someone to talk to and ask questions, even an automated chatbot because otherwise I would go to the pharmacy because I really like people helping me and suggesting me stuff
		C9: The biggest problem right now is that people actually lacking the knowledge about medical stuff and drugs apart from basic stuff like condoms and pregnancy tests, so I for me as well, I would need some expert opinion
		C10: Pharmacists do not know the previous diseases and can consult about interferences between medical products

	Product assortment	C5: I can see the whole assortment; in pharmacies I usually only get shown one brand from the pharmacist
		C5: If I need something immediately but it is not available in my local pharmacy
		C6: No risk for me, to go to the pharamcy and them not having my required products
		C9: Online you can be sure they have your products available
Individual Dimension	Convenience	C1: My main reason to order with this service was the convenience if I am honest
		C2: When ordering I do not want to leave the house and when I know what to order it is way more convenient to just go online
		C3: I could not leave the house but still had to get some cough syrup but also in general i like the convenience of such services where I can save time and effort by not leaving my apartment
		C4: Way more convenient than ordering from home and getting stuff delivery to your door, especially if your movements are limited and you cannot leave the house with very high effort
		C5: Do not want to leave the house
		C6: Directly ordering from home without leaving the house and being required to dress up
		C7: Fast and reliable delivery from home
		C8: I just like to make everything as easy as possible and receiving anything including medicine at home at any point, no matter the opening hours of pharmacies is great
		C9: Really no effort to order stuff, and I can do it from everywhere, even being cozy on my couch
		C10: I would not need to do anything else then ordering and just conveniently wait for my order at home or do other stuff while waiting for the delivery during the time I would have needed to drive to the pharmacy in the next town
	Immediate Demand	C5: When I immediately need something
	Knowledge	C3: I would consider myself very knowledgeable about all those services and platforms, which usually makes me an early-adopter to ease up my life in all kind of aspects
		C8: When I ordered the first time, I was really excited because I also really like to order groceries with Gorillas or Flink, so I think there is rather no problem for me to first use this other than setting up payment and address

	Distance to next pharamacy	C2: Another example besides convenience, my grandmother cannot leave the house and is not even able to go to the pharmacy on her own anymore, so it is really necessary for her
		C10: Next pharmacy is in the next town like 15min drive, so it would be really easy for me to get it to my door and not to spend another 30min only driving there and getting home again
	Ease of use	C4: I am rather persistent in using a lot of applications but those I saw seemed rather easy to use
		C6: Application would need to be easy to be used
		C9: Process needs to be easy for me otherwise it is not making my life easier when not just walking to the nearest pharmacy
		C10: Application for me to use needs to be way forward and easy to use in order for me to go through all the order steps on my phone
	Perception	C1: Got used to order groceries online through quick delivery services, so I kind of feel like I am aware of the process and all and I was easily convinced to adapt that to medicine as well
		C2: My technology acceptance barrier is very low, so if I find out about new services easing up my life, I am very fast in adopting
		C3: I like everything being delivered and already use a lot of those services for groceries, clothing and food as well
	Anonymity	C3: I feel very uncomfortable being in a pharmacy, maybe being a contagious person with some sickness and I like the feeling of anonymity when talking about health issues
		C6: I do not want to talk about my sickness and its symptoms in a pharmacy with other people around listening to my story
	Judgement	C1: I hate buying pregnancy tests offline, because I feel pharmacists are very judgy
		C2: I hate going to pharmacies and I find pharmacists incredibly judgmental
		C3: I do not need to tell people about my symptoms and do not have to address private information with some stranger and if I do I feel judged for my symptoms by the pharmacist
		C9: You are saving yourself embarrassment ordering online
	Time saving	C10: I could do other stuff while waiting for the delivery during the time I would have needed to drive to the pharmacy in the next town

Social Dimension	Pandemic	C1: I felt unsafe in a pharmacy, when they started doing the COVID-Tests there and I thought maybe some of the people getting tested there and waiting as well might even be infected
		C2: The pandemic made me do it and order through on-demand service with my medical products even though I think I will also use it after the pandemic is after
		C3: I was not allowed to go out due to isolation rules and needed some stuff to fight my symptoms but did not want to be a burden to someone else
		C9: During the pandemic right now I ordered so much because I did not want to leave the house and just wanted it to be delivered to my house and especially if I have Covid and cannot leave the house anyways
	Recommendation	C3: People usually do not want to talk about their symptoms so they would not come to me and tell me I had these symptoms and got those medications for it through this service, they would rather only tell me and recommend it if they got to know I could make use of it now. Usually, medication does not come up in a conversation like that. I did not think I would need that specific service but someone recommended or adviced
		C6: I always put great importance to customer reports and experiences of others and would need that to use it
		C9: A friend told me and was totally convinced of the service and told me to use it once I need some medicine
		C9: I would also want to see reviews on products and have other consumers opinions on different products
On-demand vs. Quick delivery	On-demand	C4: For random and not immediate stuff I would prefer delivery to a requested time for my convenience
		C7: As I am working the whole during the week and am in the office, an order for a specific time after work in the evening would be perfect for me. Non-urgent stuff. I would always order on-demand for a specific time
		C8: Preferably I would choose the time of delivery, so I can plan when I am home and when to receive the products if it is not a really immediate need at that moment, otherwise I need the quick delivery for sure
	Quick	C1: If I need to fix something I would want to rather do it now than later, same with ordering stuff
		C2: With pharmacy stuff I would want to have it now and asap and immediately order and receive it
		C3: In case of medication I would prefer quick delivery, because I would not stock up medication but rather have an immediate need for specific products and in general I like immediate reward
		C4: When I am sick, for sure I prefer getting my stuff as soon as possible to lower the pain and symptoms
		C6: Medicine is required for me usually urgently when I am sick, even when pharamacies are closed in the evening or on sundays. Sickness cannot be timed
		C7: Only when I am sick and in urgent need for medicine I would consider the quick delivery

IV. Survey

Variable	Hypothesis	Dimension	Description	
OnlinePharmacy			Did you ever order any non-prescription medicine (rezeptfreie Medikamente und Drogerieartikel) via an online pharmacy?	1=Yes, 0=No
ODPlayer			Are you familiar with the following quick delivery players for medicine?	1 = Mayd 2 = First A 3 = Kurando 4 = None 5 = Others
Adopter			Did you ever use any on-demand medicine delivery service?	1=Yes, 0=No
Awareness		Individual Dimension	Are you aware of such a delivery service for non-prescription medicine	1=Yes, 0=No
FriendsFamily		Individual Dimension	Do you have friends or people in your household/circle that already purchase medicine via on-demand delivery services?	1=Yes, 0=No
Price	H1	Financial Dimension	Competitive product prices are a major driver for the adoption of on-demand medicine delivery services	Likert Scale 1 to 7
Product_Brand	H2	Functional Dimension	Product assortment regarding brands is a major driver for the adoption of on-demand medicine delivery services	
Product_Function	H3	Functional Dimension	Product assortment regarding functionality is a major driver for the adoption of on-demand medicine delivery services	
ExpertConsultation	H4	Functional Dimension	Sufficient opportunities for an expert consultation is a major driver for the adoption of on-demand medicine delivery services	
Comparability	H5	Functional Dimension	Opportunity to compare products is a major driver for the adoption of on-demand medicine delivery services	
Affinity_TechnologyApplications	H6	Individual Dimension	Knowledge/expertise in respective technology/applications is a major driver for the adoption of on-demand medicine delivery services	
DesiredTime	H7	Functional Dimension	Possibility to order medicine whenever you like is a major driver for the adoption of on-demand medicine delivery services	

DesiredLocation	H8	Functional Dimension	Possibility to order medicine wherever you like is a major driver for the adoption of on-demand medicine delivery services	
DistancePharmacy	H9	Functional Dimension	Distance to the nearest pharmacy is a major driver for the adoption of on-demand medicine delivery services	
TimeSaving	H10	Functional Dimension	Time savings through on-demand medicine delivery service is a major driver for the adoption of on-demand medicine delivery services	
Affinity_Technology	H11	Individual Dimension	Personal affinity toward technology is a major driver for the adoption of on-demand medicine delivery services	
Affinity_Applications	H12	Individual Dimension	Personal affinity toward applications is a major driver for the adoption of on-demand medicine delivery services	
Perception	H13	Individual Dimension	Individual perception toward on-demand medicine delivery services is a major driver for the adoption of on-demand medicine delivery services	
Effort	H14	Individual Dimension	The technology being free of effort for consumers is a major driver for the adoption of on-demand medicine delivery services	
Likelihood_NewTechnologies	H15	Individual Dimension	General likelihood to adapt to new technology is a major driver for the adoption of on-demand medicine delivery services	
Anonymity	H16	Individual Dimension	Relative anonymity in the online purchasing process is a major driver for the adoption of on-demand medicine delivery services	
Judgment	H17	Individual Dimension	Judgment in the traditional pharmacy by the pharmacist or other customers is a major driver for the adoption of on-demand medicine delivery services	
Urgency	H18	Individual Dimension	Urgency is a major driver for the adoption of on-demand medicine delivery services	
Changes_LifeSituation	H19	Individual Dimension	Changes in the life situation are a major driver for the adoption of on-demand medicine delivery services	
Pandemic	H20	Social Dimension	Changes in customer behavior due to the pandemic is a major driver for the adoption of on-demand medicine delivery services	
Influence	H21	Social Dimension	Influence by opinion leaders is a major driver for the adoption of on-demand medicine delivery services	

Recommendations	H22	Social Dimension	Getting recommendations about on-demand medicine delivery services from friends and family members that already using on-demand medicine delivery services is a major driver for the adoption of on-demand medicine delivery services	
Reviews_Service	H23	Social Dimension	Having service reviews available is a major driver for the adoption of on-demand medicine delivery services	
Reviews_Product	H24	Social Dimension	Having product reviews available is a major driver for the adoption of on-demand medicine delivery services	
Future_UsageOD			Could you imagine using on-demand medicine delivery services in the future?	1=Yes, 0=No
Quick_vs_OD			Quick delivery vs. On-demand delivery - Which one do you prefer?	Option A, Option B
Age			What is your age?	1 = <17 years old 2 = 18-24 years old 3 = 25-34 years old 4 = 35-44 years old 5 = 45-54 years old 6 = 55-64 years old 7 = >65 years old
Gender			Which gender do you identify with?	1=Male, 2=Female, 3=Divers
Residency			Are you a resident in Germany?	1=Yes, 0=No
Residency_TEXT			Country of residency	Open text field
ZIP			Which city do you currently live in? (first two numbers of the ZIP Code)	Open text field

Income			What is your average monthly income?	1=<500 € 2=500-1499 € 3=1500-2999 € 4=3000-4499 € 5=4500-5999 € 6=>6000 €
Education			What is your highest completed educational level?	1 = Secondary School 2 = High School 3 = Training 4 = Bachelor 5 = Master 6 = Dotorate 7 = No formal education 8 = Prefer not to answer
LivingSituation			What is your current living situation?	1 = With partner/children 2 = With family 3 = With friends 4 = Alone 5 = Prefer not to answer

V. Survey Descriptive Statistics

Variable	Category	Category Description	Count Responses	Percentage Responses
Adopter	1	Adopter	34	23,61%
	2	Non-adopter	110	76,39%
Age	1	<17 years old	0	0,00%
	2	18-24 years old	24	16,67%
	3	25-34 years old	82	56,94%
	4	35-44 years old	17	11,81%
	5	45-54 years old	8	5,56%
	6	55-64 years old	10	6,94%
	7	>65 years old	3	2,08%
Gender	1	Male	89	61,81%
	2	Female	55	38,19%
	3	Divers	0	0,00%
Education	1	Secondary School	3	2,08%
	2	High School	13	9,03%
	3	Training	31	21,53%
	4	Bachelor	39	27,08%
	5	Master	55	38,19%
	6	Dotorate	1	0,69%
	7	No formal education	0	0,00%
	8	Prefer not to answer	2	1,39%
Income	1	<500 €	9	6,25%
	2	500-1499 €	43	29,86%
	3	1500-2999 €	40	27,78%
	4	3000-4499 €	24	16,67%
	5	4500-5999 €	20	13,89%
	6	>6000 €	8	5,56%
Living Situation	1	With partner/children	46	31,94%
	2	With family	26	18,06%
	3	With friends	31	21,53%
	4	Alone	40	27,78%
	5	Prefer not to answer	1	0,69%
ZIP Code	10	Berlin	11	
	12	Berlin	3	
	13	Berlin	7	
	40	Düsseldorf	8	
	51	Köln	13	
	67	Ludwigshafen	9	
	68	Mannheim	62	
	69	Heidelberg	5	
	70	Stuttgart	3	
	XX	Others	23	

VI. R Script

```
setwd("/Users/nicolaifeger/Desktop/THESIS/Survey_Data")
data   <-   read_excel("/Users/nicolaifeger/Desktop/THESIS/Survey_Data/SurveyData.xlsx")
data <- data.table(data)
```

General Overview & Overview split by adopter & non-adopter

```
stargazer(data, type = "text", nobs = TRUE, mean.sd = TRUE, median = TRUE, iqr = TRUE, n
o.space                                    =                                        TRUE)
data.adopter=data[data$Adopter==1,]
data.nonadopter=data[data$Adopter==0,]

stargazer(data.adopter, type = "text", nobs = TRUE, mean.sd = TRUE, median = TRUE, iqr =
TRUE,                        no.space                          =                        TRUE)
stargazer(data.nonadopter, type = "text", nobs = TRUE, mean.sd = TRUE, median = TRUE, i
qr = TRUE, no.space = TRUE)

age.count                                    <-                                  table(data$Age)
age.count
barplot(age.count, names.arg = c('18 - 24 years', '25 - 34 years', '35 - 44 years', '45
- 54 years', '55 - 64 years', 'above 65 years'), main = 'Distribution of Age', xlab = '
Age', ylab = 'Count')

#Correlation                                                                    Matrix
cor(data),use ="complete.obs")

Corr<-cor(data)
rownames(Corr) <- c("A: Adopter", "B: Price", "C: Product_Brand",   "D: Product_Functio
n", "E: Comparability",  "F: ExpertConsultation",    "G: TimeSaving",    "H: DesiredTim
e",   "I: DistancePharmacy",  "J: DesiredLocation",   "K: Judgment",  "L: Anonymity", "
M: Urgency",   "N: Changes_LifeSituation", "O: Pandemic",  "P: Influence", "Q: Recommen
dation",    "R: Reviews_Service",   "S: Reviews_Product", "T: Affinity_Technology", "U:
Affinity_Applications", "V: Effort",    "W: Perception",    "X: Affinity_TechnologyAppl
ications",   "Y: Likelihood_NewTechnology",  "1: Age",   "2: Gender",    "3: Income",
"4:                 Education",                  "5:                 LivingSituation")
colnames(Corr) <- c("A","B","C","D","E","F","G","H","I","J","K","L","M","N","O","P","Q"
,"R","S","T","U","V","W","X","Y","1","2","3","4","5")
corrplot(Corr,method="color", tl.cex=0.6, tl.col = "black")

#Adopter                                      by                                    Gender
ggplot(data, aes(factor(Gender), fill = factor(Adopter))) + geom_bar() + labs(y= "Count
", x="Male=1 Female=2")

#Adopter                                        by                                      Age
ggplot(data, aes(factor(Age), fill = factor(Adopter))) + geom_bar() + xlab("Age") + lab
s(y= "Count", x="Age group")

#Adopter                                      by                                    Income
ggplot(data, aes(factor(Income), fill = factor(Adopter))) + geom_bar() + xlab("Income")
+ labs(y= "Count", x="Income")

Adopter<-as.factor(data$Adopter)
FriendsFamily<-as.factor(data$FriendsFamily)

#REGRESSION                                  MODELS                                  LOGIT
modelall <- Adopter ~ Age + Gender + Income + Education + LivingSituation + FriendsFami
ly + Price + Product_Brand + Product_Function + Comparability + ExpertConsultation + Ti
meSaving + DesiredTime + DistancePharmacy + DesiredLocation + Judgment + Anonymity + Ur
gency + Changes_LifeSituation + Pandemic + Influence + Recommendation + Reviews_Service
+ Reviews_Product + Affinity_Technology + Effort + Perception + Affinity_TechnologyAppl
```

```
ications
logit.modelall <- glm(modelall, data = data, family = binomial(link = 'logit'))
model1 <- Adopter ~ Age + Gender + Income + Education + LivingSituation + FriendsFamily
+ Product_Brand + Product_Function + DesiredTime + Changes_LifeSituation+ Perception
logit.model1 <- glm(model1, data = data, family = binomial(link = 'logit'))
model2 <- Adopter ~ Gender + FriendsFamily + Product_Brand + Product_Function + Desire
dTime + Changes_LifeSituation + Reviews_Service + Perception
logit.model2 <- glm(model2, data = data, family = binomial(link = 'logit'))
model3 <- Adopter ~ Gender + FriendsFamily + Product_Brand + Product_Function + TimeSav
ing + DesiredTime + Changes_LifeSituation + Perception
logit.model3 <- glm(model3, data = data, family = binomial(link = 'logit'))
model4 <- Adopter ~ Gender + FriendsFamily + Product_Brand + Product_Function + TimeSav
ing + DesiredTime + Changes_LifeSituation + Reviews_Service + Perception
logit.model4 <- glm(model4, data = data, family = binomial(link = 'logit'))
stargazer(logit.model2,logit.model3,logit.model4, type = 'text', no.space = TRUE)

#REGRESSION MODELS PROBIT
probit.model4 <- glm(model4, data = data, family = binomial(link = 'probit'))
probit.model1 <- glm(model1, data = data, family = binomial(link = 'probit'))
probit.model2 <- glm(model2, data = data, family = binomial(link = 'probit'))
probit.model3 <- glm(model3, data = data, family = binomial(link = 'probit'))
stargazer(probit.model2, probit.model3,probit.model4, type = 'text', no.space = TRUE)

#Backward selection test
model4.1 <- Adopter ~ Gender + FriendsFamily + Product_Brand + Product_Function + TimeS
aving + DesiredTime + Changes_LifeSituation + Reviews_Service
probit.model4.1 <- glm(model4.1, data = data, family = binomial(link = 'probit'))
model4.2 <- Adopter ~ Gender + FriendsFamily + Product_Brand + Product_Function + TimeS
aving + DesiredTime + Changes_LifeSituation + Perception
probit.model4.2 <- glm(model4.2, data = data, family = binomial(link = 'probit'))
model4.3 <- Adopter ~ Gender + FriendsFamily + Product_Brand + Product_Function + TimeS
aving + DesiredTime + Reviews_Service + Perception
probit.model4.3 <- glm(model4.3, data = data, family = binomial(link = 'probit'))
stargazer(probit.model4, probit.model4.1,probit.model4.2,probit.model4.3, type = 'text'
, no.space = TRUE)

#SHOWING OUTCOME LOGIT/PROBIT
stargazer(logit.model1, logit.model2,logit.model4, type = 'text', no.space = TRUE, colu
mn.labels = c('logit.model1', 'logit.model2', 'logit.model3'))
stargazer(probit.model1, probit.model2,probit.model4, type = 'text', no.space = TRUE, c
olumn.labels = c('probit.model1', 'probit.model2', 'probit.model3' ))

probitmfx(probit.model4, data = data, atmean = FALSE)
```

Subgroups - Income

```
data.income.low=data[data$Income<3]
data.income.medium=data[data$Income>2 & data$Income<4]
data.income.high=data[data$Income>3]

income.low <- glm(model4, data = data.income.low, family = binomial(link = 'probit'))

income.medium <- glm(model4, data = data.income.medium, family = binomial(link = 'probi
t'))

income.high <- glm(model4, data = data.income.high, family = binomial(link = 'probit'))

stargazer(income.low, income.medium,income.high, type = 'text', no.space = TRUE, column
.labels = c('income.low', 'income.medium', 'income.high' ))
```

```
probitmfx(income.low, data = data.income.low, atmean = FALSE)
```

Subgroups - LivingSituation

```
data.Living1=data[data$LivingSituation==1]
data.Living2=data[data$LivingSituation==2]
data.Living3=data[data$LivingSituation==3]
data.Living4=data[data$LivingSituation==4]

Living1 <- glm(model4, data = data.Living1, family = binomial(link = 'probit'))

Living2 <- glm(model4, data = data.Living2, family = binomial(link = 'probit'))

Living3 <- glm(model4, data = data.Living3, family = binomial(link = 'probit'))

Living4 <- glm(model4, data = data.Living4, family = binomial(link = 'probit'))

stargazer(Living1, Living2, Living3, Living4, type = 'text', no.space = TRUE, column.la
bels    =    c('with    partner',    'with    family',    'with    friends',    'alone'    ))

probitmfx(Living1, data = data.Living1, atmean = FALSE)
```

Subgroups - Education

```
data.education1=data[data$Education<4]
data.education2=data[data$Education==4]
data.education3=data[data$Education>4                    &                    data$Education<7]

Education1 <- glm(model4, data = data.education1, family = binomial(link = 'probit'))

Education2 <- glm(model4, data = data.education2, family = binomial(link = 'probit'))

Education3 <- glm(model4, data = data.education3, family = binomial(link = 'probit'))

stargazer(Education1, Education2, Education3, type = 'text', no.space = TRUE, column.la
bels         =         c('Education1',         'Education2',         'Education3'         ))

probitmfx(Education1, data = data.education1, atmean = FALSE)

probitmfx(Education3, data = data.education3, atmean = FALSE)
```

Predict for given variables and characteristics

```
#Adopter ~ Gender + FriendsFamily + Product_Brand + Product_Function + TimeSaving + Des
iredTime     +     Changes_LifeSituation     +     Reviews_Service     +     Perception

predictdata=data.frame(Gender=c(1,1,0,0,0,0,1,1), FriendsFamily=c(1,1,1,1,1,1,1,1), Pro
duct_Brand=c(1,2,2,7,2,1,2,7), Product_Function=c(1,2,2,7,2,1,2,7), TimeSaving=c(6,1,6,
6,1,6,6,6), DesiredTime=c(7,7,7,7,7,7,7,7), Changes_LifeSituation=c(7,7,7,7,7,7,7,7), R
eviews_Service=c(7,7,7,7,7,7,7,7),                        Perception=c(1,7,7,7,7,1,7,7))
predictadopter     <-     predict(probit.model4,predictdata,     type     =     "response")
predictadopter
```

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