



LUND UNIVERSITY
School of Economics and Management

How do potential users perceive the adoption of new technologies within the field of Artificial Intelligence and Internet-of-Things?

A revision of the UTAUT 2 model using Voice Assistants

by

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24 May 2017

Master of Science - International Marketing & Brand Management

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Abstract

The following study investigates the perception potential users have when considering the adoption of voice assistants (VAs). VAs are considered to possess characteristics linkable to both, Artificial Intelligence (AI) and the Internet-of-Things (IoT). This thesis aims to provide a deeper understanding of the determinants influencing the adoption of the new VA technology using the Unified Theory of Acceptance and Use of Technology 2 model (UTAUT 2), a theoretical model explaining technology adoption and usage behaviour. The amount of gadgets being released to the market which possess characteristics of the AI and IoT technology increases constantly, while the 2012 version of the UTAUT 2 model was not constructed for these. In a qualitative approach conducting four focus groups, the aim of this study is to find out about the perceptions of potential future users on the VA technology and as a consequence amend the current UTAUT 2 model to fit newly upcoming technologies which possess similar characteristics as VAs within the AI and IoT field.

The study found out that while hedonic motivation seems to be of inferior relevance, the determinants data security, compatibility and relationship with the device are essential influencing factors to take into consideration when trying to fully understand users' technology adoption perceptions. However, the fact that these technologies are still in the early stage of adoption make it difficult for future users, to fully judge their own adoption behaviour if they are no members of the early innovation adoption curve stages. For further research, it is recommended to look into different sampling groups and apply the model resulting from this study to new upcoming technologies within the area of AI and IoT.

Keywords: Voice Assistants, Technology Adoption, Artificial Intelligence, Internet-of-Things, UTAUT 2

Acknowledgements

This Master Thesis is the result of the degree project within the programme International Marketing and Brand Management at Lund University School of Economics and Management in the spring semester of 2017.

First of all, we would like to thank our supervisor Magnus Nilsson, senior lecturer at the department of Business Administration and CIRCLE (Centre for Innovation Research and Competence in the Learning Economy). He supported us with constructive and very detailed feedback whenever we had a question or needed support, steering us into the right direction and giving us inspiring input.

A special thanks also goes to all the focus group respondents. We really appreciated your time and are more than thankful for such constructive discussions. The gathered data served as the heart of our research.

Furthermore we would like to express our special gratitude by dedicating this Master thesis to the following people:

"Mum and Dad, I dedicate this thesis to you: Thanks so much for all your support during my last 23 years. Thanks for being there for me, your continuous support and encouragement at anytime and anywhere, day and night, close by or far away abroad. You inspired me to become the person I am today and thanks for always believing in me. Without you, these accomplishments would not have been possible. Danke!" (Sarah)

"Dear Mum, Dad and Olli, in the last year we have been through absolutely tough times as we have never witnessed it before. But due to that, we have created a bond as a family which will hold on forever. I am dedicating this thesis to you. Thank you for always being there for me and supporting me to the fullest. I am more than happy to have finished my Master's degree successfully." (Maik)

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1 Introduction

“Alexa, help us writing the master thesis.“

“I am sorry Sarah and Maik, I cannot help you with this.”

Innovation and technological developments have led to enormous possibilities in the field of Artificial Intelligence (AI) such as self-driving cars, fridges that order milk automatically when depleted (CTV News, 2017) or chatbots which can answer questions on specific products or companies. Taken together, the above mentioned examples illustrate the power of AI. It has the ability to make computers and machines perform things automatically by emulating intelligent behaviour to the extent that human beings are not needed anymore (Haugeland, 1985; Kurzweil, 1990; Schalkoff, 1990; Rich and Knight, 1991; Russell & Norvig, 2010).

The most trending and impactful technological gadgets making use of AI are personal voice assistants (VAs), which is indicated by the enormous amount of specialist articles in the field of AI as well as the development of the market (Businesswire, 2016; Kinsella, 2017). First introduced by the developer Apple with “Siri” in 2011 (Apple, 2011), voice assistants have now gained new momentum boosting voice as a channel to a potentially disruptive level. Other companies such as Google, Amazon, Microsoft and Facebook saw the development and created their own devices. Nonetheless, only Amazon and Google have released a market-ready product yet. The ‘Amazon Echo’ device was first launched in June 2015 in the United States (Seifert, 2015), whereas ‘Google Home’ was launched in November 2016 (Floemer, 2017) also in the US. The next market to adopt was the United Kingdom for both devices. Amazon Echo has been currently brought to market in Germany as well. The demand for AI-based products is growing which the research done by Consumer Intelligence Research Partners (CIRP) indicates. They estimate that 8.2 million US inhabitants have an Amazon Echo device. The number of gadgets tripled in the last 12 months and also the awareness of VAs doubled compared to last year, resulting in 82 % of the Amazon customers knowing about Amazon Echo (Lindner, 2017; Geekwire, 2017). A chapter explaining the capabilities of VAs and describing the up-to-date market can be found further below in chapter four.

Notwithstanding the immense power of technological developments and the pace at which our world strives towards a digital cosmos, one must not neglect the important role of the human being. Understanding people’s behaviours and attitudes are the crucial factor for the above mentioned industries to predict whether a technology and in particular voice assistants, will be accepted and adopted. In order to create a successful product for the market, consumers’ needs should be given high importance (von Hippel, 1986). Therefore, this study’s aim is to gain a more thorough understanding of the determinants which make future consumers adopt

gadgets in the area of AI-based and Internet-of-Things (IoT) technologies and the relationship of these to that group. The concept of IoT circles around the idea of physical everyday objects and products being connected to the internet as well as with other devices (Atzori, Iera and Morabito, 2010). Within this study, potential future users of the technology in their entirety will be referred to as ‘consumers’ while existing ‘users’ are considered being the ones who already made the purchase of a VA.

1.1 Research Gap

Previous studies have shown that the Technology Acceptance Model (TAM) has been proven to be an appropriate model to understand adoption of antecedent technologies. It has been amended since its first occurrence frequently, to match the needs of newly-upcoming technologies. From initially being TAM, it became TAM 2, TAM 3 and eventually the Unified Theory of Acceptance and Use of Technology model (UTAUT), which has been modified throughout time as well. The latest version of the UTAUT model is from 2012 established by Venkatesh, Thong and Xu. Since then, it has not been amended and applied to different contexts in order to identify the factors that determine customer acceptance (Pantano & Servidio, 2012; Tsai, Lee, & Wu, 2010). Nevertheless, several authors suggest that it should be examined in further contexts getting related to newer technologies. Huang and Liao (2014) recommend the following avenue for further investigation: “For replication, future studies can use the research model in this study to test consumers’ experiences with other interactive technology“. Consequently, this research takes a consumer-oriented focus to explore the factors for adoption in the context of artificial intelligence-based voice assistants. An AI-based VA is a novel technology which has been introduced to the market just recently. Within the technology adoption literature, it has not been studied which factors influence future users’ behaviour towards adopting to AI and IoT technologies. Therefore, this study seeks to extend the understanding of consumers’ perception towards adopting to such technologies by examining two underexplored aspects. First, technology adoption models such as TAM or UTAUT have been amended on a regular basis. However, since 2012 the UTAUT 2 consists of the same determinants and has not been further developed. Second, in the last two to three years, an increasing amount of technological gadgets with AI and IoT characteristics has been brought to the market. This raises the question whether the UTAUT 2 model can still be applied to this new arising context and whether the understanding of adoption of such technologies is still sufficient. Moorthy and Vu (2014) explained the relevance for further research especially within the field of VAs as the voice will be the method to control actions or interfaces such as smartphones. To them, it is critical to understand the factors that determine the acceptance of such a technology.

The UTAUT 2 model consists of different determinants, which influence the overall user adoption of certain technologies. Since individual traits and psychological factors may influence technology adoption, Kim & Shin (2015) and Pramatarari & Theotokis (2009)

propose that future research should examine the role of these factors in the value co-creation for IoT. As VAs can be seen as one application within IoT, it is worth investigating the UTAUT determining factors further. This research aims to explore the factors for technology adoption and get a more thorough understanding. Regarding the field of IoT Technology in which the voice assistants are located, the authors Evanschitzky, Iyer, Pillai, Kenning and Schütte (2015) state that further research needs to be done in order to understand the factors that determine the acceptance of IoT Technology.

Concerning the later research method used, Balaji and Roy (2017) already suggested at the end of their own study that future research could use focus groups and other qualitative strategies to identify additional factors that influence consumer value co-creation.

Summed up, several authors have made it clear that there is a need to examine recent areas in the literature of technology adoption, and especially in the AI and IoT context, further. Simultaneously there is a need to further amend the UTAUT model or at least investigate to what extent all its components are relevant to be applied to newly-upcoming technologies. For that reason, a qualitative research method, respectively focus groups, will be used. As most previous research has only used quantitative investigation, they lack the ability to fully draw a picture of the reasoning and perception of potential users regarding their technology adoption and more specifically the way the role the several determinants play in their behaviour. As it was elaborated already and also will again, further below in the user literature stream, the perspective of potential users is of high importance within technology adoption. Focus groups present therefore the opportunity to understand different potential user perspectives in detail as well as they present the opportunity to raise further important points coming out of a discussion with various participants which could form additional determinants. Achieving these sort of fruitful results can hardly be achieved with any other research method.

On this basis, the following research question will build the foundation of this thesis:
How do potential users perceive the adoption of new technologies within the field of AI and IoT? Furthermore, the study intends to answer the subquestions of how the UTAUT 2 model is applicable within that context and which determinants would be needed to get a full understanding of users' adoption towards VAs.

1.2 Purpose and Contribution

As a framework for the research in order to detect the most relevant criteria of adopting technological innovations, voice assistants particularly, the researchers base this study on the most current version of the UTAUT model as departure: The UTAUT 2 (Venkatesh, Thong, Xu, 2012). The purpose of this thesis is to explore the determinants for technology adoption within the model more thoroughly by using a qualitative approach. This paper investigates deeper how these determinants are perceived, in which way they are relevant for the potential

user and whether even new determinants have to be added to the model. On that account, concepts from other management literature will be accessed. The researchers intend to advance the body of knowledge on the subject of technology adoption by applying this model to the relevant and contemporary context of AI. In the following, the theoretical, as well as the practical contributions of this thesis, will be stated.

Theoretical contribution:

As previously mentioned, a substantive amount of articles has spotted certain gaps as well as depicted opportunities for further research within the area of AI and the UTAUT model using focus groups. This thesis will provide a basis for future VAs as well as newly upcoming technologies in the field of AI and IoT literature streams to build on. Furthermore, the relevance of the UTAUT 2 model components will be examined for technologies in the year 2017 plus. It will be looked at if the adoption behaviour of VAs differs from those of previous technologies this model has been applied to. If found to be redundant, the model will be amended, determinants removed or added by extending it in respect to VA technology adoption by adding further relevant determinants. Up until here, research has already investigated certain determinants of the UTAUT 2 model. Nevertheless, this has never been done in the same qualitative approach presented, linking it to the role of the user which will help to fully understand the determinants and go deeper into already existing research.

Practical contribution:

The practical contribution of this thesis is two-sided: Finding out about the factors which influence potential future users most in their adoption of the VA will on the one hand help manufacturing companies and on the other hand the marketers.

As the VA gadgets are still quite new, only very few companies have released their own version of a VA gadget so far. Additionally, for companies who already released a VA gadget, it is likely that they will release a newer, updated edition once the first one has become outdated, but also to keep up in the game. The new VAs will have different or amended, maybe some even better skills compared to those already in the market. As a consequence of this study, the manufacturing companies of the VAs will know what factors potential users perceive relevant and valuable in the usage of VA or what features they miss which hold them back from properly adopting the technology. In order to add any missing new skills to the existing technology skills of the gadgets, they will offer VA which are better equipped for fulfilling user expectations. This will both alter the sales of VA in general but will also provide the manufacturing companies who adopt that change of VA skillset quickest with a competitive advantage in regards to their competitors who do not perform that change of hardware/software within the VA gadgets.

The marketers, in contrast, will learn what factors users who do not own a VA and use its technology yet perceive in what way just as well how they will learn about what factors will alter their chances of purchase. Having gained that knowledge, they will be able to amend

their marketing strategy of the VA gadgets accordingly. Highlighting the aspects of the gadgets that potential users truly value when considering a purchase or educating them to remove potential doubts, they will alter the chances of potential future users purchasing and therefore increase their return on investment within advertising costs.

1.3 Outline

This thesis is structured as follows: First, the theoretical framework, namely the UTAUT 2, is introduced and reviewed as well as research related to the role of potential users in technology adoption. Second, a chapter describing the research design and the methodological approach follows. Third, one chapter deals with voice assistants and the market. Fourth, the findings are presented and discussed. Last, a conclusion chapter sums up the findings.

2 Literature Review

This Literature Review consists of two streams. First of all, the UTAUT 2 model and its historical development and its determinants will be introduced as well as industries to which several technology acceptance models have been applied to, will be elaborated. After that, potential additional determinants to be added to the UTAUT 2 model will be introduced. Following their introduction, the role of the potential user within the adoption and acceptance process and why this perspective is essential when looking at the adoption of the VA technology in the area of AI and IoT will be investigated as part of a second literature stream. The chapter ends with the presentation of the theoretical framework used for this research.

2.1 Technology Adoption

The phenomenon of technology adoption has been studied for a long time - ever since Rogers (2003) introduced his curve of innovation adoption. He puts adopters into different categories, depending on their characteristics and the time they need to adopt a new idea, the importance of understanding how technology diffuses as well as how it gets accepted by individuals has been discussed by several authors. Rogers' model will be explained more in detail under point 2.2. As a theoretical framework for this master thesis, the UTAUT 2 (Venkatesh, Thong, Xu, 2012) will be used to better explain users' adoption of voice assistants. The next chapter illustrates the development of the model.

2.1.1 UTAUT 2 – Historical Development

One of the first models to better understand people's acceptance of certain technologies is the

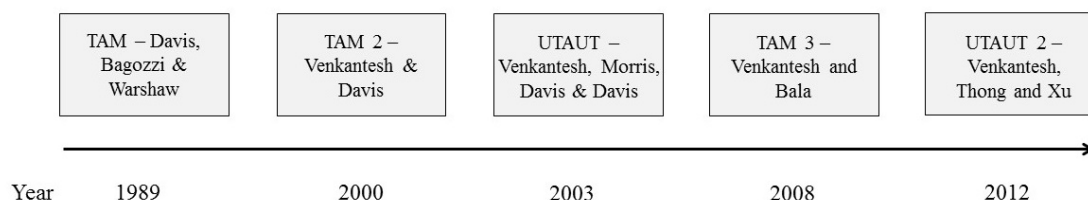


Figure 1 Historical development of technology adoption models

technology acceptance model (TAM). It was introduced in the field of information systems to better predict employees' ability to adopt computer-based technology in an organisational context. TAM's purpose is often described as to predict and also explain why a technology is more likely to be accepted or not (Davis, Bagozzi & Warshaw, 1989). For that reason, the model consists of fundamental determinants. Primarily relevant are on the one hand the perceived usefulness, the degree to which a person believes that using a particular system would enhance his or her job performance (Davis, 1993). On the other hand, the perceived ease of use is defined as "the degree to which the prospective user expects the target system to be free of effort" (Davis et al., 1989, p.985). Both of these factors influence the attitude towards using technology, which influences the behavioural intention to use technology and thus the actual use of the technology. Within this thesis, they will be considered as one common determinant. Reasons for that will be elaborated at a later point.

Other researchers in the development of technology adoption agree with the TAM being an appropriate and well-established model to predict behavioural intention to use certain computer-based technologies (Mathieson, 1991; Venkatesh and Davis, 2000). However, it has been amended and developed throughout the years, which is illustrated in figure 1. Venkatesh and Davis (2000) extended the model by adding social influence processes (subjective norm, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use) resulting in the TAM 2. Venkatesh and Bala (2008) even presented the TAM 3 integrating a collection of pre- and post-implementation interventions which affect the determinants of technology adoption. Other research in the user acceptance literature has brought up a variety of different models. Eight prominent models (Theory of Reasoned Action (TRA), TAM, motivational model, Theory of Planned Behaviour (TPB), combined TAM and TPB, model of PC utilisation, innovation diffusion theory, social cognitive theory) have been comprehensively examined and compared yielding in a unified model which is called Unified Theory of Acceptance and Use of Technology (figure 2) established by Venkatesh, Morris, Davis and Davis (2003).

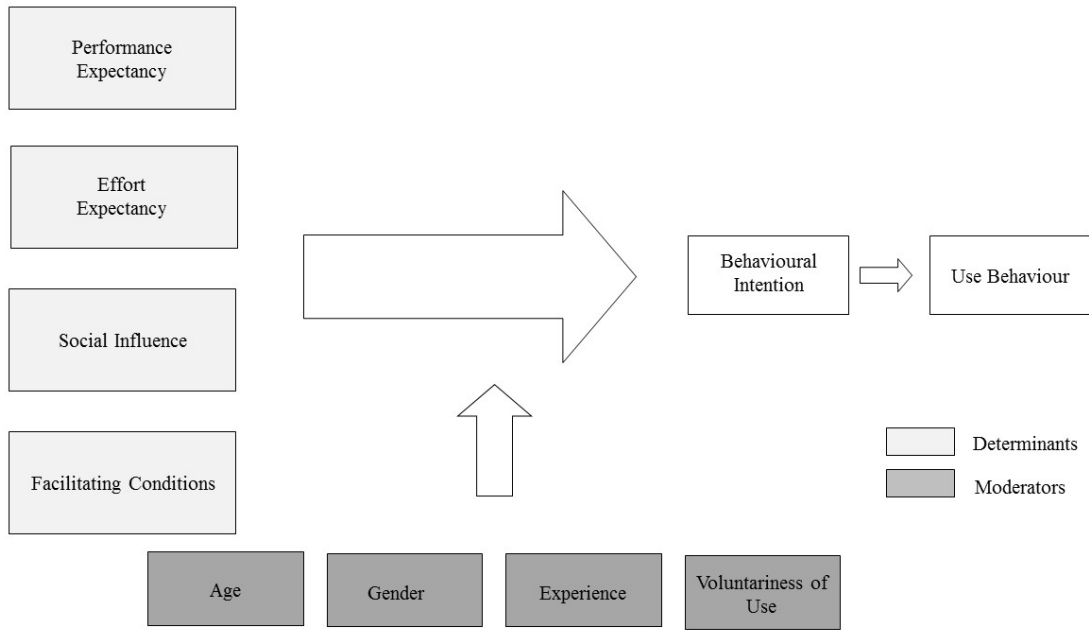


Figure 2 UTAUT based on Venkatesh et al. (2003)

The UTAUT model encompasses four different determinants stimulating the behavioural intention and use behaviour: performance expectancy, effort expectancy, social influence and facilitating conditions. Furthermore, the model presumes the role of four significant key moderators such as gender, age, voluntariness, and experience. With their work, the authors set a new milestone for the research on individual acceptance of the technology. This model has been shown to explain as much as 70 percent of the variance in behavioural intention to use technology and about 50 percent of the variance in the usage of technology (Venkatesh, Thong, Xu, 2012). Notwithstanding the explanatory power of this model, the researchers suggest that future research can add to the prediction of intention and behaviour to adopt the technology by identifying new constructs. Consequently, Venkatesh, Thong and Xu (2012) propose the UTAUT 2 (figure 3). It incorporates three constructs into UTAUT and leaves out the moderator ‘voluntariness of use’, which has been necessary to make the UTAUT applicable to the context of voluntary behaviour. The three new constructs are hedonic motivation, price value and habit which are eventually confirmed as important determinants for predicting technology adoption. Furthermore, the objective of extending the UTAUT theory was to draw the attention to the technology use context. This user acceptance-driven approach as well as the fact that UTAUT 2 is the most current model for technology adoption justify applying this theory to the context of the adoption of VAs.

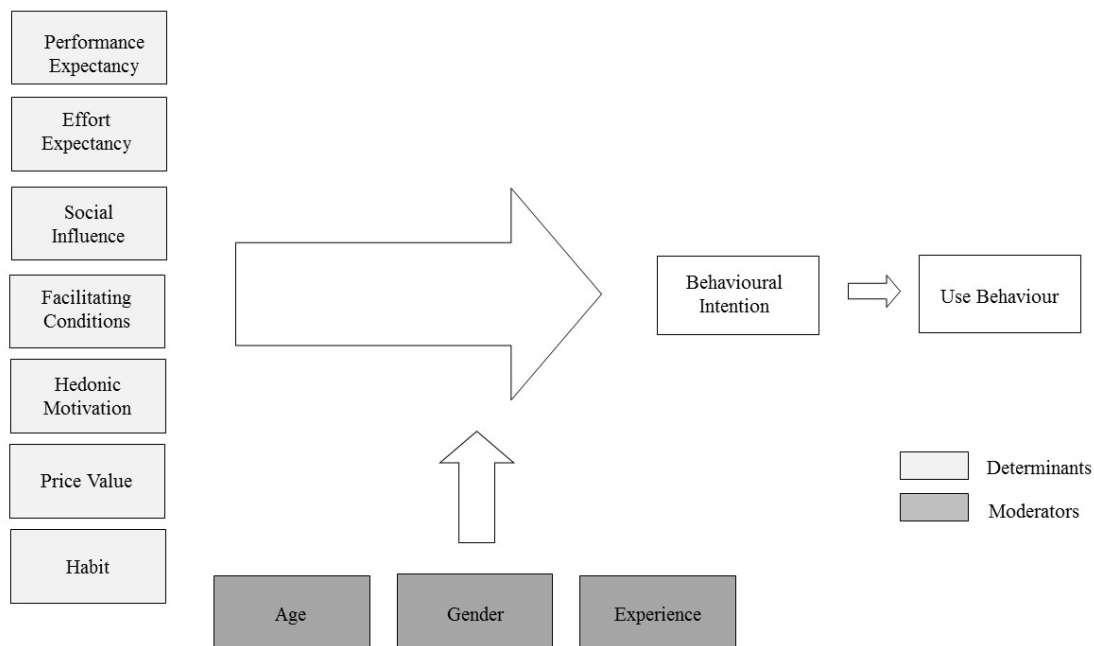


Figure 3 UTAUT 2 based on Venkatesh et al. (2012)

2.1.2 Determinants

The goal of the UTAUT2 is to predict the behavioural intention to use a technology. All determinants in the previous UTAUT model (2003) emerge from eight other previous models such as TAM, TPB, TRA etcetera. This means that the process to get to those respective determinants was done thoroughly and included a substantial amount of research over time by several authors. Furthermore, the determinants considered as influencing for each model evolved over time - both to fit specific contexts, such as for example an amended version of the model for the adoption of household technologies (Venkatesh & Brown, 2001) but as well to suit new technologies that emerged. As already mentioned, the UTAUT 2 model includes seven determinants, three moderators and the factors behavioural intention and use behaviour.

The determinants affecting the adoption of technology of voice assistants will be assessed further below regarding their elaboration for their right to exist and also link them to further literature which could become of use in supporting the understanding of why and how users consider adoption to voice assistants:

Performance Expectancy

Performance Expectancy is described as “the degree to which using a technology will provide benefits to consumers in performing certain activities” (Venkatesh, Thong & Xu, 2012, p.159).

Venkatesh et al. (2012) describe Performance Expectancy as one out of four key pillars of the initial UTAUT. They claim that Performance Expectancy “influences the behavioural intention to use a technology” (p.159). Already in the year 2003, Venkatesh, Morris, Davis and Davis had claimed that Performance Expectancy was the most powerful determinant when foreseeing behavioural aims. Additionally, they claimed that it is in near distance to utility. After researching a variety of diverse models, they state that five frames can be found under the term Performance Expectancy: Perceived usefulness, extrinsic motivation, job-fit, relative advantage and outcome expectations. Each of these frames forms substantial parts of amended/related forms of the UTAUT2 model such as TAM, TAM2 & C-TAM-TPB (perceived usefulness), MM (extrinsic motivation), MPCU (job-fit), IDT (relative advantage) and SCT (outcome expectations).

In addition, it has to be added that, depending on where users find themselves within Rogers’ adoption curve (Rogers, 2003), they have different expectations regarding the performance of a gadget. While the so-called ‘lead users’, which lead trends in terms of experience and intensity of need (von Hippel, 1986) know a lot about what for example, technology gadgets can, could or should do, other users are not as aware of these technical specificities and therefore do not have as high but maybe rather modest performance expectations. When connecting Ulwick (2002) with von Hippel, it can be seen that he puts restrictions on this lead user approach. Concerning really new technologies, asking consumers for their desired features and abilities within the innovation process is suboptimal as they are limited to functions and abilities, within the developed innovation, they already know. To sum it up, this means that different groups of people might have different levels of expectations on a voice assistant but involving them in the development process in order to find out what features they really want and how they would use it could be hard, as most of them lack the ability to think outside the box of things they previously experienced.

When it comes to companies who manufacture VA, fulfilling actual performance expectations of the users and potential users seems a lot more important than simply being the first one to offer a VA gadget to the market, which might not fulfil most user expectations. As several companies offer voice assistants and them, as well as others, keep developing them and their features, the question arises who will be the one succeeding in the market and go out of the gadget battle as a winner. Within the study of Kim and Mauborgne (1997), a highly important remark regarding this can be found. They state that “value innovation is about offering unprecedented value” and that it does not mean “being first to the market” (Kim & Mauborgne, 1997, p.110). That means that companies who are in the battle right now or about to enter are not likely to win only because they are the first in there. This would mean that if they focus on achieving maximum consumer satisfaction with their offered product, once it is released to the market, they would have far higher chances of succeeding to get it adopted in the entire market because that product would fulfil potential performance expectancies better. The better they fulfil the performance expectations of consumers, the more likely they are to be preferred by them over other companies.

Effort Expectancy

Effort Expectancy is introduced by Venkatesh et al. (2012) as “the degree of ease associated with consumers’ use of technology” (p.159).

As Performance Expectancy, Effort Expectancy can be found along with two more fundamental columns within the UTAUT predicting the indicators which influence the behavioural motives to handle and need a technology (Venkatesh et al., 2012). They state that consumers take time and effort into consideration for forming a view of the overall effort for accepting and using of technology. This means, before deciding to buy or use a technology, consumers take their time to evaluate what the effort required to accept and use a technology would actually imply. Based on that evaluation, their likelihood to adopt to the technology either increased or decreased. This would mean that two factors play a role within this: How high they evaluate the effort and whether they judge it to be aligned with the benefits they would gain from accepting and using such a technology.

Huang and Liao (2014) consider divergent factors as important for consumers when building relationships with certain technologies meaning they looked at how consumers can be encouraged to use a technology or make them continue using it. The factors they consider important regarding their potential usage or adoption of technology depends on their relative level of cognitive innovativeness. Consumer innovativeness is described as the degree of curiosity consumers have towards trying out new things and change in general (Cotte & Wood, 2004). This “willingness to change” is considered by Park, Yu and Zhou (2010) as a personality trait. Consumers with a high level of cognitive innovativeness focus more on the outcome of using a gadget according to Huang and Liao. They seem to find arousal in discovering new gadgets (Hirschmann, 1984; Zarandi & Lotfizadeh, 2016). Huang and Liao (2014) state that consumers with a low level of cognitive innovativeness, in contrast, focus more on the effort/ ease of use and the “playfulness” of the technology. The level of cognitive innovativeness influences both the frequency how interactive technologies are used and how sustainable their relationship towards the technology is. The different levels of cognitive innovativeness also help to differentiate early adopters and general consumers according to Manning, Bearden and Madden (1995). As a consequence of their quantitative online study amongst Taiwanese undergraduate and graduate students, Huang and Liao extended the TAM model to find out about company’s and individual’s adoption of latest technologies.

Nguyen, Nguyen, Pham and Misra (2014) look at previous models stating that these existing models link effort expectancy mainly to three constructs naming perceived ease of use (TAM/TAM2) (Davis; 1989), complexity (MPCU) (Thompson et al. 1991), and ease of use (IDT) (Moore and Benbasat, 1991) as constructs of that determinant.

Social Influence

Social Influence is described as “the extent to which consumers perceive that important others (e.g. family and friends) believe they should use a particular technology” (Venkatesh et al., 2012, p.159).

Apart from being one of the key pillars of the initial UTAUT model influencing the behaviour of people to use a technology (Venkatesh et al., 2012), the social influence determinant indicates the following: Whether one’s likelihood to adopt to a technology is influenced in any way and if so, how much, depending on what or if friends, family or other sorts of relationships say or share about themselves using a certain technology.

Peres, Muller and Mahajan (2010) bring up two components within social influence besides word-of-mouth: Network externalities and social signals.

First, network externalities signify that the utility of a product increases, the more consumers adopt the product. Second, social signals originate in the wish of individuals to either differentiate themselves or their status from others or to show that they belong to a certain group by demonstrating their group identity through owning and using a certain innovative good. This means that the adoption depends on the information people get from others as well as how they want to be perceived by them, transmitting social signals. relate to the social information that individuals infer from the adoption of an innovation by others. Social signals are said to operate vertically, meaning status related and horizontally, relating to group identity and belonging.

Concerning word-of-mouth, Peres, Muller and Mahajan (2010) state that further research could investigate how marketers could enhance their ability to influence people’s word-of-mouth process. In order to approach this, they talk about the “ripple-effect” - an indicator which shows how many others one person influences. This could using network externalities and social signals, help to more quickly diffuse, meaning spreading an innovation in a market.

Facilitating Conditions

Facilitating conditions “refers to consumers’ perceptions of the resources and support available to perform a behaviour” (e.g., Brown and Venkatesh 2005; Venkatesh et al., 2012, p.159). Facilitating conditions are, as the previously mentioned determinants, one out of the four initial fundamental indicators of the initial UTAUT (Venkatesh et al., 2012). They regulate both behavioural intention and the usage of technology. This means that facilitating conditions say something about what consumers or potential future users need in order to adopt a technology, what factors/resources have to be given or even what help they need in order to properly use or consider using a new gadget.

Hedonic Motivation

Hedonic Motivation is described as “the fun or pleasure derived from using a technology” (Venkatesh et al., 2012, p.161).

Holbrook and Hirschman (1982) already stated that hedonic motivation is a key prognosticator within consumer behaviour. Additionally, it is very common to use it within the context of consumer technology usage (Brown and Venkatesh 2005; Venkatesh et al., 2012). The fun or pleasure aspect is a crucial part when evaluating the acceptance of technology and its use (Brown and Venkatesh, 2005; Childers, Carr, Peck & Carson. 2001). Van der Heijden (2004) as well as Thong, Hong and Tam (2006) second that finding claiming that these aspects have a direct influence on the acceptance of a technology. To sum it up, various authors found out, that the higher the fun or pleasure expected from the usage of a technology, the more likely consumers are to accept it, which means to buy and use it.

Price Value

Price Value can be described as the consumers’ trade-off between the perceived benefits of the applications and the monetary cost for using them (Dodds, Monroe & Grewal, 1991). Due to the authors Lord, Powers and Seongwon (2016) means, that monetary price reveals, how much consumers are willing to relinquish in order to possess a good or service. Within the field of marketing research, the monetary price is closely linked and often portrayed together with the quality of products and services. This pairing up is supposed to help evaluate what the perceived value of these goods or services is (Zeithaml, 1988). Within price conceptions, perceived price and objective price (the actual price on the price tag) are two different things. Zeithaml emphasises this by saying that two consumers might interpret and perceive a price for one good entirely differently. Perceived price indicates how a customer perceives and senses about the value of a specific service or good. Whether he buys or not depends on whether he considers the benefit or sacrifice higher when making a purchasing decision. Monetary price contrastingly by Zeithaml hints to “questions such as whether the service was a good buy, worth the money, fairly priced, reasonably priced, economical or appears to be a good bargain“. This makes the price, in general, to be one of the most important aspects when looking at how consumers perceive the value of a certain good. Price can be considered an essential forming factor within value perception.

Habit

Habit is phrased by Limayem, Hirt and Cheung (2007) as “the extent to which people tend to perform behaviours automatically because of learning” (p.709) while Kim, Malhotra, and Narasimhan (2005) equate habit with automaticity (Venkatesh et al., 2012). When not only looking at initial acceptance but also at the willingness to start using and integrating a technology into one’s daily life, habit has proven to be a pivotal aspect to predict such a technology use (e.g. Kim and Malhotra 2005; Kim et al. 2005; Limayem et al. 2007) (Venkatesh et al 2012). At the same time, habit is highly influenced by previous experience

consumers have with either that gadget or other technology gadgets. Kim and Malhotra (2005) claim that antecedent usage is a powerful indicator for forthcoming use of a technology. This would mean two things for VA: If the consumer already had many technical gadgets integrated into their daily life, their likelihood to integrate a VA into their daily grind would alter. Secondly, if they have the chance to experience a VA in any form prior to purchase, the probability that they would actually buy and use the gadget regularly will increase.

Moderators

In the following, the three moderators within the UTAUT 2 model will be briefly described. According to Venkatesh et al. (2003), they affect the relationship between the determinants and the behavioural intention. Moderators seek to enhance the model's explanatory power. Moreover, these moderators have the ability to tackle the heterogeneity noticed in previous observations.

Concerning **age**, Kopanicova and Klepochova (2016) claim that innovativeness of consumers largely depends on their age. The older consumers get, the less likely they are to find themselves amongst the group of early adopters. Instead, the number of laggards rises with age. In general, the majority of younger people adopt new technologies more rapidly than mature or senior citizens which do it comparably later.

Looking at **gender**, Kotzé, Anderson and Summerfield (2016) claim to have found out that women are more pessimistic when it comes to technology adoption compared to men. Reasons for this are that they are more risk-averse and think more about each purchase decision (higher cognitive-awareness) than their male counterparts do. The authors state that could their perceived level of risk be amended, that this would have the highest influence on their purchase decision.

Experience was defined by previous authors as “conceptualized in prior research (e.g. Kim and Malhotra 2005; Venkatesh et al. 2003) and “reflects an opportunity to use a target technology and is typically operationalized as the passage of time from the initial use of a technology by an individual” (Venkatesh, 2012, p.161).

2.1.3 Previous Studies – Industries the Model has been applied to

As previously mentioned, the UTAUT 2 model emerged out of the development of several previous models, amongst others the Technology Acceptance Model (TAM). Over time, the several models and their revised versions were applied by different authors to understand present technologies and the consumer acceptance behaviour related to these. Some articles mainly tried to look at how the models' different determinants looked like within the context of a specific technology. Other authors took specifically one, two or more determinants to prove their validity for newer technologies. This is also, when the models started to develop,

when out of TAM, TAM 2 and TAM 3, out of UTAUT the UTAUT 2 model emerged. These new models were created on the basis that previous authors, when trying to fit the technology acceptance for their individual technology to current models, found out that for more recent technologies some determinants were either redundant or even missing. In the following, some of these industry examples will be introduced to show in what way the different models have been applied and what led to their amendments.

In the year 2010, the authors Högg, Schmid and Stanoevska-Slabeva (2010) investigated with the help of a mix of online surveys, interviews and focus groups, how technology acceptance models can be extended and evaluated looking at mobile data providers. Within their research, they examine the applicability of several technology acceptance theories and models with respect to mobile data providers. Using different models, they show the occurring transition taking place from voice based services to data based services. Högg, Schmid and Stanoevska-Slabeva look at the Theory of Reasoning Action, the Theory of Planning Action, the Technology Acceptance Model, its TAM extension with the factor Social Influence, TAM 2 and the UTAUT. The achieved results from their study get compared eventually. This study is one example proving that one single model might not always fit and that for some purposes, there might be a need for it to be amended.

Another study, in contrast, evaluated the different determinants of the TAM model looking at how relevant they are compared to each other using questionnaires and interviews. In “Customer Behaviour regarding Legal Music Downloads”, Schwenkert and Scheuch (2006) investigate the selection behaviour, quality evaluation and customer relationship building within the buying behaviour of legal music downloads. The authors use the TAM model to examine how the consumer purchase behaviour changed from buying physical CDs, tapes etcetera to using music downloading shops (MDLS). Using that model, they look at providers such as iTunes, MyCoke Music and MSN Music. These are chosen thanks to their strong revenues and growing number of users back then. The main goal of their study is to determine which factors most influenced the transition of the customer purchase behaviour and to gain an understanding about which indicators show a high likelihood to show loyalty and stick to one of the aforementioned providers.

A third study mainly concerning the extension of the TAM model is called “Consumer e-commerce - Extending the TAM and task-technology fit model” (Klopping and McKinney, 2004) Within the study, the authors try to find different explanatory approaches to describe the demand behaviour of customers behind online shopping through a quantitative questionnaire distributed to 429 undergraduate students. In order to illustrate and explain that decision behaviour behind demand, they use the TAM. As a conclusion, they find out that the linkages done in the TAM between perceived ease of use and perceived usefulness do not actually apply but that instead, perceived usefulness is linkable to actual use. Additionally, they claim that the task-technology-fit model could be seen as a beneficial enlargement of the classical TAM model when looking at online purchasing behaviour.

Concerning the UTAUT model, Thong (2016) in “Internet Shopping behaviour with evidence from Vietnam and Taiwan” investigates through “electronic and manual methods” the individual factors which influence the acceptance of online shopping technologies in Vietnam and Taiwan, two countries with different levels of internet penetration getting 720 responses in total. In doing so, the UTAUT model is used and extended by the two variables: Hedonic value and Utilitarian value. These two variables are considered as highly important mediating variables. The results of the study are considered specifically relevant for marketers who want to target the optimal online shopping markets. This shows that for some context, additions to popular models are necessary.

As within this thesis, the UTAUT 2 model will be used as a basis for analysis. Some examples and suggestions for the model amendment and extensions made in relevant published studies since its release in 2012 are described in the following:

Lu (2016), within his quantitative study about the consumer behavioural intention for using mobile payment services, extended the UTAUT 2 model adding the determinants perceived risk and trust. These were found to have a substantial influence on using mobile payments. By adding these two determinants to the model, the authors claim that the new model with these two added variables could be seen as a foundation for future research and as a way to enhance it.

Within another study, Che-Pei (2013) investigates the “similarity and singularity between smartphone and tablet PC”. Using an online survey with a sample mix of 670 PC and smartphone users (half and half), asking them to assess nine factors in total, related to mobile device user acceptance and analyses the results in SPSS afterwards. He finds out that not the same out of the seven determinants have an influence on the Behavioural Intention and Use Behaviour the seven determinants have an influence on the decision to choose one or the other device. They also confirm, just as Ting-WeiChen (2016) did, that the moderators (age, experience and gender) do not seem to have substantial impact on the determinants.

In a quantitative study within the tourism industry from the year 2017 on the “adoption of social networks sites for sharing user-generated content” (Herrero, San Martín & Garcia-De los Salmones, 2017), the authors amend the UTAUT 2 model as a consequence of their conducted study to replace one of the determinants, the price value, by privacy concerns. This is done, after questioning the 537 tourists, which were chosen as a sample, as the social media sites don’t require physical money payment but instead might pose problems with revealing too much personal data. The model was amended to suit the new context better. This study additionally backs up the connections between “explanatory variables”.

To sum this industry example chapter up, it can be seen that various authors during time have used existing models within the technology acceptance area and either amended, extended, ranked the relevance of their determinants or combined them. Since the newest release of the UTAUT 2 model 2012, quite a few authors have realised that even this newest version of the UTAUT model not always suits the needs of researchers. Therefore, they started to apply

these same processes also to this model. At the same time, current research offers no reflection yet on newer technologies such as voice assistants and additional assistants surrounding intelligent housing technology steering or technology involving Artificial Intelligence. At the same time, many authors mention that models such as the UTAUT 2 need further investigation, either concerning existing variables, their relationships or in general. The aim of this thesis will be to examine the relevance of the existing determinants for potential users within the field of AI and IoT, but also to amend and extend the UTAUT 2 model for future technology acceptance research if considered necessary.

2.1.4 Additional Determinants

After conducting the focus groups and the literature research, six additional influencing determinants have been identified, which seem to be somewhat relevant when looking at the adoption of new technologies within the field of AI and IoT. As neither of them can be placed in an optimal way under the already existing determinants, they need to be considered as separate, additional determinants for the process of the research. Therefore, it is necessary to explore the research done on data security, compatibility and the relationship with certain devices, brand, design as well as the element of self-representation in regards to VAs to get a more thorough understanding of consumer's technology adoption. Within the discussion part of this thesis, it will be further elaborated which of these additional determinants will end up being added to UTAUT 2 model as a consequence of the contribution of this thesis.

Data Security

Even though data collection and the use of consumer data is a very promising technique for firms' marketing purposes (McAfee and Brynjolfsson, 2012), Martin, Borah and Palmatier (2017) argue that companies know too little about the negative outcomes that can result in poor data management. Data security is a really sensitive topic. Thus they suggest firms to use a more tempered approach towards customers' data showing transparency and control over the gathered information. This will then lead to suppressing negative reactions and to creating a higher trust (Martin, Borah & Palmatier, 2017).

With regards to mobile payments, Duane, O'Reilly and Andreev (2014) state that security concerns can become an obstacle for technology adoption. It involves sensitive and personal data. Thus, Oliviera, Thomas, Baptista and Campos (2016) noticed the relevance for data security as a possible determinant for technology adoption. They added perceived technology security to their extension of the UTAUT 2 model. Furthermore, other studies follow the same path concluding that data security concerns can be a barrier for adopting to technology in which monetary information is managed (Salisbury, Pearson, & Miller, 2001; Cheng, Lam, & Yeung, 2006; Pavlou, Liang & Xue, 2007).

Compatibility

Compatibility has been linked to technology adoption. Kuo and Yen (2009) identified compatibility as a direct predictor of the behavioral intention to adopt a new technology, underpinning performance expectancy and effort expectancy.

From the consumer perspective, there is a dilemma that consumers are so dependable on firms' offers. High switching costs and network effects lead to locking in the consumers to certain providers (Farrell and Klemperer, 2007). With regards to compatibility, switching costs are considered to be the negative costs occurring from having to switch to other brands. Network effects occur when a user wants his purchased technology to be connected to others for interaction reasons. Farrell and Klemperer (2007) even argue that firms intentionally look for incompatibility too often, thus they favour a pro-compatibility public policy.

Another aspect worth to be mentioned is the prospering body of literature on Internet of things. The whole idea of IoT circles around connected devices. This can be seen as an indicator showing the relevance of connectivity in the technology adoption context.

Relationship with device

This determinant is closely linked to the phenomenon of Artificial Intelligence. Stanford professor Jerry Kaplan sums up what many researchers in the field of AI have pointed out as a risk. Intelligent machines could eventually become smarter than human beings, for example, resulting in machines taking over their jobs. Influential scientist Stephen Hawking goes even so far as to say that AI could kill humankind (Cellan-Jones, 2016). Minsky (2007) confirms the idea of humans and machines being possibly on the same level. He argues that we are able to build machines which can think like humans and are as conscious as humans. The effects of the relationship between intelligent machines and human beings on technology adoption, however, have not been researched to the authors best knowledge.

Brand

From previous research, it can be found that there have been interconnections between certain brands and consumers' adoption towards a technology. Cantor and Nozell (2016) argue that early adopters need a compelling reason to incorporate technology into their daily lives. The likelihood of achieving this for companies is to give the technologies brand names that give a more comforting and even human-like feeling such as "Alexa". Ismail (2012) researched consumer's adoption towards a brand technology, namely the Apple iPhone. His results indicate a presence of a significant relationship between a consumer's perception of the relative advantages of Apple iPhone and the adoption intention.

Regarding brand communities, Thompson and Sinha (2008) found that high involvement in brand communities leads not only to a higher likelihood of adopting a new product from the

preferred brand but also to a decreasing likelihood of adopting new products from opposing brands.

Design

Rindova and Petkova (2007) point out the importance of aesthetics of novel technologies. They argue that when designing a new product, firms can portray the product as a meaningful object with symbolic and aesthetic properties resulting in positive psychological effects in the consumer's' perception of the new technology. Complementing this, several authors confirm that design plays a significant role when developing new products (e.g. Verganti, 2009; D'Ippolito, Miozzo, & Consoli, 2014; Moultrie & Livesey, 2014).

Nowadays, design seems to become more and more important as for example Swiss entrepreneur and designer Yves Behar (2015) illustrates by saying that design can really drive technology adoption. However, how design influences consumers' adoption towards new technologies has not been carried out in a sufficient enough study yet.

Self-Representation

Self-Representation as a concept itself has been researched from several angles. Rettberg (2017), for example studied three modes of self-representation in social media. In addition to this, Mallan (2009) looked at how young adults present themselves and interact with friends and others in online-communities.

Interestingly, with regards to VAs, Ivanic and Camps (2001) argue that the voice as channel can be used as a method of self-representation. Whether human beings use different kinds of technologies to impress others or enhance the way of presenting themselves and whether this has an influence for their adoption behaviour has not been researched though.

2.2 The role of the user in technology adoption

When looking at technology adoption, most previous studies only do quantitative investigations. Nevertheless, in order to understand the thinking and reasoning, the consumer behaviour behind their decision-making process, is crucial to look at technology adoption from a consumer behaviour perspective. The approach within this is qualitative. Von Hippel (1986) already stated that in order to make a product be successful in the market, the user needs to be understood and are of high importance when developing it. In the following literature stream, the consumer behaviour perspective concerning technology adoption will be looked at more in detail. First of all, it will be elaborated why looking at technology adoption from that perspective is essential. Afterwards, reasons will be brought up, why previous new technologies which were considered promising, failed and did not make a breakthrough

because of the way they were perceived by consumers. This literature stream will help to understand more in detail, why the following qualitative research will be done the way it is and how and why it is essential to look at the UTAUT 2 model from a consumer behaviour perspective.

Most research and strategies within the field of Information and Communication Technologies (ICT) focus on a market's most innovative consumers such as early adopters and innovators (Verdegem & De Marez, 2011). The early innovators, however, only account for two to three percent of the entire consumer population (Rogers, 2003). The idea of innovators, early adopters, early and late majority and laggards is based on Rogers' bell-shaped adoption curve: The technology adoption life cycle. This cycle describes the adoption of an entire population based on different groups, which are distinguished by demographic or psychological factors. It shows the adoption over time as well as

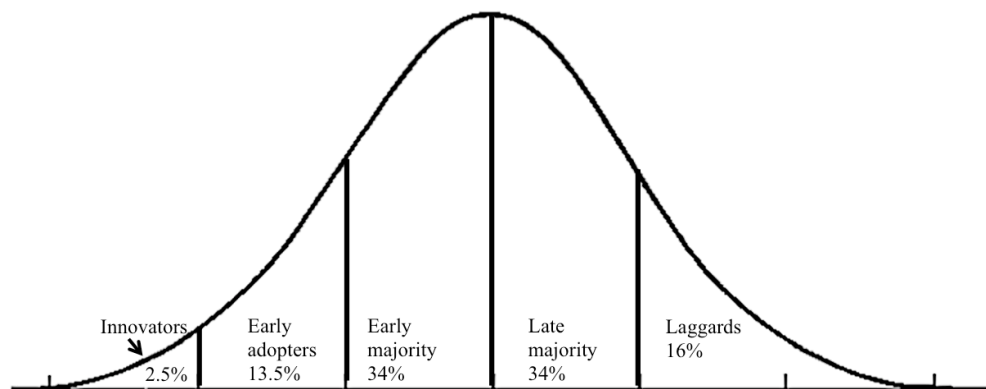


Figure 4 Adopter categorisation on the basis of innovativeness (Rogers, 2003)

the sequence in which the groups adopt and what size these respective groups have (figure 4). The small group of innovators accounts only to 2.5% of the entirety of adopters. They are characterised by liking the hazardous, being venturesome and having usually more “cosmopolite social relationships” (Rogers, 2003). According to Rogers, they have an affluent technological knowledge and are eager to try out many new ideas, even if this could cause them financial risk. After they adopt, chronologically, the early adopters tend to adopt who account to 13% of the whole adopter population. In contrast to being cosmopolites, they are rather localites. They are, by Rogers, described as being the group with “the greatest degree of opinion leadership”. As they adopt quite early, they have a big influence on their respective social groups and are often consulted by their peers who might not be as early adopters. Holding a certain esteem for early adoption in the eyes of their peers, they aim to maintain and keep that reputation up and are respected for that. Following them, the early majority follows, including 34% of all adopters. They adopt ideas shortly before the majority does, have frequent social interactions but are not the leaders amongst their peers. They are not the last ones to try out something new, but they also are not the last. After the early majority, the late majority adopts, accounting for 34% of adopters. Adopters within this group are characterised as rather sceptical. They adopt after the average member of society. In order to

even adopt, they have to feel that the new idea is fully accepted and appreciated by society and other pressures such as economic necessity convince them eventually. Once they have adopted, the last 16% of adopters within a social system, the group of laggards adopts. Laggards are very traditional. Instead of focussing on the future, they focus on the past and on what previous generations have done. They are rather isolated and not considered opinion leaders. By the time they adopt, the innovators usually already adopted to the next new technology. What also distinguishes them is that their economic situation is not as prosperous as the one of earlier stage adopters which makes them consider adoption very thoroughly trying to minimise any risk possible.

Authors such as Verdegem and De Marez (2011) have, after identifying the issue that most literature focuses only on early rather than late adopters, started to investigate the consumer profiles of both early and late adopters in regards to the adoption of Information and Communication Technologies to draw a more complete picture. Bower and Christensen (1995) also criticise this approach making it responsible for the failure of disruptive technology. They state that even though some companies are all the time at the front when developing new technologies, they lack the ability to commercialise them. This is because the companies did not look at the needs of the mainstream, but only aimed to appeal to small or emerging markets. This would mean, that in order to make an innovation to be successful, researchers and companies, in general, have to take into consideration rather the majority or the middle part users of Rogers' adoption curve instead of only focussing on early adopters.

Apart from criticising that a substantial amount of research concerning technology adoption lacks to look further than the group of early adopters, Verdegem and De Marez also criticise the approach of manufacturing companies and brands focussing too much on technical or product-related features of new gadgets or technology. They claim that the ignorance of the factors which are important for consumer acceptance are neglected on the cost of spending too much time and resources on optimising technical features.

Consequently, they argue, that in order to improve how potential customers of new technologies are being targeted, more focus has to be given to the user acceptance view of things, the perspective of the consumer to understand their behaviour concerning technology adoption.

Schrage's (2004) arguing concurs with that arguing approach stating that looking at the consumer perspective is highly important when it comes to technology adoption. He states that "innovation is not what innovators do; it is what customers, clients, and people adopt." In his opinion being innovative and being successful in distributing the innovative new invention is not about "crafting brilliant ideas that change minds; it's about the distribution of usable artefacts that change behavior." This statement implies that new technologies can only be considered successful in their adoption if people buy and use them. It does not matter how good they are - as long as manufacturers and brands don't understand the consumer's reasoning and their behaviour regarding technology adoption, they will hardly succeed in making any new technology a breakthrough which is adopted by consumers.

Concluding on the above mentioned reasoning, looking at the consumer behaviour or consumer perspective in general, is highly important to understand technology adoption. In the following, several authors' findings will be elaborated on as to at which factors they have looked at and what factors they consider important regarding that topic.

As stated previously, the consumer perspective is of high importance to look at when investigating the adoption of new technologies - just as well in regards to looking at previous new technologies and why they failed. Understanding the consumer perspective alters company's chances to produce and market innovations in the correct way so that they get adopted by as many people as possible in the market. Lamore, Berkowitz and Farrington (2013) already highlighted the importance for a company to launch a new product successfully, as only sixty percent of such newly released gadgets seems to be a success while the others fail to diffuse the market.

When looking at already existing literature concerning technology adoption failures, authors such as Sääksjärvi and Morel (2010) state, that consumer doubt can cause innovation to fail. They claim that most research done within that field, only focusses on why innovations succeed. Solely focussing on positive features of new innovations creates an incomplete research frame and "can lead to only a partial understanding of how innovation diffuses in the market." This means that only looking at either why innovations succeed or why consumers adapt to certain criteria instead of why they fail or for which reasons consumers are rather hesitant to adopt innovations gives a limited picture and is of minor help when trying to tailor a strategy how to achieve maximum adoption of one's innovation within a market.

Douthwaite, Keatinge and Park (2001) have come up with a similar finding in their case study research amongst technology being released from the R&D department and its adoption. They found out that the likeliness of adoption increases, the more "key stakeholders", people who are directly affected by it, benefit. This signifies that in order to alter chances of a new technology being adopted throughout the market, the R&D department and the researchers should closely monitor how a technology performs in real life conditions and improve it themselves. Von Hippel (2005) even goes as far as to say that the users' ability to innovate is getting better at increasing speed. This would mean if asked in the early stages of a gadget's release or even during its development, researchers and brands can learn a lot about how to tailor innovation best to achieve maximum user acceptance. Douthwaite, Keatinge and Park state that the knowledge gaps about what key stakeholders want (in the case of voice assistants, that would be the consumers buying the gadget and using it), which occur with the highest likelihood in the initial release phase of a new technology are what makes new technologies most likely to fail. This implies that if the researchers and brands are aware of these from a very early stage, these could either be prevented or resolved quickly enough before a technology starts to actually fail. Lamore et al. (2013) concur with that direction of thinking stating that if R&D and Marketing departments were to cooperate closely, their chances of responding to market trends, such as trends occurring from innovations or things/ functionalities people expect regarding a new technology's innovation, alter. Simultaneously

the closer their cooperation is, the higher the “degree of market acceptance” is when executing a new product (Lamore et al. 2013).

To sum up this second part of the literature stream looking at why fail, it can be said that when investigating a technology’s likelihood to succeed in adoption, it is both important to know enough about what and how consumers think about and use a new technology and to investigate that in real life, but simultaneously to also look at hindering conditions which create consumer doubts and make them not adopt a technology. It has become obvious that consumers differ in terms of their innovative curiosity resulting in some adopting new technologies faster and more likely than others. However, most research focuses on understanding why early innovators’ behaviour and leave the middle and late segment mostly out of the picture. Furthermore, it has been shown that consumer doubt can often be a reason for a technology to fail adoption and that working closely together with the consumers and truly trying to understand them and their attitudes towards certain new technologies, will alter the chances for companies and the technology, in general, to make it a success.

2.3 Analytical Framework

Based on the existing UTAUT 2 model and the user literature stream, the following model has been deducted from the abovementioned literature review and will serve as a tool when approaching the empirical study part of this paper. The focus of the study will be to investigate the participants’ perception in regards to the seven previously-existing determinants and the six potential additional ones, having the focus on how they perceive these factors having in mind that they are potential future users (figure 4). The research wants to fully understand the determinants from a consumer perspective regarding adoption as well as add further determinants or remove existing ones if required. In order to facilitate the research, the following analytical framework will be used:

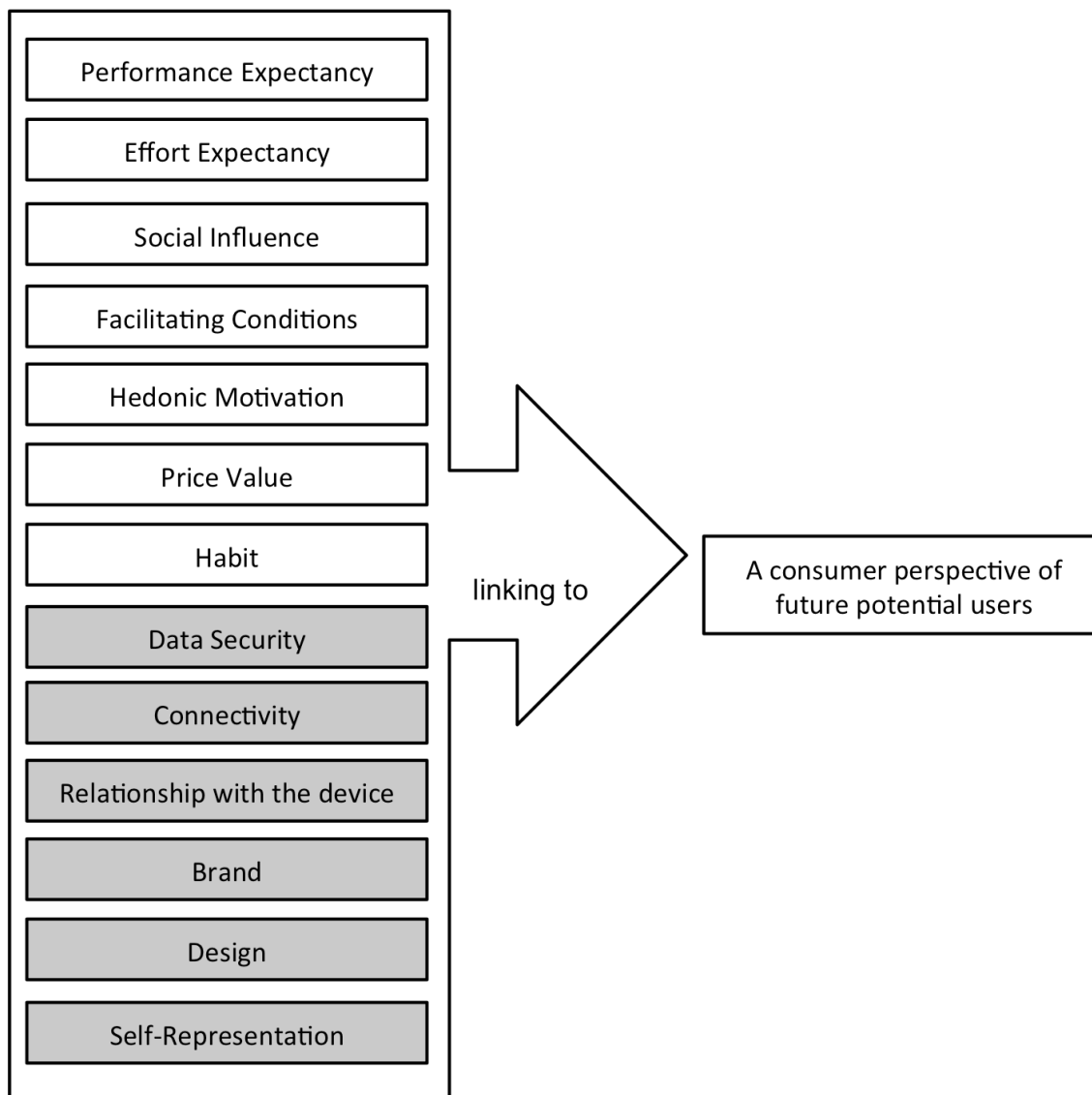


Figure 5 Analytical Framework

Within the present study, behavioural intention and use behaviour will be considered as a common denominator during the investigation, meaning that their distinction or specific individual relationships with other determinants will not be further examined. Instead, all seven determinants from the UTAUT 2 model on the left will be investigated towards their influence and the perception potential users have about them regarding which determinants they picture as relevant. In order to achieve a fuller understanding of these determinants, these will be paired up with additional literature. Added to these will be six additional determinants, which were found to be of relevance.

The moderators age, gender and experience will also not be a focus of this research's investigation. The reasons for this will be stated within the sample arguing within the Methodology chapter.

3 Methodology

Based on the previously outlined literature review and the theoretical framework, the following chapter gives a description of the methodology of the research. The choice of the adopted research philosophies will be presented followed by an argumentation for the selected research design of this master thesis. Furthermore, the appropriate data collection method including the analysis process is discussed. Subsequently, possible limitations with regards to the quality of the study are described.

3.1 Research Philosophy

Awareness about the underlying philosophical assumptions of business research can increase the quality of the research as well as proliferate the creativity of the researchers (Easterby-Smith, Thorpe & Jackson, 2015). With regards to Johnson and Clark (2006) and Saunders, Lewis and Thornhill (2009), it is essential for the researchers to discuss their philosophical position. This master thesis has thus considered epistemology and ontology to construct the respective philosophical point of view (Saunders, Lewis & Thornhill, 2009; Bryman & Bell, 2015).

Considering that the researcher's purpose is to get a deeper understanding of the factors for adopting to VA technology and to understand consumers' reasoning for adoption, the researchers reflected upon ontology - the philosophy about how human beings perceive aspects of nature in terms of reality and existence (Bryman & Bell, 2011) - and have a realistic approach. This study seeks to explore the reasons for the adoption of VAs. It is of high interest to see the different possibilities for adopting and people's reasoning for each adoption factor and their respective relevance in the context of VAs. The researchers are aware of the fact that others might detect different findings of consumers adoption of artificial-intelligence-based technologies, and thus other truths, which goes in line with Collins (1983) stating that "what counts for the truth can vary from place to place and from time to time".

With regards to epistemology - the theory of knowledge and how to enquire in the nature of the world (Easterby-Smith, Thorpe & Jackson, 2015) the researchers take a social constructionist viewpoint. As within the field of technology adoption most researchers follow a theory testing, respectively a more positivistic approach, the aim of this thesis is to critically assess what has been done and might have been left out of sight to then eventually get a deeper understanding of the factors that are crucial for technology adoption.

3.2 Research Design

Bryman and Bell (2011) state that the research design exemplifies the structure for collecting and analysing the data. It explains how researchers intend to answer the research questions. As research evolves when examining more literature, reading and learning more about the field of study might also lead to revising appropriate aims and the research question (Easterby-Smith, Thorpe & Jackson, 2015). Having paid attention to this, the researchers chose a qualitative research design. What supports this choice is that this master thesis' main interest lies in uncovering "the quality or nature of human experiences and what these phenomena mean to individuals" (Draper 2004, p.642). The aim of qualitative research is to "understand and explain beliefs and behaviours within the context they occur" and its characteristics are "interpretive and naturalistic" (Draper 2004, p.642). This implies that the qualitative approach is appropriate when aiming to learn about the factors influencing consumers in their adoption of the VA technology and their reasoning behind it. The data gathered will reveal the consumers' perceptions towards the adoption of VAs and will look at how they value and are influenced by certain determinants and how they reason for it. Moreover, this study is interested in in-depth understanding of the determinants leading to technology adoption opposed to quantification and hypothesis testing as followed by many other researchers in this field.

Starting with the UTAUT 2 model as a theoretical framework and the conducted literature review on technology adoption and the consumer behaviour within the context, the researchers, instead of taking only the determinants of the initial model, analysed potential additional six determinants and went back to the theory part adding some literature findings on these new determinants as well, iterating back and forth between theory and data. It is only in the discussion part when the researchers decide, which out of the six potential additional determinants to actually add to the amended UTAUT 2 model and further discuss and which of the existing ones to take away. The result of this amended model and the analytical framework will be presented at the end of the discussion chapter in figure 8.

3.3 Data Collection Method

Why focus groups?

Focus groups are of exceptional use when a researcher's aim is to observe and investigate the attitudes and opinions of different parties/participants within a specific group, while they are sharing thoughts and perceptions, which is why the focus group method was considered most appropriate for this thesis (Easterby-Smith, Thorpe & Jackson, 2015). It is also the interactivity within focus groups, which is considered a plus about this investigation method. Other methods such as secondary data collection would not have led to as fruitful outcomes.

Other qualitative methods such as interviews would not have led to the same quality of results either, as new discussion points especially emerged out of the group discussions which were not planned in or considered as potential factors by the researchers prior to the focus group conduction. The fact that different participants brought up statements which were challenged by other participants or built upon, created valuable material which would not have been achieved using other methods. The goal of the researchers, using that focus group construct, was to fully understand the reasoning behind the participants' adoption perception and behaviour of voice assistants to uncover their reasoning behind it and eventually draw lines of their logic to the UTAUT 2 model. Additional explanations for the researcher's intention to utilise focus groups as a method are about to be expanded in following sections of this thesis.

The researchers' goal of the focus groups is to find out how consumers adopt VAs as a new technology and how their adoption behaviour within the UTAUT 2 model differs from previous technologies that have been applied to it, identifying potential missing determinants. To emphasise the relevance of using focus groups as a research method, as previously mentioned, Balaji and Roy (2017) suggest that future research within the area of detecting what consumers value could use focus groups as a method. The researchers of this study are especially interested in obtaining attitudes, reasoned behaviour and how the VA gadgets are perceived within a social construct.

Focus groups were chosen as setting as they provide an atmosphere where both individual but also collectivistic opinions, attitudes and behaviours can be voiced. They allow the participants not only to freely report about their own attitudes on certain questions and topics but also to reflect these back interactively in a group discussion gaining potential new inputs to let the discussion flourish. Focus groups have the reputation for offering the chance to create an environment where participants feel comfortable sharing their ideas and viewpoints as well as comment on each other's perspectives (Walker, 1985). Easterby-Smith, Thorpe and Jackson (2015) describe focus groups as "loosely structured, guided conversations among a group of individuals" (p. 136). They claim that focus groups enable researchers to study the different reactions of focus group members on certain topics and to share experiences (Easterby-Smith, Thorpe & Jackson, 2015).

Alvesson states in respect to his reflexive pragmatism and the romantic point of view that the creation of trust and commitment between the researcher and the researched is essential when aiming for a 'genuine' interaction. As the researchers act interactively and close to the researched in a focus group, the interviewees are encouraged to honestly share their opinions and attitudes with the researching team (Alvesson, 2003). The close relation between investigators and interviewees ensured that the participants felt comfortable to share any ideas with both the researcher and within the group setting. Additionally, the participants were provided with snacks and drinks and as a location, a university building was chosen which all of the participants already knew. This guaranteed that they would arrive at the location both on time and without any stress. The food and beverage aspect had as a consequence, that they felt both welcomed and that they could meet basic needs while creating an open atmosphere where exchanging opinions and statements with each other was further supported. This

assured the collection of rich data which would not have been collectable in both deepness and variety in a different setting.

In order to collect the required data, four focus group discussions were held. Each of them lasted around sixty to seventy-five minutes. The criteria for the participants were, that they were all members of the same age group, ranging from 20 to 30, so members of the youngest potential age group to actually purchase a VA themselves. Additionally, a selection criterion was that they are highly educated, as higher educated participants were assumed to have broader knowledge in general (including technology knowledge), would be more able to critically reflect on their own behaviour and had a future higher purchasing power due to higher salary they would earn thanks to their better education which would give them better-paid jobs. These criteria were important, as the voice assistant gadgets are used within the entirety of a home and also compatible with other gadgets. If participants, even regarding their future, could not picture themselves owning several gadgets to connect the VA to, their reactions might have been different or biased. Taking highly educated participants, it was made sure that mental limitations or missing budget would not cause any limitations to the study. A sampling overview can be seen in table 1.

The moderating factors age, gender and experience were not investigated in detail. Ting-WeiChen (2016) found out in his study, that apart from age, the other two moderating factors have a "non-significant moderating effect". That is why they were not considered as important investigating factors within our study. As the age is still considered an important factor, it was decided to limit the age range in the sample selection, letting only students (because of the highly-educated aspect) participate. These all can be placed within the age category twenty to thirty years old. Other authors have previously criticised that the purchasing behaviour of students online might have major representativeness for the entirety of consumers. Authors such as Klopping and McKinney (2004), however, argue that students are "the upcoming market segment that businesses are targeting for online shopping". As the VAs are primarily bought online, this is a valid point. They bring up another study stating that students at university level are additionally highly likely to expand their amount of online bought good and services in the future (CSRE Campus Market Research Series, 2001). Other studies, according to Klopping and McKinney second these findings stating that students at university level are apparently amongst the utmost active users looking at online shopping segments (PR Newswire, 2000; Yoo & Donthu, 2001).

A further selection criterion was that the participants did not have a VA themselves yet. The reasoning behind this was, that the researchers wanted to find out about the perception of people concerning the gadgets at the moment and how they would picture themselves using it and what would increase their likelihood to buy one and do so. If one of the participants already owned a gadget, he or she would have skipped some steps within the adoption process, that the researchers were actually interested in. Additionally, he or she could have influenced the other participants, their opinions and perceptions, which would have led to biased answers.

To avoid previous biases or subgroup building because of friends knowing each other, the focus group participants did not get the option to have a look at the questions before. They were not actually even told the exact topic until showing up at the discussion. Instead, they were only told that the focus group would deal with “technology adoption“. Not revealing the VA as a core of the topic to be discussed before the actual gathering was done on purpose – every participant should start off from the same point without having done any previous personal research which could influence their opinions. To recruit the participants, the Facebook groups of different programmes at Lund university were approached. The members of these groups were invited to a Facebook focus group event equipped with a Doodle link and the opportunity to state availability for four different focus groups times. After having registered the participants’ time availability, the researchers not only aimed for allocating each potential participant a certain time, but they also ensured that no close friends or people with the same background (nationality/ course programme) were in the same focus group to not create any coincidental biases. Instead, they tried to ensure that the participants were comfortable with each other but did not know each other that well previously to avoid that if they knew about VAs, they would at least not have talked about that topic with the same people previously. Criteria for the final composition of the focus groups were to achieve an equal study programme mix, cliques were split and age was not considered as an important factor within this context, as all participants were of the same age range. After having put the participants into four different time slots, the participants received a confirmation from the researchers telling them which slot to eventually show up to. The maximum member of participants per focus group was set to seven participants in order to still provide the ground for everyone’s voice to be heard within the group.

Number of FG	Time	Participants	Age of Participants	Country origins of participants
4	60-75min/group	7-8/group	23-30yrs	Austria, Bangladesh, Finland, Germany, Netherlands, Peru, Poland, Sweden, Thailand, United Kingdom

Table 1 Sampling composition

In total, nine guiding questions were asked, being split into three different categories: Engagement, exploration and exit (Eliot, 2005). Not always the exact same wording was used as these questions served more as a guidance linking each exploration question to one determinant. Follow-up questions were asked, laddering up and down (Easterby-Smith, Thorpe & Jackson, 2015) but are not noted in the table. Leaving the conversation open even though a topic guide with leading category/question areas existed eventually led to new findings (additional determinants). This would not have been possible if the focus had been

too narrow on the following predefined guide. The questions asked in respect to these categories were the following:

Stage category	Determinant or Purpose	Guiding question
Engagement	Icebreaker to build rapport	What would be the first thing if you had the chance to talk to Alexa, Google, Siri or other voice assistants?
Exploration - Questions regarding key topic/determinants	Performance Expectancy	In what ways will you benefit mostly from using voice assistants?
	Effort Expectancy	Why do you think is it easy or not easy to use voice assistants?
	Social Influence	How would your likelihood to use voice assistants change when important others (such as family and friends) influence you? How would they have to influence you so that you use voice assistants?
	Facilitating Conditions	What would you need to use voice assistants with its full functionalities? (state examples to better explain this question if necessary)
	Hedonic Motivation	What aspects do you consider as fun and pleasurable when using voice assistants? (do you consider them as important for accepting this technology?)
	Price Value	What role does price play in order to use voice assistants? (When asking us for prices we will ask them what they would be willing to spend?)
	Habit	What would make you use voice assistants on a regular basis? (societal factors, marketing?)
Exit	Closing	Do you have anything to add?

	questions to wrap up	
		Follow up questions possible?

Table 2 Question guide for focus group conduction

Prior to the start of the actual focus group discussion, the participants were informed about the topic and were shown two videos from competing VA providers, Google Home (figure 6) (Google, 2016) and Amazon Echo Dot (figure 7) (Amazon, 2016). These are the companies with the most popular VAs in the current market. Their commercials were shown. in order to align their knowledge about the technology within the group and to make sure that everyone knew what the actual core topic to be discussed was. After that, they were provided with a Consent Participation Form. They were given time to fill that out and raise any further potential concerns they had, before actually getting started with the discussion.

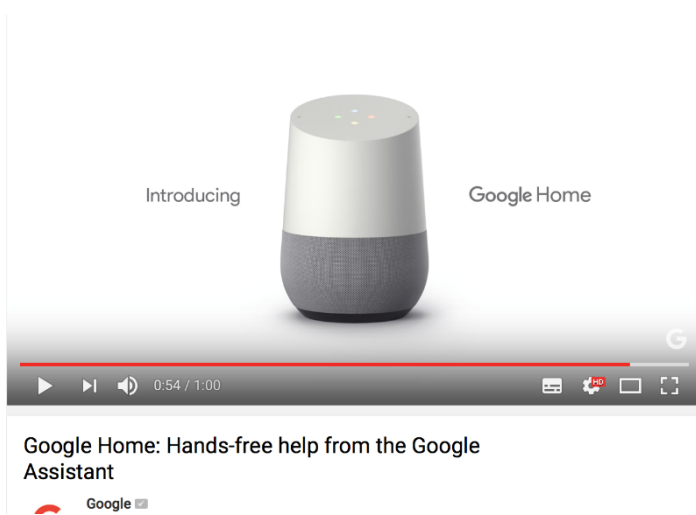


Figure 6 Google Home product introduction video on YouTube (Google, 2016)



Figure 7 Amazon Echo Dot product introduction video on YouTube (Amazon, 2016)

Focus Group Conduction

When starting the actual conduction of the focus group, the two researchers split roles. While one of them took the role of the moderator listening attentively and managing the group dynamics, the assistant moderator took care of recording the session, taking notes and observing body language and further mentionable aspects during the discussion (Eliot, 2005). The assistant moderator did not interrupt the moderator during the focus group conduction but let him or her talk freely.

The assistant moderator also matched each participant with a number which would be used during the transcription and analysis to ensure anonymity.

At the end of each focus group, the participants were asked whether in case of a needed follow-up, they would be okay with the researchers reaching out to them. By this approach it was ensured, that if any further information was needed, it could even be collected after the focus group had ended.

After recording all four focus group discussions on a phone, they were transcribed and analysed accordingly.

3.4 Data Analysis

First of all, a literature review was conducted, based on the two streams linkable to voice assistants and possible explanations regarding their adoption: UTAUT 2 and its determinants, industry examples the model has been applied to and as second stream, the role the user plays within. These were utilised trying to explain and understand the different influencing components when it comes to technology adoption in this specific case. Using these three

streams as a kind of base, a question guide for the conduction of the focus groups was created, linking a guiding question to each of the seven UTAUT 2 determinants (table 2). When it was found out, within the analysis process, that further determinants might need to be added to the UTAUT 2 model, the researchers went back to do some further literature research about these and included them in the first literature stream, together with the literature research about the previously existing determinants.

Methodologically, the conduction of the analysis of the qualitative data was done based on Mayring's (2010) methodological approach of content analysis. Compared to Mayring's approach, the way of doing the analysis in this research paper is kept a bit narrower in order to avoid exceeding the scope of this thesis.

After recording the focus groups as well as taking notes of participant's reactions and behaviour during the discussion (done by the assistant moderator), all the focus groups were transcribed. In order to ensure anonymity, each focus group participant was assigned a number between one and seven. Consequently, in the transcript, the participants are referred to as P1, P2, P3, P4, P5, P6 and P7 while the moderator is marked as M. In the transcription, the respective person's reference (P1, P2 etcetera) saying something was noted in the left column. In the second column to the left, the transcription of what the person was saying was noted. Within this context, it also has to be mentioned that incomplete sentences, as well as colloquial statements and words, were also transcribed in order to not change the initial meaning of what the participant said. Additionally, observations noted during the focus group discussions by the assistant moderator were noted in brackets behind or in between what the participants said. These included aspects such as participants being hesitant in their reply, sceptical or laughing.

After the transcription of all four focus groups was finished, the next step included the categorisation of the answers. In order to do so, the categories zero (no relevant answer to any of the seven questions) to seven were assigned to each individual answer. This was done to ensure that, even if answered within a different context, the answer would still be assigned to the respective question. In some cases, statements were assignable not only to one but two or more questions. Consequently, they were attributed not only, for example, a "2" as a category, but "2, 3, 6".

Finishing the categorisation, a ranking of the importance of the answers in regards to the individual questions started. This ranking was used as a coding device and sorting mechanism to decide about the relevance of each statement, in order to make the later analysis easier. In order to ensure that this was done unbiased, both researchers ran through that process separately. Filtering the answers by the number of question to which they refer, in a fourth column, each of them noted down how relevant they regarded each single answer for the question asked. Each question, as previously mentioned, was linked to one specific determinant. The ranking was done by numbers. A ranking of "3" implied that the answer was highly relevant for the aforementioned question. A "2" meant medium relevance, while a "1" implied that the answer was of minor importance to the question. Ranking an answer with "0"

signified that the statement given was not important at all when answering the assigned question. After the ranking of the importance of the individual statements was done separately by the researchers, in a sixth column an average of their ranking was created.

As a final step, the analysis started, taking into consideration the most relevant aspects of each individual question within every single of the four focus group discussions. As the entire transcription, categorisation and grading were done in an Excel document, it was easy for the researchers to filter the results into category question numbers. This meant that they applied the Excel filter in that way, that when they analysed determinant one, only the answers assigned to this determinant, including their rankings, were shown. Additionally, it was made sure that the statements giving replies to several questions (e.g. “2, 3, 6”) were also displayed when filtering the individual categories answering one specific question/ indicating statements to a specific determinant. Within each analysed determinant, first of all, the most relevant aspect areas regarding this determinant were brought up. After that, they were looked at in further detail and investigated for their relevance for the overall respective determinant. Within the discussion part later, the seven determinants were compared to each other as well as reflected back with the findings of the literature review part.

3.5 Limitations and Quality of the Study

This chapter discusses the limitations of the methodological research choice. Replication (Objectivity), reliability and validity are the rather quantitative criteria indicated for business research (Bryman & Bell, 2015). As those criteria might not be suitable for qualitative research (Easterby-Smith et al., 2015) authenticity and trustworthiness (credibility, dependability, confirmability and transferability) will be used to evaluate the weaknesses of this master thesis. The trustworthiness criteria particularly ensure the rigour of qualitative research (Guba, 1981; Schwandt, Lincoln & Guba, 2007).

With regards to authenticity (Lincoln & Guba, 1985), the researchers see one possible weakness in the selection of the participants and the limited amount of conducted focus groups. One could argue that with a wider selection of respondents (other educational background, age differences, other origins) one could get more diversified findings. Thus it could be criticised that there is a shortcoming in transparency in the selection criteria of the applied sampling. Considering the amount of conducted focus groups, four respectively, it could be argued that more data should have been gathered. However, the researchers paid attention to reaching the point of theoretical saturation (Bryman & Bell, 2015).

The second criteria suggested for qualitative research is trustworthiness consisting of credibility, dependability, confirmability and transferability (Bryman & Bell, 2015). Credibility states how plausible the research’s findings are and what confidence can be put into the truth of the research (Holloway & Wheeler, 2002; Macnee & McCabe, 2008). The

researchers aim for the participants' original views on the matter of voice assistants. It was ensured that every participant had the same knowledge about voice assistants by only inviting participants that do not own the device and by showing the exact two videos before the discussion. Moreover, by following the same topic guide throughout all four focus groups without leading the respondents in any direction, it can be argued that this research created credible, unique findings in the under-researched phenomenon of VA adoption. However, this context is quite narrow and the findings can thus not easily be generalised.

The qualitative research criterion transferability investigates the degree to which the findings can be transferred to other contexts (Bryman & Bell, 2011; Tobin & Begley, 2004). As the adoption behaviour of AI-based VAs is a new research field, the authors aimed to explore new insights which can be portrayed to other technologies in the field of AI as well. The better understanding of the determinants of technology adoption, as well as the three new established determinants, could help other researchers in the context of AI and IoT. Notwithstanding this, statistical generalisation is not the intention of this research. The reader should rather get a deeper understanding of the phenomenon and the ability to make own judgements about applying our new established determinants to another context.

The dependability criterion refers to reliability and the possibility for other researchers to repeat the studies. The authors are aware that there can be some concerns regarding biases when conducting focus groups (Saunders, Lewis & Thornhill, 2009). The moderator's comments could have influenced the respondents. Furthermore, the individual manner of interpreting the received data can be construed as a possible weak point regarding dependability. However, the authors maintained evidence (such as transcriptions and records of the empirical data as well as data analysis documentation) throughout the whole study ensuring that the taken steps are clear and understandable to the reader.

Confirmability refers to demonstrating that the findings emerge from the data and not from the researchers' interpretations so that the results could be confirmed by other researchers (Tobin & Begley, 2004; Bryman & Bell, 2011). Thus, the authors did everything to be as objective as possible even though it is almost impossible to have no effect whatsoever on the research process in qualitative research. As the team consisted of two, the authors strived to be reflexive towards each other and prevent our predispositions and personal meanings which could influence the judgements of conducting the research.

To conclude, the authors believe that, besides the above mentioned limitations and in line with the research purpose, the methodology choices enabled them to gain a deeper understanding of the determinants affecting the adoption of VAs.

4 Voice Assistants

Recently, there has been emerging interest in a new technology: Artificial intelligence-based voice assistants have been on the rise (Voicebot, 2017). They are used at home to assist with the actions in people's daily lives. Their goal is to make the lives more efficient by shifting the interaction from via phone to voice-driven. Additionally, voice assistants learn from the user's behaviour to even enhance the experience. This is the smart artificial intelligence component (Newman, 2016). Many tech firms have noticed the trend and provide or will provide solutions for the market. This will be explained further in chapter 4.2.

4.1 What can a Voice Assistant do?

Voice assistants are capable of doing many different things. They listen to the user for the whole time and can be activated through a wake word together with the certain task or question. After that, the VA will immediately respond. In general, the user can ask it any kind of questions. VAs have an abundance of data and are knowledgeable about the weather, the latest news, sports results, traffic, language translations etc. (Google Home, 2017). Another major function is the ability to play music through the integrated speakers. VAs can be synced with the user's preferred streaming service such as Spotify, Amazon Prime Music and others. Via voice control, the user can search for songs, control the playlists or adjust the volume even when it is playing at maximum (Gibbs, 2016). What opens up, even more, capabilities are the software developments from third parties that can be integrated to the VAs. For example, users can make use of applications such as "Domino's Pizza" or "Uber", which are connected to the VA's system to order pizza or request a cab ride. Furthermore, one can control other elements within the home such as dimming light bulbs, setting the temperature through connected heatings or turning off the oven (Amazon, 2017). The number of such connected services is proliferating and ensuring that the use of VAs will become more and more convenient.

4.2 Voice Assistant Market

First of all, it needs to be mentioned that the voice assistant market is rapidly changing. Almost every day, articles about alterations or technological developments are uploaded in

magazines, journals or blogs on the internet. All the information described in this chapter refer to the current date, namely the 15th May.

According to a study done by MindMeld (2016), VAs were already used by two-thirds of the smartphone users in the US in Q1 2016. This can be seen as an indicator for the probable use of voice assistants such as Alexa and Google Home as an individual device without the necessity of the smartphone. The current voice-enabled speaker market has been evaluated according to a study by eMarketer. The study reveals that Amazon's Alexa has 71% market share, whereas Google Home has 24%, followed by smaller providers such as Lenovo, LG, Harman Kardon and Mattel. Furthermore, they predict that 60 million American citizens will use digital VAs once a month in 2017 propelled by the heavy use of millennials (Martin, 2017). When having a look at the different providers of voice assistants, it can be noticed that a battleground for the tech companies has emerged. So far, Microsoft, Google, Amazon, Apple, Samsung and others have established own voice assistants with Amazon and Google being the only ones actually competing with a market-ready version (Hempel, 2016; Kharpal, 2017; Tsukayama, 2017). On the internet, one can find several pages comparing the voice assistants and explaining their differences (Dunn, 2016; Hempel, 2016).

As already mentioned, the VA market changes with a rapid speed. Critics already argue whether VAs will be used widely suggesting that a screen would enhance the use of voice assistants (Condliffe, 2017). Acknowledging this assumption, Amazon has unveiled a new version of its VA with an integrated screen, with which the users are able to make video calls, play YouTube videos or send messages to other Amazon Echo devices (Field, 2017). Those developments seem to continue and other companies follow the tech giants. One example for a new developed VA as competition to the well-established ones comes from South Korea called 'Clova' (Chong, 2017). This example shall illustrate that the possibilities seem endless not only from a technological perspective but also from an international business point of view.

5 Findings

This chapter shows the findings from the four conducted focus groups. These are categorised into the investigated determinants affecting the acceptance of technology of voice assistants. Throughout the research, the additional determinants which have been illuminated will be presented after the original determinants of the UTAUT 2 model. Illustrative quotes are used to describe the key message as a heading of the paragraph following it. To further emphasise and distinguish analysis statements from quotes, all direct quotes given by the participants, within the following findings part, will be highlighted in italics.

5.1 Performance Expectancy

Performance Expectancy is “the degree to which using a technology will provide benefits to consumers in performing certain activities” (Venkatesh et al., 2012, p.159)

Throughout the focus groups, three topics around consumers’ benefits when using VAs were identified. To determine the relevance of the benefits, the most salient factors which came up during the discussions were discussed first. Second, participants stated multiple exemplary situations in which the use of voice assistants could be beneficial. Third, the focus group members compared the VAs to their previous experience with VAs such as Siri and argued whether there are sufficient benefits to adapt to it in the current world.

“I would say convenience, that it helps me to do things faster and for like practicality.” (P4, FG1)

First of all, the participants appreciate the gadget’s initial value proposition – making people’s life easier. The convenience aspect of using voice assistants in the daily life is really what stood out throughout the discussions. As a prerequisite for adopting and permanently using VAs, the majority of participants want the gadget to be easily understandable and easy in usage. It needs to work perfectly and flawlessly (P5, FG1; P3, FG2; P4, P5, P7, FG3). Additionally, they stated that they would like the VA not only to be convenient but also time-saving. This means that it would be nice if it could take care of things, freeing the user to do other activities at the same time. If it additionally could solve problems like *„at the moment for every small thing you have to take out your phone to start any app“* by *„ask and get your answers“* (P7, FG1) – that would be valued by the participants. Thus, P1 of FG does not like that *“for every small thing you have to take out your phone and start any app”*. She thinks it would be a great benefit to have everything integrated into one performing device (P1, FG1).

In order to be able to use the full potential of the gadget, they expect it to be connectable to the entire house. This also concerned the haptics and physical interaction with the voice assistants. Several participants do not want to carry the gadget around but simultaneously request it being accessible „*everytime and everywhere I go*“ (P6, FG2; P1, FG3). Lastly, some would buy and adopt the gadget if it provided them with some extra benefit (P6, FG1), which they cannot find in current technologies.

“I think it would facilitate even more what we have in our generation already: that we have our knowledge at our fingertips until now. Now we have it even without typing anymore. I can basically ask it anything I want.” (P6, FG3)

Secondly, following the focus group members’ important benefits of VAs, they mentioned exemplary situations in which the use could provide benefits. In general, it is about the VA fulfilling tasks while doing other things at the same time. This is mostly in situations where the hands are at use and the voice would be the more convenient way to execute another action. The most participants value that one receives information from the device without having to spend time searching and the fact that *“that device would just give you an answer”* (P7, FG2). They mentioned it can be useful when wanting to get to know the weather, sports results, a recipe while cooking or the daily schedule. Furthermore, purchasing actions are considered to be convenient and time-saving such as ordering a cab or a pizza. One participant gave the example of a weekly shopping list which could be put in the settings and get delivered via simply using the voice (P3, FG2). Equally beneficial would be the connection to devices in the house (P4, FG3) as well as to the smartphone, so that *“if you run to school or work or whatever and you are not sure whether you turned off the coffee brewer, hair straightener or whatever...you can just double-check whether it’s turned off”* (P5, FG2). Following this, some participants argued that the use of VAs could be nice if it worked outside of home such as on the way in the car (P3, P4; FG4).

“I am still wondering whether this technology is really as good so that this would be really working. Because right now this Siri and the Apple iPhone - you should be able to do the same thing but it is not working.” (P3, FG1)

Thirdly, some group discussion members were within the context of this question mainly focusing on their previous experience with voice assistants (such as Siri) and what was bad about them instead of focusing on their benefits. The perception they had from previous assistants was applied to current voice assistants. They did not seem to make a distinction between old and new assistants and did not see that the gadget will actually deliver what it promises in the ads. Some raised the wish of the gadget being able to learn while performing the tasks about their daily patterns so that they do not have to think about daily routine aspects (turning off lights, reminders to take an umbrella etc). Within that context, they both preferred the gadget to either understand their daily patterns and adapt to these with reminders for example or by doing the actual job itself. However, some participants brought up concerns in terms of the voice assistant ‘listening’ constantly and their personal data security being threatened as a consequence of that (P3, P6, P7, FG3; P2, FG4). Concerning the machine’s

ability to learn itself, they also stated that they would only like the VA to perform actions they had previously programmed into it and found the gadget performing or automatically learning tasks from their behaviour rather creepy. Furthermore, it is crucial for most participants that VAs are capable of offering something new that opens opportunities which have not been there before (P6, FG1). Others argue that the technology might not be there yet and that the benefits are not sufficient enough for using VAs (P1, FG3). They expect it to convey a value or even surprise them with something that can be truly beneficial for their daily life (P6, FG4).

To sum up the performance expectancy determinant of the focus group participants, the most important benefit factors are considered the following: Convenience, time-saving, ubiquitousness and being able to learn by itself. Some focus group participants even went so far as to state that their ideal voice assistant „*could do everything a [human] personal assistant could do*“ (P4, FG2). If the VA was seamlessly integrated and had sufficient abilities, they would have a high likelihood to adopt the technology. At the same time, the majority of participants sees data security as a huge concern with the voice assistant constantly listening. As a consequence, a separate category point will be dedicated to that issue further below under point ‘Data Security’.

5.2 Effort Expectancy

Effort Expectancy is “the degree of ease associated with consumers’ use of technology” (Venkatesh et al., 2012, p.159)

The main points regarding effort expectancy which were brought up in the focus groups are the following three: Importance of ease of use generally, its effects on social interactions and its flaws based on previous experiences.

“I just want to take it out of the box, plug it in and be able to use it. I mean for me it just has to work really well without hassle. Like if I order a pizza for example with the voice assistant then it has to work. It has to be smooth like everything in the system. Otherwise, I will not be happy.” (P6, FG4)

First, throughout all groups, the participants emphasized the importance of an easy and effortless handling. One participant claims that he is “*a bit lazy*” and does not want to write down things or get up if it is not needed (P2, FG3). The device definitely needs to function flawlessly, reduce work and save time. However, the participants of the focus groups regard voice assistants as rather time-consuming in their setup. They are especially concerned about the fact that it would take quite some time for the system to work flawlessly such as setting up a music playlists or connect it to different applications (P5, FG4). Furthermore, they doubt that the system can easily be integrated into the whole house without having any prior

specialist technical skills. Within that same focus group discussion, the point was also raised that carrying the gadget around the house for it to work was not an option (FG3). However, at this point, it has to be considered that most of the participants have never used any voice assistant. That is why some participants might overrate the effort needed on some occasions. This assumption is supported by the statement of P4 in FG4 telling P5 that it actually was not that hard to use explaining it at the example of a friend who owns an Amazon Echo device and that the setting up process for the friend had been easy. Nevertheless, the participants who never used the gadget before or came into contact with it previously agree on the fact that the system should work easily and *“be easy to incorporate”* (P4, FG3) when being integrated into the entire house and that being portable might be a value-enhancing feature of it. Complementing this is the issue raised by one participant who barely spends time at home and is not in need of it at home (P6, FG3).

“It would be annoying if just one person can talk to it.” (P1, FG2)

A second point brought up regarding effort expectancy is its effect on social interactions and social life. The participants of FG1 saw the gadget as interrupting their ordinary social interactions – not as a part of their daily life but rather as an intruder. This attitude is backed up by their opinion of picturing the VA as non-human and not intelligent enough yet to fit in appropriately into their daily life. In order for it to better blend into their social life, P2 of FG2 would for example like to personalise the command word herself. Instead of activating it with *“Ok Google”*, she would like to chose the activation word herself. For her, it is important what other people think about her within the social context. Saying *“Ok Google”* in the middle of an ordinary conversation with real human mates around her in her opinion would make her look weird. Some of the other participants concur. However, some state that personalising the activation word would not make any difference for them at all. What some care about though, is that *“drunk friends could order a new car or something”* (P7, FG1), for example during occasions such as home parties. Cancelling orders or sending back items which were ordered by people other than themselves (children or drunk friends etc.) is an effort they would prefer to avoid (FG2). Endorsing this, one participant sees a practicability issue when ordering through voice control since there are so many providers, brands and product options at different prices so that the device could not make the right choice (P7, FG4).

“The closest thing what we have right now to voice assistants is Siri on the iPhone and that works terrible. So, I think that makes us all really reluctant to trying, using or buying it.” (P3, FG4)

A third main point which was brought up in all focus groups constantly is the opinion, that the VA will not work properly anywhere, as technology is not there yet. This deduction was made by participants based on their previous bad experiences with similar, but more primitive assistants such as Apple’s Siri (P2, FG2). One example for demonstrating the frustration is the lack of practicalities with former voice assistants: *“My biggest frustration with Siri is, that I do not know what she can or cannot do. I mean she is great at calling someone from your*

phone list. That, she does amazingly. But she can not even like start a playlist in Spotify. Which is like for me tedious - if I walk in somewhere with my hands full and I want to listen to my playlist and I tell her can you play the playlist and she is like no I can not open apps.” (P5, FG2). Participants also worry about whether the VA will really understand their question and whether it will not be annoying if the command would be used in everyday life without really meaning it, if that would activate the gadget and if personalisation being available would be a good or a rather negative thing within that context. Moreover, some participants doubted whether VAs would work flawlessly and sensitively enough especially in loud environments such as many people talking in the room. (P2, FG1) To elaborate more on these concerns, P3 (FG3) brought up that the current, more advanced VA had problems understanding strong accents such as the Scottish one and did not work properly in that market. Similar problems could also be caused, due to the participants, in the Austrian market, which would be for some participants coming from that area, a reason not to purchase them. In FG4 it was brought up that languages, in general, could create a problem, as making the VA available in every possible language (especially those which are spoken by only small populations) could either create problems or take up a lot of time. In FG3, an international student brought up the concern, that she would have to switch between English and her mother tongue (German), depending on where she would live or who she would live with.

To sum up the effort expectancy regarding the acceptance of VAs it is crucial to be able to use the VA without any flaws. It can be seen that consumers see the gadgets momentarily as quite complex to install and do not agree that the promised features and benefits will actually work but that they could create rather extra effort. This would mean that both, marketing and manufacturers would have to look at that concern more in detail. Moreover, the participants seem to be not ready to control the gadgets via voice especially in social situations. Lastly, discarding the reluctance due to previous experiences with VAs will be a challenge for adoption.

5.3 Social Influence

Social Influence is “the extent to which consumers perceive that important others (e.g. family and friends) believe they should use a particular technology.” (Venkatesh et al., 2012, p.159)

Concerning the determinant social influence, the following relationships were posed when it comes to affecting purchase or usage behaviour of VAs in any way: Influencers (bloggers and vloggers), friends and family, no relationship (decision depends on individual self).

“I mean right now there are so many influencers like bloggers talking about it. I think in this case it wouldn’t really convince me to buy it.” (P3, FG1)

First of all, bloggers and vloggers, due to the participants, are not a strong influence when it comes to purchasing or usage decisions. Some participants would like to look at their content

to learn how they can use their gadgets to full potential once they have bought it. Until then, however, they state that they are not more likely to purchase or use a VA only on the base of an influencer's recommendations. They actually go as far as to mention ads in the same context. Their likelihood to purchase or buy is as low after watching an ad as after watching the content of an influencer. One comment approves the unimportance of ads and puts it in conjunction with the next relationship within the social influence determinant: *"I also think nothing could be more convincing than friends being happy with it. Like any commercials can be as awesome as they want to be. It does not make me buying it. But if I see my friends or family being really happy and satisfied with it, I will buy it as well."* (P2, FG1)

"I think my likelihood to use or buy it will also change if my friend have it." (P6, FG1)

The second relevant relationship for VA adoption brought up in the focus groups is the one with friends and family. As the above mentioned citation illustrates, every focus group was of the opinion that important others have a strong impact on the adoption of voice assistants (P2, P3, P5, FG1; P2, P3, P4, P6, FG2; P6, FG3; P5, FG4). The majority of the participants state that the more people have it and talk about it, the higher the interest to buy and likelihood to use it. One participant even mentioned that there is nothing more convincing than satisfied friends recommending it. Nonetheless, one should not neglect the fact that friends and family members can also have a negative impact on the probable use of VAs if they are not happy with the gadget, as P3 of FG1 expressed: *"If I have a bad recommendation [...] it would, even more, build up a barrier for me to use the device"*. P4 in FG1 brought up that she will only use the gadget if it *"helps me to interact with my friends"*. This means that the more friends have it, the higher her probability will be to use it (critical mass increasing). P6 within that same group mentioned his fear of becoming *"old school"*. That could imply that he fears to be left out when he does not give in to the peer pressure once all his friends own a VA. In contrast to the critical mass theory brought up by P4 in FG1, P4 in FG3 sees no benefit that a whole social group has through the device as for her it is really personal and an individual benefit not influenced by outer standing people. Weighing the overall opinions of the focus group participants, for the majority not necessarily the opinions of friends and family are important, but the factor whether these own a gadget or not and whether they learn through them more about it. While only very few of the focus group participants consider themselves to be early adopters, most participants agree that if friends (in general) or many friends own a VA, their likelihood to buy or use a VA themselves would increase just as well. Three participants overall got to try a VA at a friend's place and were surprised and positively tempered towards actually buying and using a VA (P3, FG1; P2, FG2; P4, FG4).

"I think I would try it out myself first and then I would see. But I wouldn't like just listen to a recommendation from some friend, definitely not." (P7, FG3)

The third relevant 'relationship' identified, is the one not existing. Consumers state that they are not influenced by any of the abovementioned relationships but form their decisions autonomously. One of these is P4 of FG3. He would buy the new technology of VA regardless of what friends or family think. P3 of FG4 also only cares about necessity and *"the*

main USP is convenience” for him when adopting a new technology. What all participants have in common, however, is their willingness and curiosity to try out the gadget themselves, even if they do not plan to purchase it (yet). One reason for that is the fact that most of the participants do not know much about VAs and their capabilities.

Concluding, it can be said that apart from very few exceptions, friends and family form important influencing factors. Vloggers, bloggers or ads have minor influence while the biggest influencing factor apart from friends and family can be considered the individual consumers being curious trying out the technology for themselves to try it out. If this is done at a friend’s place and the friend gives along with it a positive recommendation, chances of adoption are especially high.

5.4 Facilitating Conditions

Facilitating condition “refers to consumers’ perceptions of the resources and support available to perform a behaviour.” (e.g. Brown and Venkatesh 2005; Venkatesh et. al 2016, p.159)

When discussing facilitating conditions which consumers would need in order to adopt voice assistants, the participants were often split into opinion or different groups having different priorities. This will be further elaborated when introducing the three main points the members linked to facilitating conditions: Time spent when getting to know functionalities, the form of education in how to use a VA and participants’ life situation.

“I do not think I would be willing to learn how to use it. Like going to a place and taking a lot of time.” (P5, FG1)

First of all, when looking at the willingness of the participants to spend time in order to understand how to use voice assistants, they can be split into two groups: Those who want to spend much time in learning to understand it and those who do not wish to spend much time in order to do so. While several people talk about how they would spend their time to educate themselves about how to use the gadget (see next point), P3 of FG1 claims that she has no willingness at all to put in an extra effort to understand the usage of a VA: *„It needs to be super convenient, super self-explaining itself. It needs to be that I have a look at it and then I know a second later how it works. I don’t want to spend a lot of time to get to know and learn how it works. Then there is no point to use it“* (P3, FG1) or *„I would just expect it to work. I wouldn’t look at any videos or read anything. I would expect it to work“* (P5, FG2). Instead, she wants the gadget to be easily understandable and not put in any extra effort. While she is kind of an extreme in the focus group discussion, not willing to dedicate a single minute to understand the gadget, most of the participants were willing to spend some time. Nevertheless, they differed in their extent to which they are willing to spend time investigating and understanding it. For some participants, it is also about their current perception of VAs. As for now, some do not see the need, they would not read about it or go

to a store. To illustrate this, one participant gave the example of him being into so-called ‘drones’. (P4, FG4). Thus, it is more about deciding that, he wants this technology and after that he would look for every information needed. One additional aspect regarding the willingness to spend time on VAs is the phase within the adoption curve of the individual. For the participants, it is clear that ‘early adopters’ are rather interested in trying everything out and understanding the functionalities of the VA to be eventually the ones recommending it. However, mostly everyone in the focus groups would wait for friends to adopt it and then maybe spent time trying it out at a friend’s place.

“If there was something special I wanted to know, I would search for that specifically I think. But otherwise, I will use it from out the box kind of.” (P5, FG2)

Secondly, when it comes to types of education that have to be available in order for people to understand how to use the gadget, the participants split into different preferences. The preferences also differ in terms of the participants’ general knowledge about the gadgets or their differing extent to adopt new technologies in general as already mentioned above. While some participants of focus group four claim, that they would know how to use a VA and do not need more than simple information on the website, others state that they would need more instructions when learning how the gadget works (P6, FG1): *„So there would be much more for me personally that I need to know in advance what this thing is able to help me with and what it can do for me.“* (P3, FG1). Nevertheless, both groups agree that having some source (even if it is just a knowledgeable friend who knows about all the flaws and benefits of the VA – P3, FG4) to learn about the full spectrum of the VA’s skills would be useful. As potential sources for gaining information, they valued the following types of education: Experts explaining the device (via live communication, videos, blog posts or reviews), the manufacturing company providing them with hints (compared to iPhone tips) or just trying it out completely themselves. An expert, due to the participants, could be a friend or just a person in general who gives instructions on what the gadget can do and cannot have a broad knowledge about its entirety of skills (P6, FG2; P6, FG1). While P7 (FG2), P4, P2 and P7 (FG3) would like to get in touch with such an expert by reading reviews and watching videos and shared social media content of such expert people online, others mention the opportunity of the gadget providing tips on the iPhone introducing new functionalities. At that point, P2 of FG2 introduces an interesting aspect: Instead of learning via phone instruction push notifications every now and then how the gadget works, she would much more prefer to ask VA (such as Alexa) herself what the device can do and expect an answer in return instead of reading instructions. The third group of people would either like to *“try it [the gadget] out”* themselves (P5, FG3) in places such as an Apple Store or a friend’s house or do a lot of research themselves across all different types of information sources (P1, FG3).

“We are all students in Sweden with no jobs...I hardly spend time in my room anyway and I am not going to be the one talking in his room and everyone will be like what is wrong with this person.” (P5, FG4)

The third facilitating condition being part of the focus group discussion is the personal situation of each participant. A selection criterion of the focus group was, that all participants were between 20 and 30 years old. As all participants are students, their housing situation and income differ from those belonging to other age groups. These two factors, however, seem to play a big role in the adoption behaviour of the VA technology. These were specifically discussed within FG4. Due to the participants within that group, it is not the gadget that needs amendment, but the personal situation – the housing influences the extent to which the gadget can be used and the budget has an influence on the willingness to pay. The benefits provided to students who live in a student dorm and cannot use most of the house electronic steering skills of the gadget, plus only live in one instead of several rooms, the benefits provided by the VA do not seem good enough at the moment (P4, FG4).

To sum the facilitating conditions chapter up, three things can be said: First of all, getting in touch with the gadget in some form pre-purchase (friend, Social Media, while shopping) seems to increase the education level of the participants concerning the VA usage and is appreciated by most of them. Secondly, they are not willing to spend too much time in figuring out how it works but are open for minor inspiration search and most importantly, for trying it out themselves. Thirdly, the personal housing situation of the participants seems to have an impact when looking at facilitating conditions for accepting a VA to its full potential. Living in only a single room or shared apartment, their willingness to adopt to a technology of which they can only use fragments decreases substantially.

5.5 Hedonic Motivation

Hedonic Motivation is “the fun or pleasure derived from using a technology.” (Venkatesh et al., 2012, p.161)

Within the hedonic motivation aspect, the focus group members discussed the fun or pleasurable moments from using voice assistants. First, different fun or pleasurable situations are described. Second, the fun and pleasure deriving from the VAs functionalities are stated.

“I think it helps when you have a hangover and you’re in bed like...and then play music or order a pizza for me” (P2, FG4)

First, in every focus group, the participants could imagine different situations in which voice assistants could deliver pleasurable or fun moments. Voice assistants could be used at parties among a group of people (P7, FG3). A VA could be entertaining by telling jokes (P2, FG2), give funny answers (P6, FG3) or narrating stories (P5, FG1). The majority of participants related pleasurable moments to music. Voice assistants could have karaoke functions or play different kinds of music depending on the mood of the user. Another aspect for delivering fun moments could be to make the voice assistant speak in another language or accent or even make it sound like a celebrity such as “Mickey Mouse” or “Bruce Willis” (P3; FG3).

Additionally, for some participants, gamification could be interesting such as the ability to play games versus friends or answer questions in a quiz.

“Exactly based on what is in your fridge and your profile food-wise that the system has recognised and then it gives recommendations. That would be nice” (P6, FG4)

Second, the abovementioned examples illustrate the variety of occasions in which the technology could deliver fun and pleasurable moments. However, more prominent throughout the discussions was the pleasure deriving from the relationship with the technology and the included possible functionalities. A majority of participants likes the artificial intelligence-based component of the voice assistant. It should be able to learn based on what activities have been executed or searched for. The gadget should advance and even think further than oneself by predicting or suggesting certain things such as new recipes, new movies or new songs. Some participants would challenge the gadget in testing how much it is able to do and to *“remind it, that it’s just a machine”* (P5, FG1). Notwithstanding this, the human component of the system can be something really surprising and exciting which increases the chance of adoption. Examples of this could be the understanding of irony throughout a conversation or read the user’s mood and react to it (P3, P4; FG1). Following the personalised and humanised path, Focus Group 2 could imagine the VA to be integrated in the household, *“when your wife or husband leaves the house, tell the machine that it reminds them to take the key”* (P4, FG2) or *“if you have a discussion and you are so sure about something you could always ask her if that is true or not”* (P2, FG2). For most participants, the possibility of everyone speaking to the device contains flaws though. They were concerned about friends playing pranks through the device as the statement *“you have friends over and they say turn the lights on and off that would be super annoying. Is there a function that stops that?”* (P3, FG3) shows or children ordering items online just by speaking up to the voice assistant. Personalisation and individualisation are important for most participants, as *“it does not feel very personal if everyone else is talking to Alexa as well”* (P6, FG4). Many participants suggested that the voice assistant should recognise only the user’s voice.

Evaluating the importance of the determinant hedonic motivation for adopting to voice assistants, not one group considered fun and pleasure as highly important. Convenience and saving time were named as more important factors. Most participants see the VA’s ability to deliver fun and pleasurable moments as something that should be given and available if asked for. It is rather seen as a side gadget. Some participants mentioned that it could be fun if the VA tells you jokes or has enjoyable conversations, but it will probably get boring after a short period of time. In addition to that, humour is something that is linked to the individual. Everyone considers other things as fun and pleasurable. Nevertheless, if the VA is able to adjust to the individual, learns throughout the usage and delivers value to the user which then creates pleasure and surprising moments, the hedonic motivation determinant can gain more importance for adopting the technology.

5.6 Price Value

Price Value is “consumers’ trade-off between the perceived benefits of the applications and the monetary cost for using them (Venkatesh et al. 2012, p.161; Dodds et al., 1991)”

Just as Dodds et al. defined the price value determinant, all focus groups revealed that the price is closely linked to the benefits one gets in return. Furthermore, the current life situation and received recommendations are related to the price and the accompanied willingness to pay for voice assistants as well.

“I think with increasing functionality may price barrier would also go up” (FG4, P4)

First, the price is closely related to the benefits one gets in return. Most participants did not see the value of voice assistants at the moment. Moreover, they were not entirely convinced or had the need to buy one. Thus most of them were not willing to spend more than 100 Euros for voice assistants. However, the majority is more likely to adopt and buy quicker as the functionalities and thus their benefit from using it improves. One participant saw voice assistants as an incremental improvement and compared it to the adoption of smartphones. *“If we think about the price of an iPhone and how smartphones revolutionised the price of a phone because they were around 100 to 200 Euros the best ones and then the iPhone came out with 600 Euros. People, and me as well, were willing to pay that because it completely changed upside down the way we communicate. But I just simply do not see the same in this one right now that it changes you know my complete daily life” (FG4, P6).* Others also mentioned that the price can get irrelevant if the benefits are high and the user likes the product a lot. *“If I compare it (the Voice Assistant) to the Macbook or the iPhone which I bought. It is not like the Macbook is actually the best computer on the market. You can get better computers, that is a fact, for a lower price” (FG1, P1).* Furthermore, the participants could imagine paying more for voice assistants if it is interconnected with the whole house because then it is something that enhances the lifestyle and transports benefits. The connectivity and compatibility aspect will be explained more thoroughly later as it is an important determinant for adopting the technology.

“I wouldn't know if I would pay fifty euros for it. Right now. But later, maybe. Like if you earn a bit of money, then maybe. But fifty euros would be like really maximum for me. Because I do not see the need for it at the moment. “ (P7, FG2)

Second, some participants related the role of the price for adoption to the life situation they are in. All focus group participants are currently enrolled as students at Lund University. As they do not have much money and live in small apartments, the use of a voice assistant at the moment is not needed. So the financial situation in which the participants are in right now as well as the limited benefits for their daily life in Lund make the participants less willing to spend a high price for the gadget.

“At the moment I'm not even interested in what it can do. Maybe this will change at one point if my family or someone uses it and says this is the best thing in the world you cannot live without it or whatever.” (P7, FG4)

Third, another aspect linked to price could be recommendations. One participant was not willing to pay a high price for VA right now, but as soon as family or friends or society accepts the technology the likelihood of adopting as well rises. One example for this is brought up by one participant who adopted the service “Whatsapp” due to necessity because all of his friends used it (FG4, P3). Moreover, it would be appreciated by the participants to see the gadget in action at a friends or family member’s house to get convinced.

Summed up, the price is plays a role for technology adoption since it is closely linked to the benefits one gets in return. Linked to the price is also the current life situation and received recommendations. However, they might not be as impactful as the received benefits in return for the price.

5.7 Habit

Habit is “the extent to which people tend to perform behaviours automatically because of learning (Limayem et al. 2007, p.709), while Kim et al. (2005) are equating habit with automaticity (Venkatesh et al., 2012).

For the habit determinant, it is brought up by all focus groups, that the system has to run smoothly and seamlessly. The voice assistants need to be convenient and time-saving to use them in an automated way integrated into the daily life routines. Throughout the discussions, two major topics were stated. First, the participants thought of occasions where the usage of voice assistants could be convenient and useful. Second, the location for using it was discussed and it was doubted whether the home would be the best way to use it and whether it should not be portable instead.

The participants considered the voice assistant as very helpful for situations in which you can save time or where you have to do more things at the same time (FG1, P2). Most participants also appreciated that the use of your hands is not necessary. Examples for integrating voice assistants in the daily life could be ordering food or ordering a cab while cooking or to adjust electronic devices such as the lights, the oven or the heating. The fact that you speak up to use it could be something that one has to get used to. *“When you buy it first, it will happen to you many times I guess that you do stuff with your phone and then you realise: Oh I could have done this with my voice device so to say” (FG1, P7).*

“But that thing is standing at home right? I am spending so little time at home, I wouldn't even...if it was on my phone then I have it I guess. I have Siri, but I never ever use it, but at home I do not see the purpose.” (P6, FG3)

The second aspect regarding the habit determinant is the location for automated use. One participant mentioned that people tend to be rather outside of the home. *“It should be easily portable or something. Because I mean we are all eight, ten hours per day in the university and the rest of the time like sleeping and two or three hours that we do stuff at home actually. And you know if it would be super tiny and you could have it in your pocket here or here and put it also on your desk at work or wherever, then I would be much more likely to use it more often”* (FG1, P7). One opportunity for a better adoption would be then for companies to integrate it into the workspace (FG1, P3). *“I think in professional life it makes the most sense because at the office you would be like hey I have a meeting at three o’clock tomorrow. Can you put that in my calendar? Or call me a taxi. Or I have a meeting, can you write an e-mail that I am five minutes late, can you book me a flight? When is the next train? Because when I am at home I am there in the morning and in the evening and then I want to relax, but most of the time I spend at work.”* (FG4, P2). Besides the beneficial use of work, the majority of participants wants the device to be portable. It should work on the bike or even in the car. Some mentioned that the future will be much faster which leads to a world in which many people are in a hurry. The device should be on people somehow such as a wearable solution or even more futuristic such as a little earbud (FG3, P6). Beyond that, it was stated that the VA needs to be paired with the phone so that one can control everything that is at home on the go. For some participants, this data transfer via the phone can also be beneficial at home because they were worried about the fact that the voice assistant cannot hear you everywhere in the house. In addition to that, they were concerned whether to have more than one device or if one is enough (FG3, P4).

Concluding, for automated use of VAs it is essential that the device works smoothly. Furthermore, participants would appreciate if the device could be integrated into their daily routines at home as well as the ubiquitous availability even on the go.

5.8 Additional Determinants

In addition to the pre-defined determinants from the UTAUT 2 model, the researchers intended to look for additional determinants which were brought up during the focus group discussions. They could help to predict and understand the adoption of voice assistants although the interviewees did not include these aspects in the topic guide. Factors that have been discussed are data security, compatibility, relationship with the device, the brand, the design and the self-representation through a technology.

Data Security

Data security is something that all focus groups discussed when talking about the adoption to voice assistants. The three main topics of interest regard voice assistants functionalities, the transfer of data and the personalised usage.

“So it can hear everything you are saying?” (P7, FG3)

First, when speaking of data and security issues, lots of participants asked questions about the functionalities of voice assistants. They were wondering whether voice assistants constantly listen to oneself or if they could be switched off (P2, FG4; P7, FG3). And if they could be switched off, would that maybe harm the voice assistants optimal usage because that would mean it might not always learn from the actions it should do. One participant even portrayed a possible relationship scenario: *“But can you listen to the recordings? For example, when you think your husband is cheating and you are like: Alexa, play me everything that happened from then to then yesterday! Can you do that?” (P6, FG3).*

“My take on the whole data discussion is that people worry too much about their personal data cause no one cares about your calendar things or no one really cares about what you share on Facebook. There is, and this is just my opinion, nothing to be afraid of.” (P6, FG4)

Second, the opinions about giving away the personal data varied. Some participants were really concerned about data security, whereas others argued that people nowadays give away so much data already and that it would not be a problem. One major issue regarding data security is the personalised data for purchasing activities. As voice assistants are capable of buying things online they have to be connected to some kind of bank information. The participants want to be ensured that no one else can get access to this data. In this context, the focus group members mentioned the importance of trust. One does not trust Amazon and Google and would even go so far as to spend money and *“pay [...] for such a system”* to for a third party such as an insurance to guarantee that his data is save (P2, FG4). Another participant in this focus group also sees trust as important and would not give his data to *“some sketchy provider or whatever”* (P1, FG4). In focus group one, participant 2 and 3 were outweighing the given away data with the benefits in return. Whereas P3 feels like *“losing too much control about life”* and does not have trust in the technology, P2 would think it is nice if the device knew the user’s preferences and gave suggestions based on the data.

“Especially, how does it work when you have a child and it says: Hey Amazon I always wanted to have an iPod, buy me one!” (P6, FG3)

Another third aspect introduced by the focus groups is personalisation. As security seems to be important to the participants, it is, therefore, crucial for VA adoption to be able to use it individually (P3, P7, FG1). Voice recognition or other securing solutions would, in this case, be very relevant. Not only for purchasing activities as mentioned before, but also for example if the VA is secured to the house *“if you have an alarm system”* (P2, FG2). To prevent others

(such as children or friends) from buying things through the device, members of focus group 3 suggested having different personalised modes or keywords (P3, 4, 5, FG3). One participant mentioned that giving away personalised data could lead to lots of benefits in the usage as such companies “*have a lot of data of me*”. (P4, FG2). Another participant agreed and mentioned that one could change the settings individually. So it would be possible to allow others to use certain activities and what should be known by the system and what not. (P7, FG2)

Concluding the determinant data security, most participants seemed to be concerned about their data and the functionalities of VAs. In this context, it is relevant to the respondents that their data is handled in a secure way and that the use of the VA can be personalised, especially with regards to online purchasing activities in order to adopt the technology.

Compatibility

A second novel determinant for technology adoption of VAs is compatibility. First, the participants deliberated that voice assistants should be connected to every other possible gadget within the house. Second, compatibility and the role of the provider was discussed. Third, participants again brought up their current life situation which has been described under ‘Facilitating Conditions’ already and thus capturing less attention in this chapter.

“The more connected things I have, the more relevant it is. Because it is like the hub for all my devices.” (P4, FG2)

First to mention, among all focus groups, there was a consensus about the importance of compatibility. A voice assistant should be able to connect to as many devices as possible. Participants wondered whether the VA can, for example, be connected to the fridge, the garage, the windows etc. arguing that “*this would be a big incentive if it really connects to everything*” (P3, FG4). Some participants argue that in order to use VAs to the full extent it is necessary to set up the “*whole eco-system*” (P2, FG3). Which is meant by that is to have other technologies in the house as well, using the VA as a tool to control everything with it. Most participants want the VA to work individually for their individual house (P5, P7, FG2), one participant argues that “*the best would ideally be an all in one solution*” (P4, FG2) so that he does not have to switch between devices. In the context of the “*smart home*”, one participant found it interesting if the device knew when he is home. This could not only be good from an environmental point of view, but also from a security point of view “*to protect my house like for example puts LED on and off every once in a while with an algorithm so people think I’m home even though I am on holiday*” (FG4, P7). P6 in FG4 went even so far as to say that this technology could fulfil people’s basic needs like safety in this case.

“I think it is about compatibility. For example, if you have a device that is not Google and if you have Google Home. I think there are compatibility issues. So, I use “ok Google” but on my phone I use Siri. So, maybe I have to schedule three times for three devices. If you have a set-up, I think it is easier, but different devices need different inputs.” (P2, FG3)

Secondly, as mentioned before, for the participants it should be possible to connect the devices to everything in the house. Likewise importantly is the fact that it should be compatible with devices such as the smartphone, the laptop or TV independent of what provider one uses. Some participants argued that if they had a certain brand already in place which with the VA cannot connect, it would be a reason not to buy (P2, FG1). P4 in FG2 complemented this by saying that it should be most useful to him, resulting in not having different solutions. Furthermore, participants expect the VA to connect to already existing applications in use such as calendar, mail or navigation.

“I do not think it is about the age, to be honest with you. It is about the position we are in order to adopt this technology.” (P4, FG4)

Third, the current life situation, as mentioned earlier, seems to play a role for adopting to VAs. In the compatibility context, some participants saw it as a prerequisite to have a house to use VA with all its functionalities. *“Right now, I would not need it. I live in a corridor”* (P2, FG2). Especially FG4 raised the issue of not being in the stage of life in which they have a big house or apartment and the necessary money. Thus, for them the benefit to buy and use it is not big enough: *“For me, it is my surrounding. I might actually have bought one already if I would not be living here. Because I would be more interested in general and might try it out”* (P4, FG4).

Summing up the compatibility determinant, it is crucial to the respondents for using VAs to have the ability to connect the device to other gadgets within the house. Furthermore, a VA has to be compatible with other owned devices. Lastly, since VAs are used within the house, participants consider their current housing situation as a relevant factor for adopting to VAs.

Relationship with the device

The relationship with the device is the third new identified determinant. In terms of adopting VAs, there were two standpoints arising in the focus groups. On the one hand, there is the interesting component of the VA making use of AI and becoming smarter so that one can have conversations. On the other hand, negative aspects about the relationship with the device have been brought up by the participants, which will be elaborated below.

“I think this can be really interesting in the future when AI becomes really smart (...) and you come home and then someone would ask: How was your day? You would literally have a conversation with it (...) really interesting” (P7, FG4).

First of all, it needs to be mentioned that participants could imagine a VA being almost *“like your best friend”* (P3, FG1) in the sense that one could talk to the device about how the day was and actually have a real conversation as one would have with a fellow human being. The extent of this interaction is dependent on *“how intelligent the device is”* (P1, FG1). Some could imagine the device to change one’s mood after *“you tell her you are sad, she will be*

like: *Say no more, I am on it!*" (P4, FG3) and then, for example, the VA would play atmospheric music. This artificial intelligence-based component – a machine becoming smarter and performing actions automatically – appears to be captivating to some participants. Moreover, artificial intelligence resulting in surprising actions by the VA can deliver high values and thus benefits to participants. Interestingly, participants from all focus groups linked the vision of having a relationship with an AI machine to movies or series which they have seen such as *"Her"* (P7, FG2), *"Suits"* (P3, FG1) or *"Legends of tomorrow"* (P1, FG3). This might imply that for the participants VAs are still partly seen as something fictional.

"I feel a little bit of fear of machines taking over the world" (P1, FG2).

Secondly, notwithstanding the possibilities that AI offers, a majority of participants is still not totally enamoured with the development. For one participant, it would even be a criterion not to use it: *"That's super creepy. If it actually predicts what I am doing next, oh my god, I would throw it out immediately"* (P6, FG3). It was argued whether the relationship with the VA would even go so far as to make some people becoming isolated (P1, FG1). Introverted people might shut themselves completely from reality and would only talk to their machines at home. Another issue for some participants is the (maybe too) personal connection to the device. From seeing the introduction videos, they were wondering how far the VA could go. The fact that the device has a name such as *"Alexa"* already makes it intimate for some participants (P7, FG2). In addition, it could be weird talking to someone that is not a physical human being and most do not value if the device would personally greet one with *"good morning"* or *"good night"* (P2, FG2).

Summing up the relationship determinant, there are good and bad parts to it which influence consumers adoption to VAs. On the one hand, it could deliver benefits if the VA makes use of AI and builds up a personal relationship with the user. On the other hand, people might not be ready yet to communicate with a VA such as with a human being. Furthermore, participants saw an issue of becoming less social and isolated.

Brand

Speaking for all focus groups, it seems to be more relevant that a VA is convenient to use and has the ability to connect to many other devices than belonging to a certain brand. The participants are aware of brands trying to "lock-in its customers" (P4, FG3) and they do value the competition. Though a VA must connect to the devices one has, independent of the VA's brand. One exception illustrating the possible impact of a brand for technology adoption was "Apple". Many participants highly appreciate the brand and argue that more people would be willing to use a VA "if Apple would have a voice..." assistant solution (P1, FG2). This is especially due to the fact that most participants already trust the brand and have at least one other device in place.

Design

As a VA is used within the house, some participants mentioned the necessity of an appealing design in order to use it. One participant described the Google version as not good looking and “*kind of chunky*” (P5, FG2), whereas the Amazon Echo appeared to be professional and futuristic (P5, FG1). The Apple products, even though there is no market-ready version yet, were usually considered as having a nice design. However, design refers to taste and is thus quite individual. Therefore, it is too vague to argue for the relevance of design for adopting to VAs.

Self-Representation

Focus Group 4 brought up the aspect of self-representation via the device to impress others. In a business context, for example, it could be possible to implement a VA in an office room. When having a client invited for a meeting, one could start the beamer, close the curtains and dim the lights through the voice which could lead to an impressed and surprised client (P2, FG4). P5 in FG4 argues that “*many people would not admit to do that, but it is also an image thing if you have that thing in your house, it would be cool*”, concurring to link the possession of having a VA to why people own iPhones or Tommy Hilfiger shirts. Therefore, one factor for adoption could be self-representation by having a VA as a status symbol.

6 Discussion

In this chapter, the findings of the analysis will be elaborated and commented on. The relevance of each existing and potential additional determinant for the overall adoption of the VA technology as well as upcoming technologies for potential users will be portrayed. Additionally, the analysis findings will be linked back to the findings of the literature review. Furthermore, the relevance and implications of this study for upcoming research will be discussed and further areas for future research will be suggested.

As initially mentioned, the purpose of this study is to get a deeper understanding of the influential determinants for potential users' adoption of VAs within the context of AI and IoT technology. This research further examines which factors seem to influence them in which way and are of importance when looking at their willingness to purchase and use a VA.

This study has shown that not all seven existing UTAUT 2 determinants have equal impact or relevance at all when evaluating the adoption decision for VAs of consumers. Previous studies have shown that especially looking at it from a consumer perspective and understanding potential future users of VAs, will help to increase the technology adoption rate. As the determinants rarely have been looked at from this perspective, this is considered highly important. Even more, some essential determinants seem to be missing. In the following, an examination of the current and suggested additional determinants will be conducted. Moreover, these findings will be linked back to the literature part to check whether the findings concur, oppose or need amendment of the current status quo of academic research within the field of technology adoption.

Structure-wise, this chapter will first discuss all determinants including the determinants data security, compatibility and relationship with the device, which will be the ones being added eventually to the UTAUT 2 model. The focus group discussions generated, as previously mentioned, even more potential determinants influencing consumers' adoption behaviour of VAs. However, these factors were not discussed in detail by the participants and seem not to have the same big relevance as the three above-mentioned determinants do. Therefore, the emphasis of the discussion will be placed on the other ten determinants (7 initial ones and the three above-mentioned ones) and the determinants brand, design and self-representation, which were rarely mentioned in the focus groups, will be excluded of the following discussion part. Within this discussion, the now ten determinants in total will be linking the literature review to the findings made within the analysis as well as regarding potential limitations and suggestions for further research. After completion of that, a summarising part will draw a broad and concluding picture. Within the entire discussion process, all nine determinants will be treated equally.

6.1 Performance Expectancy

The main aspects within performance expectancy circled around the issue to which extent consumers are actually able to say/ predict which features they want regarding VAs and their future development.

Ulwick (2002) and von Hippel (1986) already discovered that different groups of people differ in their expectations concerning a specific technology. According to them, most people have actual difficulties when pointing out features they would like to see within a certain gadget. They lack the ability to see and imagine what is happening in the future and therefore base their judgements on things they already know. As a consequence concerning the benefit expectations asked, they referred often to an assistant they already knew: Apple's Siri. Focussing on what this assistant can do instead of what the new voice assistants can do might have biased them in their answers and also limited their imaginations of what actually could be possible with the new assistants. Especially FG1 focussed a lot on what was not working with Siri and what could be improved. All focus group participants had a hard time coming up with entirely new benefit requests and to see what is happening in the future, being too attached to features and functions of assistants they already knew.

Contrastingly, regarding the findings of Douthwaite, Keatinge and Park (2001), who stated that the adoption likelihood increases the more the consumers benefit, this statement was also found to be in line with the focus group discussion opinions. Several participants critiqued the VAs and their skills, appearance etcetera in certain ways. However, they stated that if certain issues would be either removed or improved, their likelihood to adopt to that technology would increase. This would have as a consequence, that the R&D departments of the several VA brands should look closer at the consumer expectations, especially regarding their performance expectancy and amend or add wished-for features. This close relationship was already suggested by Lamore. The finding of this study is, that this would also increase the VA adoption. Further research could back this up more in detail. They have come up with a similar finding in their case study research amongst technology being released from the R&D department and its adoption. They found out that the likeliness of adoption increases, the more "key stakeholders", people who are directly affected by it, benefit. These network externalities will later also be linked to Peres within the discussion part of the Social Influence factor. This signifies that in order to alter chances of a new technology being adopted throughout the market, the R&D department and the researchers should closely monitor how a technology performs in real life conditions and improve it themselves.

What can be seen critical when assessing the participants' ability to actually answer the question properly, is the fact that most participants heard about the voice assistants for the actual first time within the focus group discussion.

That is why all in all, the performance expectancy aspect is, of course, relevant when understanding which factors are considered important for consumers in order to purchase a voice assistant. Nevertheless, it is shown that they have a hard time picturing potential benefits out of the spectrum of gadget performance skills they already know. This implies that either marketing of current VAs should change to make consumers aware of the entire skill spectrum or that that concerning production of VA skill sets, asking the consumers of what they wish for is not necessarily the best way to go, as their imagination is limited when it comes to new gadgets but definitely a possible and recommended starting position to enhance VA adoption, keeping in mind that no world-changing results will probably come out of this, but it will definitely result in a better understanding of the consumer.

6.2 Effort Expectancy

As elaborated in the literature review above, effort expectancy is one of the most important determinants when examining behavioural intention.

Within effort expectancy, two factors seemed to play a role for the participants: How high they evaluated the effort and whether they judged it to be aligned with the benefits they would gain from accepting and using such a technology.

Most of the participants saw the effort to learn how to use a VA and integrate it into their daily life rather high and sometimes even troublesome. Within that context, they voiced their need but also their willingness to learn about the gadget's functions in different ways several times. A reason for focussing so much on the high effort they would have when adopting a VA can be explained through Huang and Liao's cognitive innovativeness article and the use of Rogers' adoption curve. This adoption curve indicates that only a very small percentage of the entirety of consumers are early innovators. The big majority are not adopting as quickly and their personality traits are slightly different, especially when it comes to curiosity about trying out new technologies. Huang and Liao confirm this saying that while people with high cognitive innovativeness focus on the outcome of using a gadget, those people with lower cognitive awareness focus rather on the effort of using it. While people with high cognitive awareness find themselves at the early beginning of the adoption curve, the level of cognitive innovativeness sinks, the more the adoption curve is looked at the right side. That means that the majority of people and also participants within the focus groups seem, probability-wise, be located rather in the middle parts of the adoption curve. As a consequence, their cognitive innovativeness is lower and the way they perceive the effort they would have to put into use the new technology is far higher.

Another reason why the actual diffusion of VAs might take longer than expected is that high effort expectancy could be seen as high consumer doubt. Linking this to what Sääksjarvi and Morel said, high effort expectancy could be also seen as high consumer doubt. This would

mean that because consumers do not know enough about the VAs, their doubts might arise which would eventually lead to the gadgets not being adopted as smoothly.

What can be brought up critically regarding the validity of the answers to this question is the fact, that most participants did not seem to have enough knowledge about the VA to answer the question. They asked many follow-up questions about how the VAs worked and referred to gadgets they already knew (such as Apple's Siri) when evaluating the effort. As a consequence, they had quite strong opinions on why the new system would not work, basing it on previous bad experience. As Siri did create several problems for the participants, her usage for participants was judged as frustrating (FG2). The participants based their evaluation of their perceived effort for the new VA mainly on Siri. That could have caused biased answers. The fact that participants have problems understanding what the gadget can actually do and how it works could either be linked back to theory, associating it to concepts of low cognitive innovativeness and consumer doubt but just as well it could lead to a criticism of the method used: Simply showing an introductory video of the VA gadgets at the beginning of the focus groups might not have been enough for most participants to understand the entire scope of the skill set. Nevertheless, spending more time on explaining their features might have created too much bias.

To summarise, the effort expectancies by the participants were considered rather high. Reasons for this could be that the VAs have just recently been introduced to the market and the people adopting it find themselves still in the early phases of the adoption curve. This does not only mean that most people have a low cognitive innovativeness level regarding VAs and therefore perceive the effort to adopt and use them rather high. Not knowing enough about the technology creates also a rising consumer doubt which could hinder the technology's smooth diffusion in the market. How these were overcome successfully with past technologies which diffused the market and whether the indicators of the VA technology within that transition could be an area for future research.

6.3 Social Influence

The authors Högg, Schmid and Stanoevska-Slabeva, as a consequence of their technology adoption research, already found out that Social Influence plays an essential role in technology adoption. They conclude that psychological and social influences are of high importance when accepting a new technology. When using, amongst other models, the TAM model for their study, they therefore even extended it by the factor Social Influence.

The findings of the focus group discussions concur with that finding that other people seem to have a substantial influence on the adoption behaviour of the individual.

Linking the findings to Peres, Muller and Mahajan and their two components within social influence, it can be concluded the following:

Concerning network externalities the consumers concurred saying that the more people or friends they knew had one, the more likely they themselves would be to get themselves a VA, as this, for example, would enhance the opportunities and ways to talk and bond with their friends. This goes in line with the previously mentioned findings of Douthwaite, Keatinge and Park who claim that the more “key stakeholders”, meaning users, benefit from a technology and simultaneously acknowledge these benefits, the more likely a technology is to diffuse the market. The focus group findings indicate that also regarding VAs, the network externality effect seems to be relevant and increase the perceived utility of the gadget.

Regarding social signals, the result of the focus group conduction was, that these are not perceived too strong by participants yet. Nevertheless several of them stated that if everyone they knew had one, they would not want to be the ones who do not. This means that it is not seen as a status symbol but it definitely is considered as a group belonging factor people would not want to miss out on. However, an interesting factor in the focus groups was brought up, which can also be related to social signals. When talking about using the gadget in the presence of friends and during a conversation randomly activating the VA with “Ok Google” or “Hey Alexa”, some participants expressed their discomfort in doing so. They felt that this behaviour in the presence of friends or other people was rather odd and could make them look weird. If there was the option to one day use the VA in public spaces, this doubt would even be of bigger size. While the majority of participants agreed, some contrastingly stated that they would not mind talking to their assistant in public or with friends around and that applications such as Whatsapp already cause us to do these things today and that it isn't considered weird by them at all. Future research could actually further look into this perception and see if the reason for the people's perception of seeing talking to a VA as something weird is because it is regarded as something non-human and impolite or because its origin lies in the newness of the technology: The fact that it has not diffused the entire market yet, is still unknown by large parts of the population and therefore maybe not socially accepted.

The word-of-mouth effect to which also Peres, Muller and Mahajan referred, seems to work within the VA context as well, especially as the participants seemed very keen on trying a VA out if a friend told them about it or if one of their acquaintances owned one themselves.

While friends and family were considered to have a big impact on the adoption behaviour of the participants, bloggers, vloggers, other influencers and ads were considered less influencing by them claiming that their convincing power would not be strong enough.

Right now, most participants, however, do not see themselves as getting a VA and using it in the nearer future. The main reason standing out being that most of them do not seem to be part of the early innovator adoption curve stages (Rogers, 2003) and the technology adoption of VAs does not seem to have tipped over that stage yet. Friends and family nevertheless

continue to have a big influence on their adoption behaviour. When it comes to the participants themselves influencing their friends and family to buy and use the VA gadget, they are not quite there yet, due to the early stages where the adoption curve is still in. Once the adoption is over that stage, it is highly likely that the social influence factor and especially friends and family influencing will speed up the adoption of VAs and the likelihood of consumers to buy and use the technology.

6.4 Facilitating Conditions

Venkatesh et al. (2013), as well as Brown and Venkatesh (2005), describe facilitating conditions as the way consumers or future consumers perceive the resources and support available to perform a behaviour.

Most participants within that context argued that they would need extra support in order to understand how to use the entire skillset of a VA.

Additionally, it was seen critically by most participants, that their current situation of life, where they do not own an entire apartment or house with many linkable gadgets, causes them to not be able to use a VA's entire skill set. They consider that their personal situation does not offer all facilitating conditions to let a VA properly work. Not being able to use a VA's full potential decreases their eagerness to adopt the technology. All in all, the most important factors within this facilitating conditions category seemed to be closely linked to the determinants effort expectancy and social influence.

As the housing situation (therewithin goes the limited amount of linkable IoT gadgets) seemed to be a substantially influencing factor on the adoption behaviour of the participants, a suggestion for further research would be to look at this determinant more in detail looking at different age and housing situation groups to investigate to which extent and which ways their adoption behaviour differs. The characteristic of a VA, that it is perceived and judged according to its IoT skills makes this even more important. In the future, more technologies will be released within the field of IoT. It would be highly interesting to see, whether facilitating condition constraints based on the current life situation of the potential consumers seem to have the same hindering effect when it comes to adoption of other IoT gadgets.

6.5 Hedonic Motivation

As mentioned in the literature review, Holbrook and Hirschmann (1982) consider hedonic motivation as a key determinant within consumer behaviour. Brown and Venkatesh (2005) as

well as Childers et al. (2001) go even so far as to say that the fun and pleasure aspect is crucial for evaluating technology acceptance.

Notwithstanding the findings of previous researchers, the findings of this paper refute that the higher the fun and pleasure deriving from the usage of a technology, the more likely are the consumers to accept it. Hedonic motivation was rather seen as an unimportant determinant for adopting to VAs by the respondents. They appreciated the technology to be capable of delivering fun and pleasurable moments. However, they see it more as a given feature which should be in place anyways. Furthermore, most participants are currently still skeptical that the gadget can fulfil its basic functions which are promised. They consider the VA gadgets as a help instead of a gaming device. The perception of this might change over time (closely linked to consumer doubt concept of effort expectancy). It might be that once the participants get more educated (with time) their perceptions about the gadgets in terms of hedonic motivation might change. As the participants could imagine moments and functionalities which result in pleasure and also deliver beneficial value to the consumer, future research could examine the relationship between hedonic motivation and the connected benefits further.

Summed up, hedonic motivation in the specific case of VA adoption is of minor relevance, if not of no relevance at all, contrasting the consensus of previous researchers within the literature of technology adoption.

6.6 Price Value

With regards to the price determinant, this research definitely approves Dodds et al. (1991) in saying that consumers' have a trade-off between perceived benefits of the applications and the monetary cost for using them.

The first significant thing to be mentioned is the fact that almost nobody knew about the prices for voice assistants. When asking for the relevance of the price with regards to adopting the technology, queries occurred about how much it costs. To not lead the participants in any direction, the interviewees asked how much the participants would be willing to spend for a VA. The participants' knowledge about voice assistants was relatively low which led to different viewpoints because each individual had to imagine the VA's benefits and match these benefits with the price.

A second factor worth to be discussed is the influence of the focus group situation as a method. Especially for this determinant it could be seen that the price estimates and the willingness varied significantly in each focus group. The overall impression for Focus Group 1 was that the price does not really matter as long as the benefits outweigh the price. Contrasting this, the price did matter for Focus Group 2, as they might not see the real need

and the VA's full functionalities at the moment. Focus Group 3 was willing to pay between 200 up to 700 Euros when first asked, which was considerably higher than in the other focus groups. Only one person would not even pay ten Euros, but does see the price as a quality indicator for the technology. Focus Group 4 was sceptical about the price in the first place and not willing to pay more than two digits. As the conversation proceeded though, most of them were even willing to pay four digit amounts due to the possible function of connecting the whole house. This finding complements Zeithaml's (1988) argument that different consumers perceive a price for a certain good or service entirely differently.

Critically reflecting the chosen sampling strategy, it was not clearly spotted whether the price perception of the VA is dependent on the current life situation or whether this is not relevant. One might draw other interferences when interviewing worthier participants already working in stable job positions. This is an indicator for future research as well as to find out if there is a relationship between the price perception and where the possible user is located in the aforementioned adoption curve.

6.7 Habit

Limayem et al. (2007) and Kim et al (2005) put habit in relation to automaticity. Within the focus groups it was found that the respondents in their technology adoption process of VAs intend to integrate the device into their daily routines. In relation to automaticity, this means not only having beneficial use at home, but also when they are on the go. It can also be confirmed that habit is a relevant predictor for sustained use of VAs, as many participants appreciate that the device is able to learn due to artificial intelligence. Through this functionality the VA will also be very personalised to the user's individual needs. Those two aspects were valued by the participants and increase the likelihood of them adopting to VAs and using the device on a regular basis.

Kim and Malhotra (2005) argue that the habit determinant is influenced by previous experience with the device or other technological gadgets. Moreover, they claim that antecedent usage is a powerful indicator for forthcoming use of a technology. In this research, the authors consciously decided for participants that do not own a VA. Only three participants got familiar with VAs. These participants had positive experiences, which increased their chance of technology adoption. Contrarily, the negative experiences with older versions of VAs such as Siri, biased the majority of respondents partly in not seeing the benefit of owning a VA. Others stated that they would like to try VAs prior to purchase in order to get familiar with the gadget which has eventually an impact for their adoption of VAs.

Therefore, it can be concluded that the habit determinant is influenced by previous experience of consumers. Moreover, habit has a relevance for adopting to VAs, especially when it comes to sustained usage exceeding the initial adoption.

6.8 Data Security

The data security determinant was added by the others as a new factor for adopting to VAs. In the literature it is argued that data security is a really sensitive topic, thus requiring a tempered approach towards customers' data (Martin, Borah & Palmatier, 2017). Respondents were really concerned about their data when using VAs. Especially the fact that one can order things online so easily via voice was an issue to most of them. Online purchases (in the mobile industry) was something that induced Oliviera, Thomas, Baptista and Campos (2016) to add 'perceived data security' as a possible determinant to the UTAUT model. The findings in the context of VAs complement adding data security as a determinant to the UTAUT model.

In conclusion, this study approves the relevance of data security as an additional determinant for the adoption of VAs. Moreover, the authors go so far as to say that data security should be considered in uprising AI and IoT technologies to identify consumers adoption towards the certain technologies.

6.9 Compatibility

Kuo and Yen (2009) illustrate that compatibility is linked to technology adoption. This research approves that compatibility has to be considered as a determinant for adopting to VAs. Participants in each focus group pointed out the essential need to have the possibility to connect other technologies to VAs. Not only should a VA be compatible with devices in the house such as the fridge, light bulbs or kitchen appliances, but also with different smartphone or laptop brands. They would like to control a VA via voice as well as with a smartphone. Farrell and Klemperer (2006), in this context offer the concepts of switching costs and network effects. The findings illustrate that the respondents would definitely see a weak spot in having to switch to another brand due to lack of compatibility, but rather since it is inconvenient than cost intensive. With regards to network effects, it can be seen that the likelihood of adopting to VAs is higher if others use the technology as well and if it was connected to each other.

To sum up, compatibility currently gains more and more relevance as new technologies are developed rapidly. Our research suggests firms to pay attention to compatibility, and thus enable their technologies to be synced with other providers as well, to avoid negative reactions from consumers.

6.10 Relationship with the device

In regards to having a relationship with a technological device, the literature is quite limited. However, the phenomenon of artificial intelligence deals with the connection between human beings and machines. In this research we argue for considering the relationship (in whatever way) with a technological gadget as an important factor to determine whether the technology gets accepted or not. The findings indicated both, positive and negative aspects of having a relationship with VAs. It is therefore unclear what consequences the relationship has for adopting the VAs. Future research should investigate how the AI component, learning and becoming smarter, influences technology adoption. Furthermore, AI is still seen as something rather fictional by the participants. It would be interesting to explore the fictional perception of technology and see whether it is something considered to be positive or wishful, thus resulting in a higher adoption rate.

6.11 Discussion Summary

Summing up this discussion part combining and analysing the literature and focus group discussion findings, the following summary can be drawn in regards to the different determinants and their linked literature and other factors.

Regarding the performance expectancy determinant, participants seemed that they are not knowledgeable enough to fully understand the scope of VAs and evaluate their skills coming up with what they actually expect from them apart from linking their expectations to gadgets with similar (but less advanced) features they already knew. Additionally, it seems that also within the general field of VAs, AI and IoT, closely working together with potential consumers seems to be a recommended approach for R&D departments. Within that context, it is important to mention that most companies and also literature mainly seem to focus on the wants and needs of the early innovators. Leaving out the majority of their target group through this behaviour can be regarded a true downside. Being aware of this weakness, especially on basis of this study, will aid companies and researchers in the future to draw a fuller picture on the potential adoptions of new technologies, especially within the field of VAs, IoT and AI.

Looking at effort expectancy, solely the early innovators seem to mainly focus on what the gadget can do. Potential users in the middle part of the adoption curve, which actually represent the majority of this potential adoption force, think a lot more about the effort it takes to use and learn to use a VA gadget. They do not seem to be educated enough yet and misestimate the effort, which in return leads to increased consumer doubt and could slow

down adoption rates. To be aware of this fact and to steer against it will be the job of the entire industry.

When it comes to social influence, friends and family play biggest social influencing factor. Every participant seemed willing to try the gadget out or shows at least some curiosity to that extent. As the gadget is quite new, however, people fear social discrimination being perceived as weird when using a VA as its usage (especially in public or social contexts) might not have achieved entire social acceptance yet. It is therefore important for brands to understand this and maybe try to counteract this perception.

Most participants saw facilitating conditions rather in conditions originating in themselves than as an influencing factor from the outside. By this it is meant that they consider their current life situation, without owning an entire apartment or house and various gadget they could connect a VA to if they owned one, as a limiting factor which would restrict them from using the full potential/skill set of the VA. That could be a reason which might hold them back from purchase. Future IoT Research could look into that. Looking out of the box and not solely on VA but also IoT, there is one concern, related to the fact that the individual housing/economical situation seems to be of such great importance: IoT might have a big problem when it comes to younger age groups (and maybe also older ones or people who cannot “afford” the “add-ons”) which contribute a huge extra value to the VAs. If this is a general concern and to which degree or in what ways this affects the adoption of either these other age/ wage groups when it comes to both VA and IoT could be an area for future research. The so-called ‘outer factors’ which facilitate the usage are only the acknowledgment that the participants see their need for further education when it comes to the actual usage of the VA.

The hedonic motivation factor was, contrastingly to prior literature findings, of minor relevance for the adoption consideration of the group participants. For the moment, as a consequence of this study, its relevance for the adoption decision and behaviour is considered as so inferior that it will be removed from the initial UTAUT 2 model as a highly influencing determinant of adoption.

The price-value perception seems to be mainly linked to the degree to which the gadget can be used at home. The sole price of the gadget seems to be of minor importance for the participants. If at all, people seemed to be interested in what it would cost to set up a VA “properly” in the entire apartment in order to steer the house electronics etcetera instead of only buying the VA itself without any technological gadgets it can be paired to. This determinant can also be linked to the compatibility determinant.

Habit is a strong predictor for technology adoption as people want to integrate the technology into their daily routines. With regards to VAs, companies should offer portable solutions of VAs or enable the VAs to be somehow used while on the go. Furthermore, the habit determinant is closely linked to previous experience with a technology. Thus, it is especially

required for firms to ensure that the first usage of a VA works smoothly and without any flaws.

Data security seems to be a growing concern and especially relevant when it comes to the characteristics of a VA which are linked to AI. As more and more of newly developed gadgets to be used by people in their daily lives possess these characteristics, it is essential that this factor is added and taken into consideration to understand what might restrain consumers from adoption and how data security concerns could be limited. Further research could investigate whether the data security concerns are only so high because the IoT and AI characteristics within gadgets are still rather unknown and whether they will change with time (is this just a general thing about new technologies which will disappear with time) or whether this will keep holding true - if handled badly there might even be the option (under special circumstances), that data security as an influencing factor might rise in relevance (thanks to special circumstances/events) - that is why it is even more important to understand participants' perceptions toward this determinant and to include this determinant in a more recent version of the UTAUT 2 model.

Compatibility could be seen as chance (lock-in) or threat (consumers getting annoyed in a world where many different companies offer many different solutions so they expect everything to work out together) for technology adoption. Future research could investigate whether the same providers which are successful in non-AI or non-IoT gadgets will be successful within that area as well (using VAs as a kind of brand extension under their umbrella brands to also conquer that field) or whether the brand will be of minor importance for consumers when entering the adopting gadgets within the IoT/AI field.

Regarding the relationship one has with the gadget, academic literature is still quite limited. Participants indicated that they want at least some kind of relationship with the gadget - already the word "assistant" indicates some human component. However, they differed in the extent to which they would be willing to let the gadget be part of their life or how "human" in its characteristic and thus "intimate" they would want their relationship with the gadget to be. It could be claimed that the wish for intimacy/fear of it decreases with time and increasing social acceptance, but that would also be an area for future research.

Existing literature helps to understand most determinants and perceptions of the consumers. However, the AI and IoT characteristics of the VA gadget cause it to not be perceived as just any new or other technological gadget. Instead, it touches on a lot bigger field of perception, psychology and consumer behaviour when trying to connect the potential user with the new technological developments. Further research will especially be needed in regards to whether the current perceptions/judgements of relevance will stay the same over time or might change/be influenced, by a growing amount of people adopting the technology and an increased knowledge and acceptance about VAs and the IoT and AI technology in general across society. Nevertheless, this amended UTAUT 2 model (figure 8), which comes out as a contribution and result of this thesis, as well as the deeper understanding of the determinants

gained through this study will facilitate an easier start off point for future, even more fruitful research.

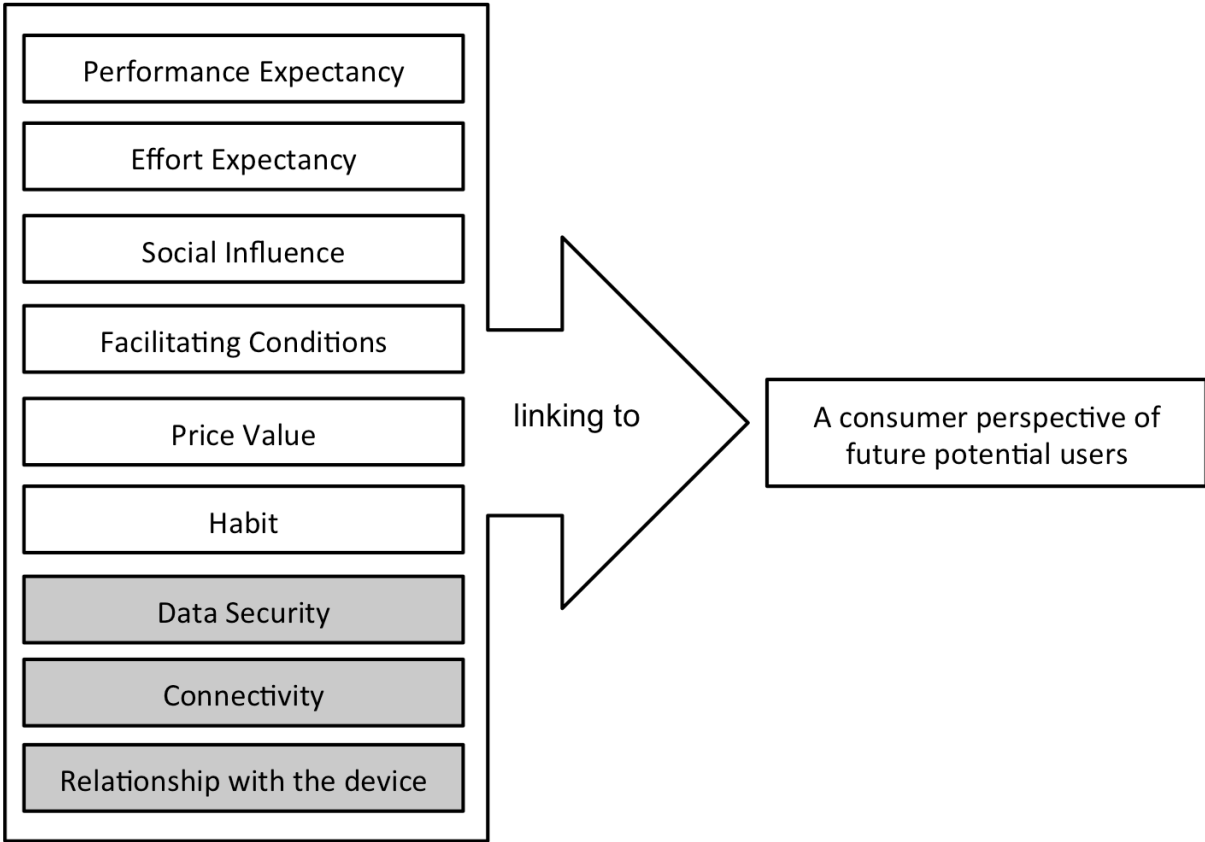


Figure 8 Amended UTAUT 2 model for further research within the field of AI and IoT

7 Conclusion

The aim of this thesis was to deeper understand the determinants influencing adoption of the new VA technology and to grasp the perception consumers have on these. The study sets out to not only draw a deeper understanding but also amend the current UTAUT 2 model, if found necessary, to fit the characteristics of this new technology, naming that this study could provide a basis for research within the areas of IoT and AI and linked-to-it newly released gadgets.

This study has shown that understanding the role of the potential user and what their concerns and perceptions are when it comes to adopting VAs is essential. While the technology adoption of VAs specifically still seems to be in the early stages, firms should still become aware of the fact that potential consumers still form their opinions or doubts in some way, even if not addressed directly and that simply tailoring a sales or marketing approach to the small ‘early innovators’ curve part of Rogers’ adoption curve might not be the most successful way to go when aiming for market diffusion. A VA differs in its characteristics from prior technologies as its IoT and AI aspects cause it to touch on a broader part of a consumer’s life. This has as a consequence that completely new determinants emerge when it comes to the adoption considerations. The same added determinants data security, compatibility and relationship with the device as well as the understanding of determinants found out within this study provides a basis for further research within the field of IoT and AI as well as a help for companies within that field when trying to understand how potential future users might think.

The results have shown that six out of seven determinants are relevant when looking at the adoption of new technologies leaving hedonic motivation out of the amended UTAUT 2 model. In contrast to findings within existing literature, this study found that three further determinants need to be added to the UTAUT 2 model. These are namely data security, compatibility and the relationship with the device. No previous studies have added these three determinants to the UTAUT 2, nor had the UTAUT 2 model been investigated with a real user-understanding approach. The reason for adding them was to fully understand the potential adoption behaviour and that the determinants keep a lot deeper wisdom about users which can be extracted and which is actually of high relevance to uncover in order to understand and being to shape the diffusion of new innovative technologies within the IoT and AI sector.

This is the first study, to our knowledge, to examine VAs in relation to the UTAUT 2 model as well as a gadget out of the IoT and AI area as such, investigating it in a qualitative approach to fully understand the meaning of the model’s determinants for potential users and

add eventual missing determinants which will be of high relevance regarding these technology areas.

Although this study was conducted in one setting, the area of VAs explicitly, the results could be transferrable to other areas or at least used as a basis for further investigation, namely the areas of IoT and AI, as VAs have mostly the same characteristics as other gadgets arising in the IoT and AI market.

This study reinforces the recommendation for the introduction of a new version of the UTAUT 2 model for it to fit newly upcoming technologies which possess different and more varied characteristics than prior ones. This is primarily relevant for companies who work with, manufacture and market VAs as these companies need to understand these dimension. New skills, versions and models of VAs are released constantly. In order to develop these, a full understanding of the perceptions potential users have is required. The findings of this study can therefore contribute considerably to the development and evaluation of the role of the user within the UTAUT 2 determinants and the technology adoption perception as such.

During the study, the aim was, to fully understand technology adoption of VAs from a consumer perspective taking into account the UTAUT 2 model. In trying to create a full understanding about these determinants and how they are perceived by potential future consumers, and how these think, a qualitative method was applied. That is why there was no survey done using a quantitative approach to estimate importance of the determinants in relation to each other and overall. The above analysis, however, does not enable the researchers to fully understand the technology adoption perception for the entire population of potential VA users as the sample was limited to age and educational level. Nevertheless, this provides a basis for future studies to build on and investigate the phenomenon in regards to different sample categories.

Further studies, generally speaking, are required to establish three things: First of all, as to whether the findings regarding VA adoption will also hold true, once the adoption has advanced to later stages of the adoption curve. Secondly, how the results differ when changing the sample to different age and educational background and thirdly, how the UTAUT 2 amended model and the findings will compare to newly-released technologies within the field of IoT and AI.

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Appendix A

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Participant	Transcription	Coding	Grading Maik	Grading Sarah	Average							
79	P5	So maybe some motivation. Because I had could have been taught I can do this and that and a lot. But my	0			0							
80	P6	Yeah, I think you don't want to learn for yourself what you can do with it. One thing could be for example, if it would help me to do faster the things that I find very practical with my cellphone, like sometimes clothes sales and that. That you have to take some time to search for it and that, if I can configurate it, that the machine - let's say on a weekly basis, on some topics: Like for example the sales of	4	2	2	2							
81	P4	What sales?	4	1	2	1,5							
82	M	For example, like I don't know Zara and H&M they have some sales, you know? Like according to my preferences. You know some other person has some other kinds of preferences or something, so that	4	1	1	1							
83	P4	But then you really need to trust it, right? If you rely on it?	0			0							
84	P3	Yes, but it would make the same algorithms like in the search in the traditional website. But only like if	7	1	1	1							
85	P4	But it's actually a good idea. Right now for example nowadays, I'm checking every day this PS4 game if it gets cheaper, but it doesn't. And then											
86	P7	I can just tell Alexa, Alexa tell me	4	1	1	1							

Screenshot Analysis Approach

Appendix B



LUND UNIVERSITY
School of Economics and Management

Research Study: Voice Assistant Adoption Behaviour
Researcher Names: Maik Martin, Sarah Kessler

FOCUS GROUP CONSENT FORM

- I agree to participate in the Voice Assistant Focus Group carried out by Maik Martin and Sarah Kessler of the University of Lund, to aid with the research of Technology Adoption in regards to Voice Assistants.
- I am aware of the topics to be discussed in the focus group.
- I am fully aware that I will remain anonymous throughout data reported and that I have the right to leave the focus group at any point.
- I am fully aware that data collected will be stored securely, safely.
- I am fully aware that I am not obliged to answer any question, but that I do so at my own free will.
- I agree to have the focus group recorded (video or dictaphone), so it can be transcribed after the focus group is held.
- I am aware that I can make any reasonable changes to this consent form.

If you have any further questions or concerns about this study, please contact:

Maik Martin | maikmartin91@gmail.com

Sarah Kessler | sarah.k.kessler@gmail.com

_____ Yes, I would like to take part in the focus group.

_____ No, I would not like to participate in the focus group.

SIGNATURE

DATE