Hey Siri, let's go shopping!

A study into the factors influencing Dutch consumers' intention to use a voice assistant for online shopping

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Master thesis

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Abstract

Purpose

Given the growth of voice assistants, Artificial Intelligence (AI) has become an important topic for individuals and companies. Voice assistants, driven by Artificial Intelligence, have enabled individuals to use voice to consume content and perform tasks. Voice-activated devices are going mainstream, and it appears that voice shopping is becoming an emerging trend. Despite the growing use of voice assistants and voice shopping in America, our understanding of voice shopping adoption in the Netherlands is minimal. This leads to the question: what factors influence the intention to shop online using a voice assistant among Dutch consumers? UTAUT-3 has been used and expanded with trust and risk perception. Next to this, the relationships among the independent variables are tested.

Method

Through an online survey, the different constructs were measured. The survey consists of nine independent variables measured using a 5-point Likert Scale that ranges from totally disagree (1) to totally agree (5). Also, demographic and experience questions have been asked. The experience questions were created to collect the right sample because the survey focuses on people who have never used a voice assistant for online shopping. The sampling technique used is a non-random sampling method and respondents were collected using the snowball method. The cleaned data set contained 304 usable responses. The distribution consisted of 69.1 per cent female and 30.9 per cent male from the age group 18-72 years (M = 29,6; SD = 13,06).

Findings

A hierarchical regression analysis was performed; this showed that performance expectancy, injunctive social norm and hedonic motivation are important predictors of the intention to use a voice assistant for online shopping. Effort expectancy, descriptive social norm and personal innovativeness appeared to have no significant effect on the intention to use. Furthermore, the predictors for risk perception negatively influenced the intention to use but were not significant. The independent relationships showed a significant effect of effort expectancy, injunctive social norm and descriptive social norm on performance expectancy. The additional analysis with trust showed that trust did not affected the intention to use. Furthermore, trust did not appear to affect privacy risk significantly but did affect security risk and performance expectancy. Effort expectancy also had a significant effect on trust.

Conclusion

The research findings suggest that if one wants to influence the intention to use a voice assistant for online shopping, performance expectancy, injunctive social norm and pleasure must be considered, for example, by developing a distinct benefit in the design phase to optimise the functioning of the voice assistant. Effort expectancy, injunctive social norm and descriptive social norm on performance expectancy have also been significant, which means that these predictors positively influence the technology's perceived usefulness. From the findings with trust, it can be cautiously concluded that trust has a significant impact on security risk and performance expectancy. When there is trust in the party, the degree of security risk in a purchase situation is reduced, and voice shopping is considered useful if the developer is trustworthy. Furthermore, easy-to-use technology can increase trust in the developer.

Keywords: UTAUT-3 model; intention to use, voice assistant, online shopping

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1. Introduction

Imagine: you ask your mobile phone "Hey Siri, order toothpaste", the voice assistant searches the web for promotional offers and previously purchased products. "Based on your order history, I found Colgate toothpaste for €1.39. Should I order it?", you answer with a simple "yes", and you've made the order. This is a good example of voice-driven technology that improves imitating human interaction (de Bruijn, 2019).

A few decades ago, it seemed impossible to have a conversation with a computer (Hoy, 2018). With the introduction of voice assistants, voice has become a widespread and commercially viable interaction mechanism (Ammari, Kaye, Tsai & Bentley, 2019). There are different types of assistants, from self-contained devices such as Amazon's Alexa and Google Home, to mobile phones and desktop agents such as Apple's Siri and Microsoft's Cortana (Ammari et al., 2019). Hence, the smart speaker is the device (e.g. Google Home), the voice assistant is the voice control technology (Passies, 2018). In this research, the term voice assistant will be used to refer to the technology.

Given the growth of voice assistants, Artificial Intelligence (AI) has become an important topic for individuals and companies. Voice assistants, driven by Artificial Intelligence, have enabled individuals to use voice to consume content, perform tasks, search for information, buy products, and communicate with companies (McLean & Osei-Firmpong, 2019). Research by Gartner (2016) also shows that expectations of the Virtual Digital Assistant are growing significantly. The software went from 'Innovation Trigger' to 'Peak of Inflated Expectations'. This can be found in Gartner's 2016 Hype Cycle for emerging technologies (Gartner, 2016). It is predicted that it will reach the productivity platform within 5-10 years, which will be 2021-2026. From this, it can be concluded that the prospects of this technology are bright.

Therefore, it is not surprising that voice assistants are becoming increasingly popular. According to a survey of 1,000 US consumers (PWC, 2018), ninety per cent are familiar with voice-based devices, and 72 per cent of these have some experience using a voice assistant. Besides, a Statista report published by Liu (2020) shows that the number of people in the US using a voice assistant at least once a month had increased from 79.9 million in 2017 to 117.7 million in 2020. Furthermore, 51 per cent of the Americans have used a voice assistant on their smartphone (Tankovska, 2020) and 24 per cent of the Americans owned a smart speaker in 2020 (Richter, 2020).

Voice-activated devices are going mainstream, and it appears that voice shopping is becoming an emerging trend. Voice shopping is the act of buying online with a voice assistant (Mari, 2019). Research by Metev (2020) shows that almost 5.5 million Americans regularly make purchases via a voice assistant. In 2019, 18.3 million Americans had made at least one purchase with a voice assistant, which is expected to increase to 23.5 million in 2021 (Clement, 2020).

In the Netherlands, where the research described in this report is conducted, voice assistants are less popular. This appeared from a report written by Tankovska (2020), which states that 46 per cent of the Dutch population is not even interested in a voice assistant. It is mainly a nice gadget and not yet as versatile in Dutch as in English. Recent research by Kantar TNS (2019) into the general use of voice assistants with 37,000 Dutch households shows that since the introduction of Google Home on the Dutch market in 2018, five per cent use a smart speaker and fifteen per cent are familiar with it. From these respondents, fifty per cent are familiar with voice commands via mobile phone, and 29 per cent already use voice assistants on smartphones (Kantar, 2019).

Despite the growing use of voice assistants and voice shopping in America, our understanding of voice shopping adoption in the Netherlands is minimal. Compared to the United States, the figures described above show that voice assistants are relatively new in the

Netherlands. It also appears that in America online shopping is already being used through voice-activated devices such as a smart speaker or voice assistant in mobile phones (Clement, 2020; Liu, 2020; Metev, 2020; PWC, 2018; Tankovska, 2020). In the Netherlands, this has not developed that far, and significantly fewer people have a self-contained device (Kantar, 2019). Because in the Netherlands relatively few people own a self-contained device, but the technology is often integrated into mobile phones, it is interesting to investigate if Dutch people would buy products online using a voice assistant and what factors will motivate them to use it or not. Through all the above, this study will focus on the Dutch market. Voice-driven AI technology and the individuals' interactions with them are a timely and important research area given the limited understanding of why individuals may or may not want to use the technology. This raises the following question: *What factors influence the intention to shop online using a voice assistant among Dutch consumers?*

To explain the adoption of voice assistants for online shopping, the UTAUT model will be used. UTAUT provides insight into the variance in the behavioural intention to use a specific technology (Venkatesh, Morris, Davis & Davis, 2003). In 2012, the model was extended to UTAUT-2 with three variables to test the acceptance of a technology in a consumer setting (Venkatesh et al., 2012). Subsequently, in 2017, UTAUT-3 was developed in which the factor personal innovativeness was added which can be conceptualized as the willingness to adopt the latest technological gadgets (Farooq et al., 2017).

The existing model can still be adapted using various factors. Trust and risk perception are direct predictors of intention to use (Featherman & Pavlou, 2003; Lee & Song, 2013; Nicolaou & McKnight, 2006; Pavlou & Gefen, 2004). Given the risks (such as privacy risk) associated with using a new technology (in this case, voice assistants for online shopping), it is good to investigate risk perception's effect on the intention to use. Besides, trust can play a role in conquering risk perceptions and uncertainty in using and accepting a new technology. Therefore, it is good to understand how trust is formed to stimulate the application of a new system (Li, Hess & Valacich, 2008). Besides, trust can also function as an indirect antecedent to reduce risk (Lee & Song, 2013; Pavlou & Gefen, 2004). By adding trust and risk perception, the predictive power of the model can be increased.

The rise of voice assistants in the Netherlands has aroused the research interest in the factors that influence the intention to shop online using voice assistants among Dutch consumers. The novelty of this research is, on the one hand, the focus on an emerging area in online shopping and, on the other hand, the testing of a complete model that aims to identify the important determinants of intention to use. This research will contribute to the literature on understanding the adoption of online shopping using voice in the Netherlands from an academic perspective. In practice, these findings provide the industry and professionals with an awareness of the factors that influence the intention to use. This will improve knowledge and understanding of successful adoption.

2. Theoretical Framework

This chapter will examine the literature review regarding the research model, the original model's extension, and the relationships among the independent variables. The explanation of voice assistants and voice shopping marks the beginning of the theoretical framework, followed by explaining the UTAUT-3 model, clarification per variable and the extensive determinants of the model. Furthermore, the relationships among the independent variables are discussed.

2.1 Voice assistants

A voice assistant can be found in both smart speakers and smartphones and can interact; connected devices can be controlled by voice (Hoy, 2018). Voice assistants are emerging technologies and are becoming increasingly popular. Many people in the US are familiar with voice assistants, and more than half of Americans actually use them (PWC, 2018). Nowadays, voice shopping is becoming a trend, and shopping with a voice assistant is gaining ground internationally. This is especially happening in countries like the United States and the United Kingdom (ABN-AMRO, 2018). Some studies show that voice assistants are not yet very popular in the Netherlands (Kantar, 2019; Tankovska, 2020) and the general understanding of choices adopting voice shopping in the Netherlands is minimal. This study investigates the opinion of what the Dutch consumer thinks about voice shopping. The goal is to predict the consumer's intention to use a technology, and therefore an extensive model of UTAUT is used.

2.2 Predictors of UTAUT-3

Development of UTAUT

In 2003, Venkatesh et al. developed an IT-acceptance model by reviewing and testing related studies using elements of different behavioural intention models such as Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB) and the Technology Acceptance Model (TAM). Based on the analysis and comparison of these models, a model has been proposed, called UTAUT. UTAUT is the most effective model for analysing technology acceptance and can explain 70 per cent of user intention variance (Venkatesh, Thong & Xu, 2012). UTAUT consists of four different factors that stimulate intentional and user behaviour. The factors are performance expectancy, effort expectancy, social influence and facilitating conditions (Venkatesh et al., 2003).

Despite the model's explanatory power, an extended version of UTAUT was tested in 2012 to accept a technology in a consumer setting, also called UTAUT-2 (Venkatesh, Thong, & Xu 2012). Three new factors were added to this new model, being hedonic motivation, price value and habit. The moderator voluntariness has been removed, which was necessary to make the UTAUT applicable to the context of voluntary behaviour. UTAUT-2 was an improvement over UTAUT because the context has changed to a consumer setting and the addition of the factors makes a great difference between the models. With the revised model, there is an improvement in the explained variance in the intention to use and effectively use the technology, from 46 per cent to 74 per cent and from 40 per cent to 52 per cent (Venkatesh et al., 2012). Then, UTAUT-3 was developed by Farooq et al. (2017). This research shows that the variables from UTAUT-2 with personal innovativeness have a significant and positive influence on the acceptance and use of a new technology. This study's findings have shown that personal innovativeness is an important factor influencing the intention to use (Farooq et al., 2017). Therefore, UTAUT-3 is preferred in this research. The existing model will be revised to an applicable model for this study.

UTAUT-3 consists of eight independent variables and the dependent variable "intention to use" (Farooq et al., 2017). Intention to use can be defined as "the degree to which a person has

formulated conscious plans to perform or not perform some specified future behaviour" (Warshaw & Davis, 1985, p. 214).

For this study, five independent variables from UTAUT-3 will be used to measure intention to use. The variables not used in this study are facilitating conditions, price value and habit. Facilitating conditions is the extent to which resources are available to assist in using a technology (Venkatesh et al., 2003). Removing barriers to voice shopping is not yet relevant to investigate because voice shopping has not yet been implemented in the Netherlands. The price value is not very relevant because it is about voice via smartphone and a smart speaker. Since over 90 per cent of the Dutch population owns a smartphone (O'Dea, 2020), almost everyone has the ability to use voice via their smartphone. Habit can be seen as automatic and prior behaviour (Venkatesh et al., 2012). Since voice shopping has not been used in the Netherlands before, this is not a relevant factor to investigate.

Performance expectancy

The first independent variable in UTAUT is performance expectancy. Performance expectancy is defined as "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (Venkatesh et al., 2003, p. 447). In this study, performance expectancy represents Dutch consumers' belief regarding whether the adoption of voice assistants for online shopping will improve performance. Several studies have shown that performance expectancy has a direct influence on the intention to use (Kessler & Martin, 2017; Martins, Oliveira & Popovic, 2014; Williams, Rana & Dwivedi, 2015) and is seen as the best predictor of behavioural intention (Williams et al., 2015). According to Venkatesh et al. (2003), performance expectancy is the strongest predictor of intention to use a technology, and because of these findings, this variable will be used in this study. Therefore, the following hypothesis is proposed:

Hypothesis 1: Performance expectancy positively influences the intention to use a voice assistant for online shopping.

Effort expectancy

Furthermore, effort expectancy has been introduced in UTAUT and is a crucial predictor accepting a technology (Venkatesh et al., 2003). Effort expectancy is defined as "the degree of ease associated with the use of the system" (Venkatesh et al., 2003, p. 450). This study represents the belief of consumers regarding the ease of use of voice assistants for online shopping. Research by Kessler and Martin (2017) shows that effort expectancy concerning the acceptance of voice assistants is very important to be able to use them without flaws. If consumers see gadgets as rather complex, intention to use will be directly affected. Therefore, this is a strong predictor of the intention to use. The following hypothesis is proposed:

Hypothesis 2: Effort expectancy positively influences the intention to use a voice assistant for online shopping.

Social influence

Next, social influence can be defined as "the degree to which an individual perceives that important others believe he or she should use the new system" (Venkatesh et al., 2003, p. 451). However, this is a limited conceptualization of social influence, as this definition only focuses on the subjective norm. Social influence could be divided into two categories: injunctive social norm (closely equivalent to subjective norm) and descriptive social norm (Ajzen, 1991). Injunctive social norm refers to what people normally agree or disagree with (people expect me to do it). Descriptive social norm refers to what most people usually do (I do it because people

do it) (Ajzen, 1991). Hence, in this study, social norms will be defined as the extent to which an individual thinks that important others believe that he or she should use a voice assistant for online shopping and the belief that when important others use a voice assistant for online shopping, the individual will use it as well. Research by Venkatesh et al. (2003) shows that social influence stimulates the adoption of a technology. The theoretical limitation by focusing only on the subjective norm will be addressed in this research by including both injunctive social norm and descriptive social as a definition of social influence. By examining this, the willingness to use a voice assistant for online shopping can be explained. It gives developers of a voice assistant insights into social influence in increasing the acceptance of the technology. Therefore, the following hypothesis is proposed:

Hypothesis 3: Injunctive social norm (a) and descriptive social norm (b) positively influence the intention to use a voice assistant for online shopping.

Hedonic motivation

Subsequently, hedonic motivation is defined as "the fun or pleasure derived from using a technology" (Venkatesh et al., 2012, p. 161). This is an intrinsic motivation that indicates the extent to which pleasure can be derived from using a technology. In this study, hedonic motivation represents Dutch consumers' belief that they derive fun or pleasure from using a voice assistant for online shopping. The study of Brown and Venkatesh (2005) has shown that hedonic motivation plays an important role in determining technology acceptance and use. Previous research stated that there is an effect of perceived enjoyment on using a technology (Chao, 2019). Furthermore, research by Venkatesh et al. (2012) proves that hedonic motivation has a direct influence on the acceptance of a technology and the use of it. Because of these findings, hedonic motivation is used as a predictor of the intention to use voice assistants. The following hypothesis is proposed:

Hypothesis 4: Hedonic motivation positively influences the intention to use a voice assistant for online shopping.

Personal innovativeness

Finally, personal innovativeness would also appear to be an important predictor to consider in the intention to use. Personal innovativeness can be defined as "willingness to adopt latest technological gadgets, or risk-taking propensity, which might be attached with trying new features and advancements in the domain of IT" (Farooq et al., 2017, p. 6). If individuals are eager to search for and test out a new technology, a person is more likely than others to embrace a new technology. (Sanchez-Franco & Roldán, 2010). In this study, personal innovativeness refers to the fact that if people are more willing to accept an innovative technology, a voice assistant for online shopping, they are more likely to use the new technology. Personal innovativeness appears to have a significant and positive influence on the intention to use and will therefore be used as a predictor on the intention to use a voice assistant for online shopping (Farooq et al., 2017). The following hypothesis is proposed:

Hypothesis 5: Personal innovativeness positively influences the intention to use a voice assistant for online shopping.

2.3 Extending the UTAUT-3 model with the inclusion of trust and the multidimensional concept of risk perception

Trust on the intention to use

Trust can be considered as a possible variable that affects the intention to use. Trust is an important part of social interactions and human communication. Without trust, this will not function properly (Baier, 1986). Since the most common activity between user and voice assistant the question-and-answer interaction is through voice, in the context of this research aimed at making online purchases via voice, it seems interesting to investigate the effect of trust in more detail. Trust can be seen as an influential factor in stimulating purchases over the Internet (Quelch & Klein, 1996). Unlike a web search, which presents many search results, a voice assistant screens information in advance to provide personalized products. However, the screening mechanism, which analyses relevant information on the web and previous interactions with the user, creates uncertainty and risks because instead of the most appropriate answer or product, also incorrect information can be given, recommendations can be made that are beneficial to producers but violate users' interests or endanger users' privacy. Hence, trust seems to play a role in the interaction between the user and a voice assistant (Hu, Wang & Liu, 2019).

Mayer, Davis and Schoorman (1995) define trust as “the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other part” (p. 712). In the context of this research, this definition suggests that trust is not aimed at the voice assistant but its developer. Although technological objects are considered as reliable objects, it is increasingly suggested that the risks associated with the use of a technology, such as a voice assistant, do not appear unexpectedly, but are accelerated by the actions of those who develop the technology (Li, Hess & Valacich, 2008). This is about trust that the developer of a voice assistant will keep consumer data safe. Increased trust is often associated with increased use (Gefen, Karahanna & Straub, 2003) and can be seen as a predictor of technology use; previous research has proven that trust directly influences the intention to use a technology (Lee & Song, 2013; Li et al., 2008; Nicolaou & McKnight, 2006; Pavlou & Gefen, 2004). Therefore, the following hypothesis is proposed:

Hypothesis 6: User trust in a voice assistant’s developer positively influences the intention to use a voice assistant for online shopping.

Risk perception of the intention to use

Because this research focuses on the intention to use a technology, the risk factors need to be measured. Risk perception is a multidimensional concept and can be defined as "the potential for loss in the pursuit of the desired result from the use of an e-service" (Featherman & Pavlou, 2003, p. 454). This study showed that it was good to include risk perception as a measure because when evaluating products or services, consumers identify risks that can cause anxiety and discomfort. Therefore, risk perception is an important factor that influences the intention to use (Featherman & Pavlou, 2003). Previous research shows that risk is a direct predictor of intention to use (Lee & Song, 2013; Nicolaou & McKnight, 2006; Pavlou & Gefen, 2004) and will therefore be used as a direct variable in this study. This research will focus on privacy and security as dimensions of risk perception.

<u>Privacy risk</u>

In a study of Featherman and Pavlou (2003) privacy risk turned out to be one of the most striking risk perception concerns. Privacy risk is defined as “the potential loss of control over

personal information, such as when information about an individual is used without that person's knowledge" (Featherman & Pavlou, 2003, p. 455). This is about the risk of incorrect use of personal data without consent or private information provided to third parties (Hong & Kim, 2020). Research shows that the technology itself does not endanger a user's privacy. This includes the inability of voice assistant developers to protect data or the decision to misuse data without the owner's knowledge and consent (Beldad & Hegner, 2018). This indicates that personal data could be stolen, leaked or misused by using a voice assistant. Therefore, the following hypothesis is proposed:

Hypothesis 7a: A high privacy risk negatively influences the intention to use a voice assistant for online shopping.

Security risk

Another area of concern for voice assistants is security. Anyone who has access to a voice assistant can ask them questions, collect information about accounts and ask them to perform certain tasks (Hoy, 2018). This poses a major security risk as these voice shopping devices contain high personal information levels such as payment details. Security is an essential factor in the use of information systems (Daniel, 1999) and security risk can be defined as "circumstance, condition, or event with the potential to cause economic hardship to data or network resources in the form of destruction, disclosure, modification, fraud, and abuse" (Kalakota & Whinston, 1997, p. 88). Security breaches can disrupt access to information, and many people are afraid of risks when using the internet for financial transactions (Rotchanakitumnuai & Speece, 2003). In the context of this study, security can be seen as the degree of protection against the above-mentioned threats. Through the above, the following hypothesis is proposed:

Hypothesis 7b: A high security risk negatively influences the intention to use a voice assistant for online shopping.

2.4 The relationships among trust on risk perception, effort expectancy, social influence, trust on performance expectancy, and effort expectancy on trust

The effect of trust on risk perception

According to Mayer et al. (1995), trust and risk are inextricably linked. When people feel uncertainty, trust can be a determinant of people's expectations of a situation (Awad & Ragowsky, 2008). Trust enables consumers to make transactions with parties that are not part of their own network. Trust in a voice assistant developer can limit the consumer's perception of the risks associated with a purchase situation. The higher the risk perception, the greater the trust needed to achieve a transaction. Hence, trusting a developer can reduce the perceived risks (Awad & Rogowsky, 2008; Jarvenpaa, Tractinsky & Saarinen, 1999). Literature indicates that trust can be considered to be an indirect predictor of the intention to use. Trust can be used as a direct variable to reduce risk perception (Gefen, 2000; Jarvenpaa et al., 1999; Lee & Song, 2013; Pavlou & Gefen, 2004). These findings provide the following two hypotheses:

Hypothesis 8: User trust in the developer negatively influences privacy risk (a) and security risk (b).

The effect of effort expectancy on performance expectancy

Both performance expectancy and effort expectancy directly influence the intention to use a technology (Venkatesh et al. 2003). Several studies have shown that the degree to which a

technology is easy to use (effort expectancy) also influences the usefulness of the technology (performance expectancy) (Gelderman, 1998; Saadé & Bahil, 2005; Sung, Jeong, Jeong & Shin, 2015; Szajna, 1996). The impact of effort expectancy on performance expectancy can be explained as the extent to which people think that the effective functioning of a technology affects its expected usability. If a technology requires less effort and is therefore easy to use, people think it is useful. The theory shows that if a technology takes long to understand, you are more likely to consider it useless (Gelderman, 1998; Saadé & Bahil, 2005; Sung et al., 2015; Szajna, 1996). In the context of a voice assistant for online shopping, it is good to understand the relationship between the two variables because ease of use can enhance its usefulness. Therefore, the following hypothesis is proposed:

Hypothesis 9: Effort expectancy positively influences performance expectancy.

The effect of social influence on performance expectancy

Potential users of a technology are influenced by the social networks they are part of. This can be, for example, a group of friends or other important connections. These relationships can influence people's opinions, decisions and behaviours through interaction and communication (Lu, Yao & Yu, 2005). According to the Social Information Processing Theory of Salancik & Pfeffer (1997), which describes that the social environment provides people with cues that can be used to interpret situations and events, it can be assumed that the extent to which a technology is used contributes to the belief of its usefulness. At the same time, society's expectation that other people should consider the technology can reinforce the user's perception of the technology's value. In the context of this study, it contains the extent to which social influence affects the perceived usefulness of online shopping using a voice assistant. Several studies show that social influence significantly impacts evaluating a technology's usefulness (Lu, Yao & Yu, 2005; Sung et al., 2015). Also, Beldad and Hegner (2017) have shown an effect between social influence and performance expectancy. In the literature, these findings are explained through the belief that a technology's usefulness will be increased when a technology is used on a large scale. Additionally, the expectation that a technology should be considered increases users' understanding of its value (Beldad & Hegner, 2017; Lu, Yao & Yu, 2005 Sung et al., 2015). Understanding this effect clarifies how positive impact of what people say about the technology can be exploited. Therefore, the following hypothesis is proposed:

Hypothesis 10: Injunctive social norm (a) and descriptive social norm (b) positively influences performance expectancy.

The impact of trust on performance expectancy

There is a mutual relationship between trust and performance expectancy (Gefen et al., 2003; Guo & Barnes, 2007; McLeod, Pippin & Mason, 2008) because it is stated that the use of a technology from a trustworthy party has a positive impact on the usefulness of the technology for users (Gefen et al., 2003). Research by Beldad and Hegner (2017) also shows that trust plays a role in perceiving a technology's usefulness. For this study, if people feel that they can trust the technology developers, they are more likely to perceive it as a useful technology. Lack of trust can lead to concerns that the technology may endanger users, causing users to focus more on the technology's perceived threat than its functionality (Beldad & Hegner, 2017). These findings suggest that trust in the developer of a voice assistant contributes to a positive evaluation of its usefulness, influencing the willingness to use it. Therefore, the following hypothesis will be proposed:

Hypothesis 11: Trust in the technology developer positively influences users' performance expectancy.

The impact of effort expectancy on trust

The level of uncertainty increases in a virtual environment, and therefore trust can be an important factor (Roca, García & De La Vega, 2009). Research shows that perceived ease of use has a direct and significant effect on consumer trust, affecting consumer use of the system (Casaló, Flavián & Guinalíu, 2007; Gefen, Karahanna & Straub, 2003). Several studies have shown that the ease of using a computer system increases trust level (Egger, 2003; Flavián, Guinalíu & Gurrea, 2006; Muir, & Moray, 1996). It also appears that an easy-to-use system can increase the user's trust in the party behind the system. This is because the system's usability can indicate that developers are willing to offer users a pleasant experience of the system (Roy, Dewit & Aubert, 2001). Koufaris and Hampton-Sosa (2004) add that perceived ease of use is an important antecedent for trust in a company. These findings show that a usable system can encourage users to have trust in the party behind the system, and therefore the following hypothesis is proposed:

Hypothesis 12: Users' effort expectancy positively influences trust in the technology developer.

Figure 1 displays the model with the constructs and relationships, as discussed in the theoretical framework.

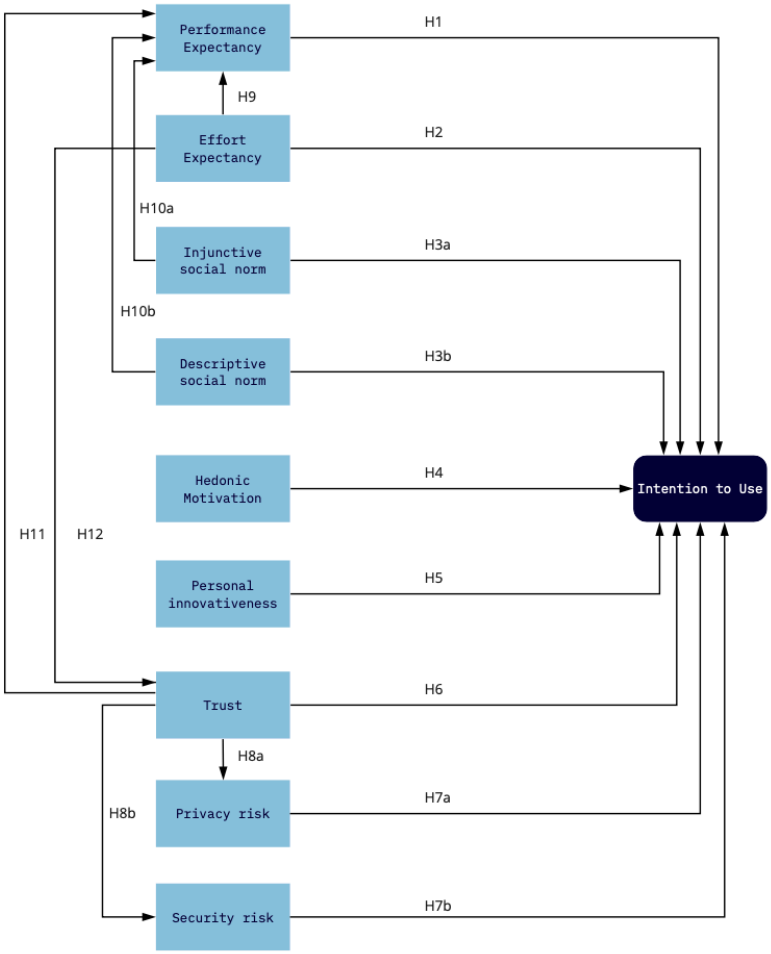

Figure 1. Research model explaining intention to use voice assistants for online shopping.

3. Methodology

In this chapter, the methodology is presented. First, the research design will be outlined, then the procedure will be explained, a description of the participants will be given, the measures will be discussed, the validity and reliability will be tested, and it will be discussed what might be done with the hypotheses that cannot be tested.

3.1 Research design

In this study, the survey method was used to investigate the proposed model. An online survey was created that could be answered by respondents. The survey method was chosen because it is a relevant way to measure the factors. Additionally, quantitative research provided hard facts about the factors that influence the intention to use voice assistants for online shopping. This research was entirely data-based, which made it more specific than qualitative research (Hamburger, 2019). Through this form of field research, respondents had the freedom to complete the survey at any time. The Qualtrics program was used to implement the online survey; within this program, it was possible to export data to SPSS.

A concept version of the survey was developed by adopting statements from the literature, and therefore it could be ensured that relevant scales provided valid measurements. The concept version was pre-tested with eight people to identify formulation and language problems with the items. The survey questions were assessed using the plus/minus method. Respondents were asked to assign plus/minus to the statements. A plus point was set for everything good or clear, and a minus point for everything bad or difficult to understand. With the feedback obtained from the pre-test, the survey was optimized, by small adjustments to the statements, into the final survey for this research. The results of the pre-test can be found in appendix A. The respondents used in the pre-test did not participate in the final survey.

3.2 Procedure

The sampling technique that was used is a non-random sampling method. Respondents were collected using the snowball method. The personal network was used to recruit respondents for the survey. This was done by asking family, friends, roommates and classmates. Media channels such as Facebook, Instagram, LinkedIn, WhatsApp and email were also used. Furthermore, respondents were asked if they wanted to share the survey in their environment to collect more data. The survey was carried out from 15 October to 15 November 2020.

In the first part of the survey, respondents were introduced to the survey's content and objectives. Informed consent was also obtained. The introduction was used to explain the purpose of the survey and information about the use of data was provided transparently to enable respondents to make an informed choice to participate in the survey.

Demographic information such as gender, age and education level were collected to identify the respondents' profiles. Furthermore, an informative video about voice assistants was created and shown to ensure that everyone knew exactly what the survey was about. Also, three experience questions were asked of which the last one, "have you ever used a voice assistant for online shopping", was a filter question. This was done because this research focuses on the intention to use. This guaranteed that only information of people who had never used a voice assistant for online shopping and therefore not biased was used in further analysis. Next, the statements were presented to measure the factors in the model. After collecting all the data, analyses were carried out with the SPSS program.

3.3 Participants

A total of 309 people participated in the survey. The analysis showed that five participants had already used voice shopping. Because the research focuses on people who had never used the technology before, and the aim was to produce a homogenous sample, these participants were removed from further analysis. In total, the sample consisted of 304 respondents who were all included in the analysis. In terms of gender, the distribution was 69.1 percent (n = 210) female and 30.9 percent (n = 94) male. Data was collected from individuals in the age group 18-72 years (M = 29.6; SD = 13.06). Table 1 gives an extensive overview of the participating respondents.

Table 1. Demographic information about survey respondents

Measure	Items	Frequency	Percentage
Gender	Female	210	69.1%
	Male	94	30.9%
Education	VMBO	1	0.3%
	HAVO	15	4.9%
	VWO	28	9.2%
	MBO	24	7.9%
	HBO	120	39.5%
	WO	116	38.2%
Place of residence	Groningen	8	2.6%
	Friesland	5	1.6%
	Drenthe	2	0.7%
	Overijssel	148	48.7%
	Flevoland	9	3.0%
	Gelderland	35	11.5%
	Utrecht	29	9.5%
	Noord-Holland	26	8.6%
	Zuid-Holland	23	7.6%
	Zeeland	1	0.3%
	Noord-Brabant	14	4.6%
	Limburg	4	1.3%
Experience with voice assistant			
- *Do you have a voice assistant in general?*	Yes	239	78.6%
	No	65	21.4%
- *How often do you use a voice assistant?*	Daily	28	9.2%
	Weekly	28	9.2%
	Monthly	37	12.2%
	Never	211	69.4%
- *Have you ever used a voice assistant for online shopping?*	Never	304	100%
Total		**304**	**100%**

3.4 Measures

The survey consisted of nine independent variables measured using a 5-point Likert Scale that ranged from totally disagree (1) to totally agree (5). A 5-point Likert Scale was used because the statements in this survey were translated into Dutch, and for some scales, there was no suitable translation. For example, for ‘somewhat agree’. All items were translated and back-translated to Dutch. Per variable, several questions were formulated to measure the relation with the dependent variable “intention to use”. Respondents could choose to what extent they agreed with the statement. The items were derived from the literature and were made specifically for this study. The complete survey can be found in appendix B (English) and appendix C (Dutch).

Intention to use

The dependent variable, intention to use, defines a person's intention to use a voice assistant for online shopping. The extent to which the various factors play a role in the intention to use was identified. Four statements were formulated by optimizing and revising existing statements

from the study of Pavlou (2003). An example item was: If the opportunity arises, I intend to buy online using a voice assistant.

Performance expectancy
Performance expectancy was measured using the existing scale of Venkatesh et al. (2012), which measured the extent to which an individual believes that a voice assistant improves online shopping performance. Four statements were formulated by optimizing and revising existing statements from the study of Venkatesh et al. (2012). An example item was: I think using a voice assistant for online shopping is useful.

Effort expectancy
Effort expectancy was also measured using the existing scale of Venkatesh et al. (2012). It measured the extent to which a voice assistant was easy to use for online shopping. Four statements were formulated by optimizing and revising existing statements from the study of Venkatesh et al. (2012). An example item was: It will be easy to learn how to use a voice assistant for online shopping.

Social influence
Social influence was measured using statements aimed at injunctive social norm and descriptive social norm. The scale for injunctive social norm measured the extent to what people normally agree or disagree with, and the scale of descriptive social norm measured the extent to what most people usually do. Three statements were formulated for injunctive social norm by optimizing and revising existing statements from studies by Venkatesh et al. (2012), Chu (2019), Pavlou (2003) and Wu and Chen (2005). An example item was: People who are important to me think I should use a voice assistant for online shopping. Three statements were formulated for descriptive social norm by optimizing and revising existing statements from studies by Venkatesh et al. (2012) and Chu (2019). An example item was: People within my immediate environment use a voice assistant for online shopping.

Hedonic motivation
Hedonic motivation was measured by combining the scales used by Venkatesh et al. (2012) and Chu (2019) and measured the derived pleasure of using a voice assistant for online shopping. Four statements were formulated by optimizing and revising existing statements from the study of Venkatesh et al. (2012) and Chu (2019). An example item was: I think using a voice assistant for online shopping is enjoyable.

Personal innovativeness
Personal innovativeness was measured using Oliver and Bearden's (1985) scale and subsequently adapted to the context of this study. It measured whether people consider themselves to be innovative in using new technologies. Four statements were formulated by optimizing and revising existing statements from Oliver and Bearden (1985) study. An example item was: I consider myself as an early adopter with new technologies.

Trust
Trust was measured using the scales of Pavlou (2003) and Beldad and Hegner (2018). It measured the extent to which an individual trust the developer of a voice assistant using a voice assistant for online shopping. Four statements were formulated by optimizing and revising existing statements from the study of Pavlou (2003) and Beldad and Hegner (2018). An example item was: I think that my personal information will not be exploited by the developer of the technology using a voice assistant for online shopping.

Privacy risk
Privacy risk was measured using the scales of Chu (2019) and Featherman and Pavlou (2003) and measured to what extent people felt privacy risk when using a voice assistant for online shopping aimed at personal information. Four statements were formulated by optimizing and revising existing statements from Chu's (2019) study and Featherman and Pavlou (2003). An example item was: I am concerned that my personal data will be abused when using a voice assistant for online shopping.

Security risk
Security risk was measured by combining the scale from Chu (2019) with self-generated statements for the context of this study. It measured the extent to which people experience security issues when using a voice assistant for online shopping aimed at payment information. Four statements were formulated by optimizing and revising existing statements from the study Chu (2019). An example item was: I am concerned that my payment information will not be secure when using a voice assistant for online shopping.

3.5 Validity and reliability of the research constructs

Factor analysis
Table 2 shows the loadings for the different items measuring the variables. An explanatory factor analysis was performed, and the Rotated Component Matrix was used. A factor analysis was used to determine how many factors were measured and whether the items within a factor were correlated. The number of factors depended on the correlation between the items and the size of the eigenvalues. The correlation could be influenced by including only those items in the analysis that measured approximately the same. Factor loadings of 0.5 could be seen as mediocre, values between 0.7 and 0.8 as good, values between 0.8 and 0.9 as great, and values greater than 0.9 as excellent (Kaiser, 1974). By capturing this in the study, it could be determined whether the data were valid.

First, it turned out that the dependent variable, intention to use, measured the same factor as the independent variable performance expectancy. When logically analyzed, these two variables could not be loaded on the same factor, and therefore, intention to use was excluded from the factor analysis. Also, the trust statements were removed because the statements had a score of 0.5 or lower or did not load on the appropriate factor. Hence, the construct did not have discriminant validity. Subsequently, statement one for performance expectancy corresponded with the statements of hedonic motivation. Therefore, statement one of performance expectancy was removed from further analysis. After several factor analyses were performed with 38 items, 29 ultimately remained. This led to a good factor analysis with eight factors, an explained variance of 69.6 per cent and an eigenvalue above one for all measured factors.

Reliability
The reliability was measured using Cronbach's Alpha. This was calculated for each variable with a reliability of Alpha .60 or higher. A generally accepted rule is that Alpha from .60 indicates an acceptable reliability level (Hulin, Netemeyer & Cudeck, 2001). An overview of the Alpha scores can also be found in table 2. Several statements were excluded to increase reliability. This applied to statement four of the variable intention to use. Initially, the reliability was .89, by removing statement four, the reliability was increased to .92. Also, the reliability of injunctive social norm could be increased by removing statement three. However, this appeared to cause problems in the factor analysis, so this statement was not removed. With a Cronbach's Alpha of .64, injunctive social norm was still reliable. Moreover, the variable trust

was far too low. Even if statement two was removed, which increased the reliability to .56, this was too low. This meant that the statements measured something else.

Table 2. Factor analysis with Rotated Component Matrix, Cronbach's Alpha, Explained Variance and Eigen Value

Construct	Statement	Factor							
		1	2	3	4	5	6	7	8
Security risk	I am afraid that the exchange with a company using a voice assistant for online shopping is not secure	.86							
	I am concerned that my payment information will be used in unrelated areas	.84							
	I am concerned that my payment information will not be secure when using a voice assistant for online shopping	.84							
	I am concerned that there might be a third party involved which makes buying online through voice not really secure	.80							
Hedonic motivation	I expect that using a voice assistant for online shopping will be fun		.82						
	I believe it is entertaining to use a voice assistant for online shopping		.81						
	I think the use of a voice assistant for online shopping will be pleasurable		.71						
	I think using a voice assistant for online shopping is enjoyable		.70						
Privacy risk	I am concerned that sensitive data will be collected when using a voice assistant for online shopping			.87					
	I am concerned that my personal data will be abused when using a voice assistant for online shopping			.83					
	I'm afraid that my personal data will be misused without my knowledge and consent using a voice assistant for online shopping			.80					
	I am afraid that a voice assistant might not perform well for online shopping			.74					
Personal innovativeness	I consider myself as an expert when it comes to new trends in technology				.87				
	I use new technological devices, before others have tried them				.87				
	I consider myself as an early adopter with new technologies				.81				
	I care about new trends in technology				.73				
Effort expectancy	I think it will be easy to learn how to use a voice assistant for online shopping					.78			
	I expect that the commands for operating a voice assistant for online shopping are clear and understandable to me					.75			
	I expect that a voice assistant is easy to use for online shopping					.73			
	I believe that the operation of a voice assistant for online shopping will not require much mental effort					.64			
Performance expectancy	I expect that the use of a voice assistant will improve my efficiency of online shopping						.75		
	I think that the use of voice assistant for online shopping is more convenient than the traditional way (= via web)						.72		
	I believe that using a voice assistant for online shopping will help me to buy things more quickly						.71		
Descriptive social norm	I heard that other people have positive experiences with using a voice assistant for online shopping							.80	
	People within my immediate environment use a voice assistant for online shopping							.71	
	I know that the use of a voice assistant for online shopping is becoming popular							.71	
	People whose opinions I value support me using a voice assistant for online shopping								.82
Injunctive social norm	People who influence my decisions think I should use a voice assistant for online shopping								.77
	People who are important to me would approve of my usage of a voice assistant for online shopping								.53
	Cronbach's Alpha	.90	.89	.86	.84	.77	.78	.67	.64
	Explained variance	10.5%	10.3%	9.8%	9.7%	8.8%	7.4%	6.8%	6.3%
	Eigen value	3.06	2.92	2.85	2.82	2.54	2.15	2.98	1.82

3.6 Hypotheses that could not be tested

Due to the questionable validity and reliability of the trust construct, some hypotheses could not be tested. Trust did have an important role in the model, and therefore it would be interesting to test this cautiously. The hypotheses could be tested with one or more items in an additional analysis to see what trust would have done in the model. Therefore, the choice was made to do an additional analysis in the result section for trust that should be interpreted with a degree of caution.

4. Results

This chapter describes the results. First, the descriptive results regarding the intention to use a voice assistant for online shopping are presented. Next, the correlations between the independent and dependent variables are demonstrated. Then, hierarchical regression analyses are performed to test the hypotheses directly influencing the intention to use. Also, the relationships among the independent variables are tested using simple regression analysis. An additional test is done to check whether effort expectancy, injunctive social norm and descriptive social norm are mediated by performance expectancy. Finally, an additional analysis with trust is performed. The effects of the independent variables on the dependent variable are presented, and the corresponding research model is displayed.

4.1 Descriptives

Table 3 gives an overview of the mean scores and the standard deviation of the variables. This is an overview of the respondents' perceptions and beliefs. The score of effort expectancy (3.60) gives the most positive mean. The scores for privacy risk (3.35) and security risk (3.23) also give a high mean on a scale of 1 to 5. This shows that the variables effort expectancy, privacy risk and security risk on a scale of 1 to 5 have a relatively strong influence on the intention to use a voice assistant for online shopping. The variables performance expectancy (2.36), injunctive social norm (2.36), hedonic motivation (2.81) and personal innovativeness (2.51) give a more neutral mean. Descriptive social norm gives the lowest mean with a score of 1.98. This means that these variables have less influence on the intention to use a voice assistant for online shopping. The dependent variable's mean score is 2.27, which is lower than average on a scale of 1 to 5.

Table 3. Descriptive information

Measurement scales	N	Mean	SD
Intention to use	304	2.27	1.0
Performance expectancy	304	2.36	.84
Effort expectancy	304	3.60	.70
Injunctive social norm	304	2.36	.71
Descriptive social norm	304	1.98	.70
Hedonic motivation	304	2.81	.87
Personal innovativeness	304	2.51	.84
Privacy risk	304	3.35	.85
Security risk	304	3.23	.92

All scores are measured using a 5-point Likert-scale from (1) totally disagree to (5) totally agree

4.2 Correlations

It is important to check for multicollinearity before examining the correlation between the various factors. Multicollinearity occurs when there are high correlations between variables, leading to an unreliable estimate of the regression coefficients. To assess the multicollinearity in the regression model, the Variance Inflation Factor (VIF) is examined. This identifies the correlation between the independent variables and the strength of that correlation. The VIF is generally perceived as detrimental when it is higher than 5. This study's values are between 1.1 and 1.9, which means that the multicollinearity is within the acceptable range (Frost, 2017).

Table 4 gives an overview of the results of the performed analysis. The correlations for the variables were measured using a Pearson correlation analysis. The table shows that several

variables correlate with each other, but they have only a weak positive linear relationship. There are some remarkable correlations between the independent and dependent variables. The strongest positive correlation is between performance expectancy and intention to use (.58). Besides, there is a strong correlation between hedonic motivation and intention to use (.56). Additionally, more moderate correlations can also be identified among hedonic motivation and performance expectancy (.60), hedonic motivation and effort expectancy (.43) and between security risk and privacy risk (.46).

Table 4. Correlations between the constructs

Measures		*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1	Performance expectancy	1								
2	Effort expectancy	.37**	1							
3	Injunctive social norm	.34**	.27**	1						
4	Descriptive social norm	.30**	.22**	.36**	1					
5	Hedonic motivation	.60**	.43**	.42**	.389**	1				
6	Personal innovativeness	.14*	.11	.12*	.119*	.20**	1			
7	Privacy risk	-.00	-.14*	-.12*	-.082	-.08	-.12*	1		
8	Security risk	-.09	-.22**	-.14*	-.078	-.17**	-.19**	.46**	1	
9	Intention to use	.58**	.30**	.44**	.303**	.56**	.23**	-.16**	-.23**	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

4.3 Hierarchical regression analysis on intention to use

Through a hierarchical regression analysis, the hypotheses from this research were tested. A hierarchical regression analysis ensures that the independent variables' impact on the dependent variable can be determined successively (De Jong, 1999). The regression analysis was performed using four different blocks. Table 5 shows the different models with the explained variance (R^2 value), the F-value (F) and the significance levels (sig.). In the first block, the original variables of UTAUT were added. These are performance expectancy, effort expectancy, injunctive social norm and descriptive social norm. This resulted in $R^2 = .41$; F (4. 299) = 52.79; P < .001.

In the second block the variable hedonic motivation of UTAUT-2 was added which led to $R^2 = .44$; F (5.298) = 48.53; P < .001. In the third block personal innovativeness of UTAUT-3 was added. This resulted in $R^2 = .45$; F (6.287) = 41.99; P < .001. The last block contains the variables for risk perception that have been added to this research model. This resulted in $R^2 = .46$; F (8.295) = 33.46; P < .001. This means that the independent variables can explain 46 per cent of the variance for intention to use. This also indicates that an increase of 5.5 per cent in the explained variance of intention to use a voice assistant for online shopping can be explained by adding factors such as privacy risk and security risk.

Table 5. Different models with hierarchical regression analysis

Model	**Adj. R^2**	**F-value**	**Sig.**
1. Original UTAUT	.41	52.79	.000
2. UTAUT-2	.44	48.53	.000
3. UTAUT-3	.45	41.99	.000
4. UTAUT-3 with risk	.46	33.46	.000

* Dependent variable is intention to use

Variables that have a direct effect on intention to use

The model supports some of the hypotheses, but it also turns out that several hypotheses are not supported (see table 6). In the final model (block 4), performance expectancy (β = .44; t(302) = 6.73; P < .001), injunctive social norm (β = .27; t(302) = 4.01; P < .001) and hedonic motivation (β = .27; t(302) = 3.96; P < .001) are statistically significant predictors of the intention to use a voice assistant for online shopping. Therefore, hypotheses 1, 3a and 4 are supported. However, further analysis shows that several hypotheses are not supported. The final model shows that effort expectancy, descriptive social norm, personal innovativeness, privacy risk and security risk do not significantly affect the intention to use. Therefore hypotheses 2, 3b, 5, 7a and 7b are not supported.

Table 6. Hierarchical regression analysis UTAUT-3 with risk perception

Block	Predictor	β	t-value	Sig.
1	Performance expectancy	.56	9.20	.000
	Effort expectancy	.07	1.01	.314
	Injunctive social norm	.36	5.07	.000
	Descriptive social norm	.09	1.27	.204
2	Performance expectancy	.43	6.42	.000
	Effort expectancy	.00	.03	.973
	Injunctive social norm	.27	4.24	.000
	Descriptive social norm	.03	.45	.656
	Hedonic motivation	.30	.4.35	.000
3	Performance expectancy	.43	6.44	.000
	Effort expectancy	.00	-.00	.996
	Injunctive social norm	.29	4.22	.000
	Descriptive social norm	.03	.37	.715
	Hedonic motivation	.28	4.07	.000
	Personal innovativeness	.13	2.36	.019
4	Performance expectancy	.44	6.73	.000
	Effort expectancy	-.04	-.51	.614
	Injunctive social norm	.28	4.01	.000
	Descriptive social norm	.02	.34	.233
	Hedonic motivation	.27	3.96	.000
	Personal innovativeness	.10	1.89	.061
	Privacy risk	-.09	-1.52	.129
	Security risk	-.10	-1.75	.081

* Dependent variable is intention to use

4.4 Relationships among the independent variables

The relationships among the independent variables were also measured using simple regression analysis (see tables below). Simple regression analysis provides insight into how a dependent variable changes when the independent variable changes and depicts the relationship between two quantitative variables (Sykes, 1993). The regression analysis was conducted for each relationship separately. The results of the different models with explained variance (R^2 value), the F-value (F) and the significance levels (sig.) are as follows: injunctive social norm on performance expectancy leads to $R^2 = .11$; $F(1.302) = 38.06$; $P < .001$, descriptive social norm on performance expectancy leads to $R^2 = .09$; $F(1.302) = 30.68$; $P < .001$ and effort expectancy on performance expectancy leads to $R^2 = .14$; $F(1.302) = 49.10$; $P < .001$. An overview can be found in table 7.

Furthermore, the simple regression analysis shows that effort expectancy has a significant effect on performance expectancy ($\beta = .45$; $t(302) = 7.01$; $P < .001$), injunctive social norm has a significant effect on performance expectancy ($\beta = .39$; $t(302) = 6.17$; $P < .001$) and descriptive social norm has a significant effect on performance expectancy ($\beta = .36$; $t(302) = 5.54$; $P < .001$).Therefore, hypotheses 9, 10a and 10b are supported. An overview can be found in table 8.

Table 7. Different models with simple regression analysis

Predictor	Adj. R^2	F-value	Sig.
Injunctive social norm	.11	38.06	.000
Descriptive social norm	.09	30.68	.000
Effort expectancy	.14	49.10	.000

* Dependent variable is performance expectancy

Table 8. Simple regression analysis among the independent variables

Path	β	t-value	Sig.
Effort expectancy on performance expectancy	.45	7.01	.000
Injunctive social norm on performance expectancy	.39	6.17	.000
Descriptive social norm on performance expectancy	36	5.54	.000

* Dependent variable is performance expectancy

Besides the model that was tested, it was noticed that there are direct relationships between the independent variables' effort expectancy, injunctive social norm and descriptive social norm on performance expectancy which may indicate that there could be mediation. This was tested using the mediation analysis by Kenny (2018). In this analysis, four steps are discussed. If all four steps are met, there is full mediation. Step 1 shows that the independent variable is correlated with the dependent variable (path c), step 2 shows that the independent variable is correlated with the mediator (path a), step 3 shows that the mediator influences the dependent variable (path b) with the independent variable as the criterion variable because the mediator and the dependent variable can correlate. After all, they are both caused by the independent variable. Step 4 examines whether the mediator fully mediates the relationship between the independent and dependent variable. If this is the case, the effect of path c' should be zero (Kenny, 2018). Figure 2, 3 and 4 show the models to check if there is a mediating role of performance expectancy. The paths c, a, b and c' were estimated through multiple regression analyses.

The first analysis examined whether effort expectancy on the intention to use is mediated by performance expectancy (see figure 2). The total effect of effort expectancy on intention to use (path c) was found to be significantly positive ($\beta = .44$; $t(302) = 5.53$; $P < .001$). Next, the effects were measured between effort expectancy and the mediator performance expectancy (path a), and between performance expectancy and the intention to use (path b). A significant positive effect was found between effort expectancy and performance expectancy ($\beta = .45$; $t(302) = 7.01$; $P < .001$). There also appeared to be a significant effect between performance expectancy and intention to use ($\beta = .66$; $t(302) = 10.89$; $P < .001$). Next, the direct effect of effort expectancy on the intention to use was calculated, with performance expectancy as a mediator (path c'). This shows that the relationship between effort expectancy and intention to use remains significant when the mediator performance expectancy is added to the model ($\beta = .14$; $T(302) = 1.98$; $P = .05$). Also, for full mediation, the effect of effort expectancy on the intention to use must be zero (path c'). The regression analysis shows that the effect is .14, which means that step four is not met. This suggests that the relationship between effort expectancy and intention to use is not mediated by performance expectancy. Therefore, partial mediation is indicated. This means there is not only a significant relationship between performance expectancy and intention to use but also some relationship between effort expectancy and intention to use.

The second analysis examined whether injunctive social norm on the intention to use is mediated by performance expectancy (see figure 3). The total effect of injunctive social norm on intention to use (path c) was found to be significant ($\beta = .63$; $t(302) = 8.55$; $P < .001$). It also appeared that injunctive social norm on the mediator performance expectancy (path a) is significant ($\beta = .39$; $t(302) = 6.17$; $P < .001$) as well as the mediator performance expectancy on intention to use ($\beta = .60$; $t(302) = 10.42$; $P < .001$). Next, the direct effect of injunctive social norm on the intention to use was calculated, with performance expectancy as a mediator (path c'). This shows that the relationship between injunctive social norm and intention to use remains significant when the mediator performance expectancy is added to the model ($\beta = .40$; $t(302) = 5.90$; $P < .001$). Also, the effect was not zero, so there is no full mediation but partial mediation. This means there is a significant relationship between performance expectancy and intention and a direct relationship between injunctive social norm and intention to use.

The final analysis examined whether descriptive social norm on the intention to use is mediated by performance expectancy (see figure 4). The total effect of descriptive social norm on intention to use (path c) was found to be significant ($\beta = .44$; $t(302) = 5.53$; $P < .001$). It also appeared that descriptive social norm on the mediator performance expectancy (path a) is significant ($\beta = .36$; $t(302) = 5.54$; $P < .001$) as well as the mediator performance expectancy on intention to use ($\beta = .66$; $t(302) = 11.16$; $P < .001$). Next, the direct effect of descriptive social norm on the intention to use was calculated, with performance expectancy as a mediator (path c'). This shows that the relationship between descriptive social norm and intention to use remains significant when the mediator performance expectancy is added to the model ($\beta = .20$; $t(302) = 2.87$; $P = .004$). Also, the effect was not zero but .20, so there is no full mediation but partial mediation. This means that there is a significant relationship between performance expectancy and intention to use but also a relationship between descriptive social norm and intention to use.

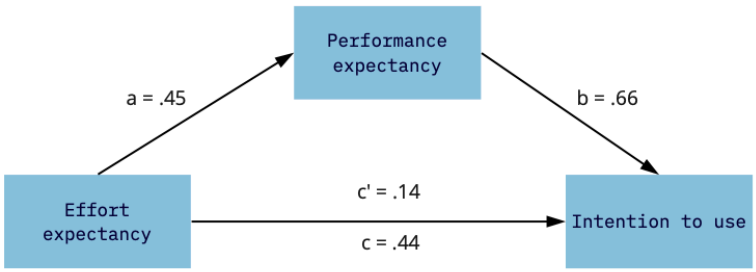

Figure 2. Standardized regression coefficients for the relationship between effort expectancy and intention to use as mediated by performance expectancy.

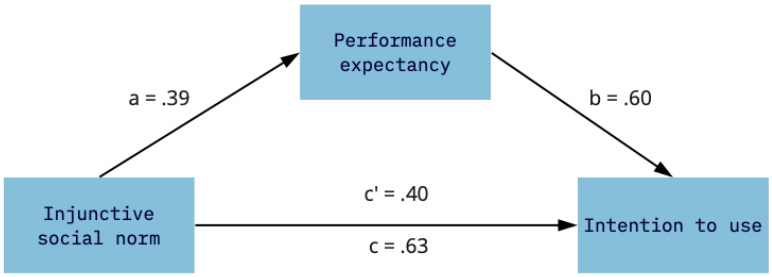

Figure 3. Standardized regression coefficients for the relationship between injunctive social norm and intention to use as mediated by performance expectancy.

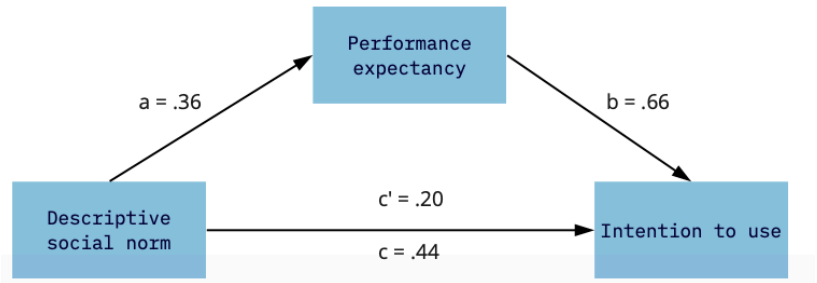

Figure 4. Standardized regression coefficients for the relationship between descriptive social norm and intention to use as mediated by performance expectancy.

4.5 Additional analysis with trust

Originally, the model contained the factor trust, but it was found out that the construct was not reliable because Cronbach's alpha was far too low. Trust was also not valid because the statements had a score of 0.5 or lower or did not correlate on the appropriate factor. However, trust did have an important role in this research, and therefore it is interesting to investigate what the variable trust would have done in the model. Therefore, trust is investigated in this subsection as if it did work. The results should be interpreted with caution because the construct is not valid and not reliable. In the validity analysis, the construct TR3 loaded on an appropriate factor with a score higher than .60 so with this statement the analyses are performed.

First of all, a hierarchical regression analysis is performed, including trust. The results show no change in the explained variance and significance of the model. However, there is a small change in the F-value (R^2 = .46; F (9.294) = 29.64; P < .001).

Furthermore, the regression analysis demonstrates that the variable trust is not a statistically significant predictor of intention to use a voice assistant for online shopping (β = -.00, t(302) = -.01, P = .99). Therefore hypothesis 6 is not supported. Also, the change in the model is almost zero for the other variables' strength and significance.

The relationships among the independent variables were also tested using a single regression analysis. From the results, it appears that user trust in the developer of a voice assistant negatively influences privacy risk but is not significant (β = -.11; t(302) = -1.82; P = .07) therefore, hypothesis 8a is not supported. Furthermore, there is a negative significant effect between trust in the developer of a voice assistant and security risk (β = -.20; t(302) = -3.13; P = .002). The results also show that user trust in the developer has a positive significant effect on performance expectancy (β = .13; t(302) = 2.24; P = .03) and effort expectancy has a positive significant effect on user trust in the technology developer (β = .27; t(302) = 4.08; P < .001). Therefore, hypotheses 8b, 11 and 12 are supported.

Because trust has a significant effect on performance expectancy, it is also examined whether trust on the intention to use is mediated by performance expectancy (see figure 5) using the mediation analysis by Kenny (2018) The total effect of trust on intention to use (path c) was significantly positive (β = .17; t(302) = 2.46; P = .02). Trust on mediator performance expectancy (path a) was also significant (β= .13; t(302) = 2.24; P = .03), as well as the mediator on intention to use (β = .70; t(302) = 12.21, P < .001) (path b). Next, the direct effect of trust on the intention to use was measured using performance expectancy as the mediator (path c'). This shows that the relationship between trust and intention to use was no longer significant when the mediator performance expectancy was added to the model. (β = .08; t(302) = 1.41, P = .16). However, it appeared that the effect was non-zero, which means that there is no full but partial mediation.

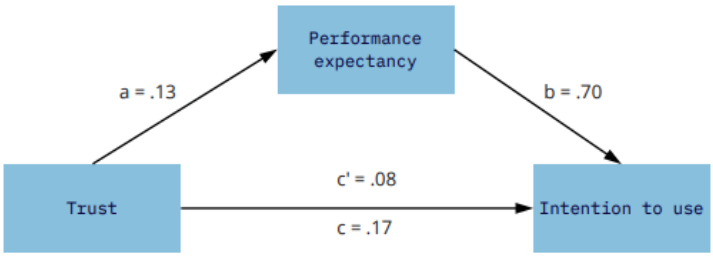

Figure 5. Standardized regression coefficients for the relationship between trust and intention to use as mediated by performance expectancy.

4.5 Research model with coefficients

Figure 6 shows the research model with the corresponding regression coefficients. The non-significant predictors are displayed through a dashed line, and the regression coefficients for trust are presented in red. Whether the effect of trust is significant or not, the results should be interpreted with caution because the construct is not valid and not reliable.

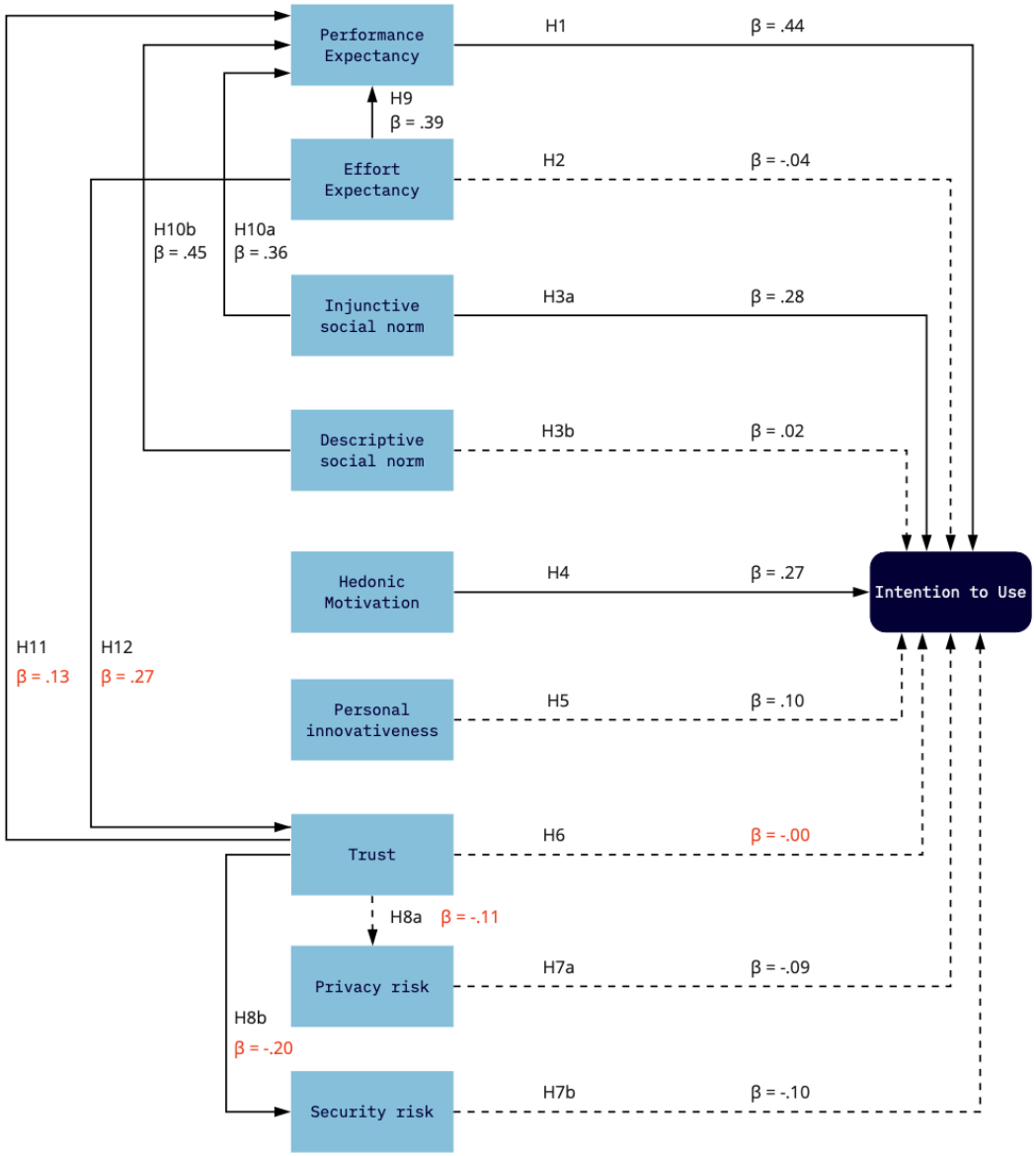

Figure 6. Research model with coefficients explaining intention to use voice assistants for online shopping.

5. Discussion of results, implications and future research directions

In this chapter, the results are discussed, followed by the additional analysis of trust, practical implications, limitations and future research recommendations. This chapter ends with a conclusion.

5.1 Discussion of results

Voice-activated devices go mainstream and it appears that voice shopping is becoming a trending task these days (Mari, 2019). This is mainly the case in America because voice assistants are less popular in the Netherlands (Tankovska, 2020). This report investigated what factors influence the intention to shop online using a voice assistant among Dutch consumers. Several factors influence the intention to use a technology. Factors such as risk perception can reduce the intention to use, while factors such as performance expectancy and effort expectancy should increase the users' intention to use a voice assistant for online shopping. Some of these predictive effects are confirmed in this study, while others are not.

Studies that have been conducted previously in voice assistants mainly focused on the functioning and characteristics of voice assistants. The possible effects of voice assistants on marketing, privacy and security issues and possible future applications were also investigated (Chung, Jorga, Voas & Lee, 2017; Hoy, 2018; Mari, Mandelli & Algesheimer, 2020). This research focused on a specific task: online shopping using a voice assistant. This is an emerging area in online shopping and has been tested using a complete model to identify the determinants of the intention to use. The UTAUT-3 model has proven to significantly predict intention to use an information system technology (Farooq et al., 2017). However, the model has never been used to identify the predictors of the intention to use a voice assistant for online shopping. The revised model used in this study adds knowledge to the research field, and the results can be used as a starting point for a delineated exploration of the determinants.

Direct predictors on intention to use

The results of the data analysis show that performance expectancy is a significant predictor of intention to use. According to Venkatesh et al. (2003), performance expectancy is one of the strongest predictors of user intentions. According to the UTAUT model, this research shows that performance expectancy is the most influential factor in using the technology for online shopping. In previous studies in areas such as the adoption of voice assistants (Kessler & Martin, 2017), internet banking (Martins, Oliveira & Popovic, 2014) and online shopping (Gefen et al., 2003), this significant influence was also observed. Performance expectancy is a reaction to the user's assessment of extrinsic characteristics of a technology. For example, how it helps the user achieve task-oriented goals (Gefen & Straub, 2000). This research shows that the perceived utility directly determines the intention to use and that it is an important decisive predictor of using a voice assistant for online shopping.

Effort expectancy is also considered a crucial predictor of accepting a technology (Venkatesh et al., 2003). The hypothesis for this construct was that it would have a positive influence on intention to use. However, the results of this study show that there is no significant impact on the dependent variable. This means that the degree of ease of use does not affect the intention to use a voice assistant for online shopping. Some studies question the importance of ease of use in technology adoption (e.g., Keil, Beranek & Konsynski, 1995). This can be explained by the article from Gefen & Straub (2000). This research's starting point is that the varying importance of perceived ease of use is related to the task's nature. Perceived ease of use has to do with evaluating intrinsic characteristics of a technology such as user-friendliness, flexibility, and ease of learning of the interface. The research of Gefen and Straub (2000) states that effort expectancy only directly influences the adoption of a technology when the main task for which the technology is deployed is directly related to the intrinsic technological

characteristics, i.e. when the task itself is an inseparable part of a technological interface. This could be an explanation of the fact that when a voice assistant is used to make online purchases, effort expectancy does not affect the adoption of the technology, because the task itself (making an online purchase) is not inseparable from the technological interface (Gefen & Straub, 2000).

In the article by Gefen and Straub (2000), it is stated that performance expectancy does influence the adoption of a technology, but effort expectancy usually does not. Performance expectancy appears to be the primary belief that influences the intention to use a technology, and from this, it can be concluded that extrinsic motivation is more important than intrinsic motivation in technology adoption (Gefen & Straub, 2000). This could be a logical explanation of the significant effect of performance expectancy in this study and the insignificant effect of effort expectancy.

The findings regarding social norms are interesting. The study results show that injunctive social norm has a significant effect on the intention to use. It is also the second-largest determinant of intention to use. This means that people use a technology because it is expected of them by other people. It is more logical to start using a technology because it is a direct observation of what other people do, descriptive social norm, but the analysis of this research does not show this to be a direct predictor. This can be explained by the article of Cialdini (2007). Injunctive social norm refers to a person's perception of what others consider as appropriate behaviour. Research shows that such an evaluation strongly influences decisions, even if the supposed others are not friends or family. Therefore, expectations of what others approve or disapprove of can be quite impactful (Cialdini, 2007). Whereas injunctive social norm activates people to act through social evaluation, descriptive social norm stimulates people to act based on social information. For example, social information about what adaptive and effective behaviour is in the environment. "If many other people are doing it, it is sensible to do the same". The latter may explain why there is no significant effect of descriptive social norm on the intention to use. In the Netherlands, there are no or hardly people who use a voice assistant for online shopping. That is why people cannot act on available social information because this information is not yet there.

The hypothesis for the construct hedonic motivation is confirmed and has a significant influence on the intention to use. This shows that Dutch consumers believe that there is a "fun" component when a voice assistant is used for online shopping. Several studies confirm that fun contributes to adapting a technology (Brown & Venkatesh, 2005; Bruner & Kumar, 2005; Chao, 2019; Venkatesh et al., 2012). It appears that a higher level of fun associated with a system leads to a greater tendency to use the technology. It is also an important intrinsic motivation to encourage consumers to use the technology (Bruner & Kumar, 2005). From this, it can be concluded that pleasure is an important predictor that motivates people to use a voice assistant for online shopping.

The last construct of the UTAUT-3 model, personal innovativeness, does not appear to have a significant effect on the intention to use a voice assistant for online shopping. This means that personal innovativeness does not affect the intention to use. This can be explained by the probability that people are not eager to test a new technology, making a new technology less likely to be embraced (Sanchez-Franco & Roldán, 2010). From the diffusion of innovation theory by Rogers (1995), it can be stated that the respondents in this study are in the early majority group. These are not trendsetters but people who want to keep up with the times. People in this group will often want to use a new technology on the recommendation of the innovators and early adopters. A logical explanation of why this construct does not significantly affect is because a voice assistant for online shopping is hardly used in the Netherlands. The early majority is often more thoughtful in making a choice, use the support and opinion of social contacts to justify and substantiate choices to others (Rogers, 1995).

Finally, the predictors' privacy risk and security risk are added to the model. The results show that the constructs negatively influence the intention to use but do not have a significant effect. This can be explained by the privacy paradox. Consumers indicate that privacy is important and that they are concerned about the use of data by organizations. In practice, it appears that consumers do not do much to protect their privacy. People believe there are risks involved in using the technology but decide to use it because there is a benefit. Consumers weigh up the pros and cons (Barnes, 2006). This can also be seen in the results of this research. Respondents are aware of the risks but see something positive in using the technology, so this awareness makes no difference in the intention to use.

The relationships among the independent variables

The relationships among the independent variables are also investigated. Moreover, an additional mediation analysis was performed, but this showed no full mediation from effort expectancy, injunctive social norm and descriptive social norm on the intention to use via performance expectancy. The path from the independent variables to the dependent variable was reduced in magnitude but deviated from zero when the mediator was inserted (Kenny, 2018). Because there is no full mediation, only relationships among the independent variables will be discussed in more detail.

Although no direct link has been found in the hierarchical regression analysis between effort expectancy and intention to use, there is a significant effect between effort expectancy and performance expectancy. This means that when the technology is easy to use, the usability of the technology will increase. Previous research has shown that this effect is significant (Gelderman, 1998; Saadé & Bahil, 2005; Sung, Jeong, Jeong & Shin, 2015; Szajna, 1996). From this, it can be concluded that the perceived ease of use plays a crucial role in increasing the usefulness of the use of a voice assistant for online shopping. This means that when a voice assistant for online shopping is easy to use, the technology is considered as useful.

While descriptive social norm has no direct influence in the hierarchical regression analysis on the intention to use, it does appear from the simple regression analysis to influence the perception of the usefulness of a voice assistant for online shopping. Injunctive and descriptive social norm are both important determinants of perceived usefulness, performance expectancy. The hypotheses are confirmed in this study and thus have a significant effect. For injunctive social norm, when people consider that society expects them to use a voice assistant for online shopping, understanding of the value of the technology will be increased. For descriptive social norm, when a voice assistant for online shopping is used on a large scale, the technology's usefulness will be increased. One explanation for this may be that most respondents in this study (people under the age of 30) are considered to be more easily influenced by social influence (Lu et al., 2005). The effect that social influence increases the perceived usefulness is in line with the Social Information Processing Theory - which describes that the social environment gives people signals that are used to interpret situations or events. Thus, the extent to which technology is used contributes to the belief of its usefulness (Salancik & Pfeffer, 1997). Awareness of the popularity of a voice assistant for online shopping, the influence of mass media and peers can encourage people to see the technology as useful.

Value of UTAUT

After conducting the study, it is good to discuss the value of UTAUT. Several researchers have already defined technology acceptance to explain the acceptance of a technology subsequently. Throughout the years, new constructs have been added and modified. In this study, a revised version of the UTAUT-3 model was used. From the study by Farooq et al. (2017) testing UTAUT-3, all eight determinants were significant for intention to use. These determinants are performance expectancy, effort expectancy, social influence, facilitation conditions, hedonic

motivation, habit and personal innovativeness. Thereby, the UTAUT-3 model explains 58.1 per cent of the variance on the intention to use. Nevertheless, there are some points to note. Research by Dwivedi et al. (2019) shows that only 25 per cent of studies implementing the UTAUT model do not add additional constructs. This shows that UTAUT is a good foundation but often needs to be adapted to the study.

This was also done in this study. The variables facilitating conditions, price value and habit were removed, and trust and risk perceptions were added to the model. Facilitating conditions have been removed from this research because removing barriers to voice shopping is not yet relevant to investigate because voice shopping has not yet been implemented in the Netherlands. Price value has been removed because this study focuses on voice via both a smartphone and a smart speaker. Since 90 per cent of the Dutch population has a smartphone, this is not an issue. Also, habit was removed from the model because voice shopping has not been used before and is therefore not a relevant factor to investigate. It also appears that when critically analyzed, the UTAUT model does not focus on the negative effects of technology use. This is also important in the acceptance of a new technology, and therefore in the current research model, the predictors for risk perception were added. Since voice shopping goes hand in hand with personal data and transactions, trust is an important determinant in this research. However, the model used regressed in explained variance on the intention to use from an R^2 value of .58 to an R^2 value of .46. According to Hair et al. (2016), a rough rule of thumb is that R^2 values of 0.75 are considered substantial, 0.50 are considered moderate, and 0.25 are considered weak. According to these criteria, the model used has moderate explanatory power. From these findings, it can be concluded that, like the study by Dwivedi et al. (2019), variables had to be added to make the model suitable for this study. The researcher attempted to do this as completely as possible but did result in a decline in the model's explained variance.

5.2 Discussion of additional analysis for trust

As discussed earlier, the construct trust has no discriminant validity and reliability. Because trust did have an important role in the research model, a format was created to examine what trust would have done in the model. Therefore, the following results should be interpreted with caution:

The results demonstrate that trust is not a significant predictor of intention to use. This means that the level of trust in the developer does not affect the intention to use a voice assistant for online shopping. Although trust in the developer does not significantly affect the intention to use, it does seem to influence performance expectancy. This is also confirmed in other studies (Beldad & Hegner, 2017; Gefen et al., 2003; Guo & Barnes, 2007; McLeod, Pippin & Mason, 2008). From this, it appears that using a voice assistant for online shopping is considered useful if the developer is trustworthy. That there is no direct significant effect between trust and intention to use does not mean that the relevance of this construct should be downgraded. Because trust in the developer contributes to a positive evaluation of usefulness, the willingness to use a voice assistant for online shopping will be significantly affected (Beldad & Hegner, 2017).

The results of the study show that trust in the party has a significant negative effect on security risk. This means that when there is trust in the party, the degree of security risk in a purchase situation is reduced. This is also confirmed in other studies (Awad & Rogowsky, 2008; Jarvenpaa, Tractinsky & Saarinen, 1999). Furthermore, research by Koufaris and Hampton-Sosa (2004) shows that when consumers have less trust in an organization, they are concerned about the safety of their transaction with that organization. Besides that, it is remarkable that according to the results, trust in the party has a negative but not significant effect on privacy risk. Logically, consumers will be more inclined to share personal information

if they trust the developer of a voice assistant, but it is not a predictor that influences the effect in this study.

Finally, effort expectancy appears to be a direct predictor of trust in the developer. The results show that effort expectancy has a positive significant effect on trust in the developer and this is also confirmed in previous studies (Egger, 2003; Flavián, Guinalíu & Gurrea, 2006; Muir, & Moray, 1996). This means that an easy-to-use technology can increase trust in the developer. The user-friendliness of a voice assistant for online shopping may indicate that the developers are willing to offer consumers a pleasant experience (Roy, Dewit, & Aubert, 2001).

5.3 Practical implications

Besides the discussion of the results, this research also provides practical implications. From a practical point of view, this research offers the industry of voice assistants and professionals awareness of the factors that influence the intention to use a voice assistant for online shopping. This improves the knowledge and understanding of successful adoption.

First of all, it is important to optimize a voice assistant's functioning concerning its use for online shopping. Considering this research results, performance expectancy and hedonic motivation on the intention to use seem to be important functioning aspects. Also, effort expectancy on performance expectancy could be an important aspect of a voice assistant's functioning for online shopping. In doing so, it is good to develop and optimize possible functions to increase usability. For example, by sharing data between organizations, such as purchase history, a voice assistant knows exactly which hand soap, toilet paper or yoghurt the consumer wants. This has the benefit that the consumer's ease of purchase is improved, and thus (repeat) purchases can be made. Simultaneously, the technology must be easy to use so that the user-friendliness is enhanced, and the consumer will regard the technology as more useful. The hedonic power of the technology should also be taken into account as pleasure is a key determinant. Think of fun features such as encouraging people to buy ice creams for next week's hot weather. This can be perceived as a nice feature of a voice assistant for online purchases. It can be argued that the design phase of a voice assistant for online shopping is an important phase in which the aspects that fit the needs of the consumer must be taken into account.

Not only can the functioning be optimized, but also insight can be gained in creating brand awareness. Injunctive social norm is one of the main predictors of intention to use, which can trigger people through the mass media. Through marketing communications, an environment can be created that stimulates the intention to use a voice assistant for online shopping. Think of advertisements that create the perception that shopping by voice is appropriate behaviour. Besides, social norms increase the perceived usefulness of a voice assistant for online shopping. Therefore, others' opinions and ratings can be an important approach to convince people that a voice assistant for online shopping can be useful. This can be done using advantageous references from celebrities or influential people.

By improving these predictors, the intention to use a voice assistant for online shopping can be optimized. Insight will be gained for professionals to optimize the design process and develop strategies to create more brand awareness.

5.4 Limitations and recommendations for future research

Several limitations can be formulated for this research that can improve future research.

One limitation of this research is the number of incomplete responses in the survey. Many people (176) stopped filling in the survey, which resulted in 304 complete responses out of a total of 480 responses. This resulted in less complete responses that could be used for this survey causing a smaller sample size, and the results can be seen as less reliable. Future research should take into account the reduction of quitting while filling in the survey. Hereby, the length

of the survey should be taken into account. Although many people stopped filling in the survey, it was still a correct sample size.

Another limitation is about the representativeness of the sample. There are outliers in the demographic information of the sample compared to the actual population. In this survey, almost half of the respondents come from Overijssel (48.7 per cent) and also the distribution in male/female is not equal to the actual population. The sample consists of 30.9 per cent male and 69.1 per cent female, while the actual population distribution is roughly equal (CBS, 2018). Because there is no equal distribution of the sample size with the real population, this can be seen as less representative because the sample does not reflect the population. To ensure an equal distribution of demographic data in the sample in the future, respondents will have to be recruited on a random basis, which will improve the representativeness of the sample.

Furthermore, this research shows that voice shopping is still in its early stages, and few people are familiar with it. Thus, variables and associated statements could be vague for people because it is hard to imagine how it will work in real life. Future research should focus on innovative methods to make it easier for respondents to understand what the research is about, and in this way, respondents will be able to give more accurate answers. E.g., create a prototype that respondents can try out once to make an online purchase.

The next limitation in this research is the incorrect measurement of the variable trust. This is difficult to explain since the statements are based on existing scales. Reliability is about consistency in results and is determined by the homogeneity of the results. From the results in this study, it can be concluded that the variations are too wide between the respondents, and therefore there is a lack of homogeneity. (Taylor, 1997). It is possible that the respondents found the questions for the variable trust difficult to understand, with the result that incorrect information is collected. Future research should pay more attention to the degree of comprehensibility without the researcher's need to be explained. This can be done through a more extensive pre-test. In this way, the questions can be tested and optimized among several people to be easy and clear to understand for all the respondents. Research by Beldad and Hegner (2017) also shows that the variable trust is not significant. As in this research, trust in the developer was used instead of trust in the technology. Furthermore, these statements were also measured with originally formulated items. From this, it can be learned that trust in the developer may not be the correct operationalization of trust. Future research may operationalize trust differently by, for example, trust in the technology to determine whether this problem occurs again.

5.5 Conclusion

This research investigated which factors of the UTAUT-3 model, with trust and risk perception, influence Dutch consumers' intention to use a voice assistant for online shopping. The relationships among the independent variables were also included in the model. The study used an online survey with 38 items to measure the 10 different constructs. A total of 304 usable responses were collected. After performing the validity and reliability analysis, it appeared that trust was not reliable and valid. Because this variable did play an important role in the study, an extra analysis was conducted with trust. The results had to be interpreted with caution.

A hierarchical regression analysis was conducted with 4 blocks to answer the proposed hypotheses. This demonstrated that performance expectancy, injunctive social norm and hedonic motivation affect the intention to use a voice assistant for online shopping. This means that usefulness, expected use by others and pleasure are predictors of the intention to use a voice assistant for online shopping. Remarkably, effort expectancy, descriptive social norm, personal innovativeness, and risk perceptions did not influence the intention to use a voice assistant for online shopping. Furthermore, the additional analysis with trust showed that this variable also had no direct influence on intention to use.

The relationships among the independent variables were also examined through simple regression analysis. This revealed that effort expectancy, injunctive social norm and descriptive social norm were significant predictors of a voice assistant's usefulness for online shopping. Because all these predictors had a significant influence on performance expectancy, it was also investigated whether performance expectancy had a mediating role. This showed partial mediation, which means that performance expectancy did not have a fully mediating role in this research model. The additional analysis with trust showed that the variable did not influence privacy risk but influenced security risk and performance expectancy. There was also a mediation analysis done for trust on the intention to use mediated by performance expectancy, but this also appeared not to be full mediation. Finally, effort expectancy influenced the variable trust.

The results show that it is important to optimize a voice assistant's functioning concerning its use for online shopping. Performance expectancy and hedonic motivation on the intention to use are important functioning aspects here. Also, effort expectancy on performance expectancy is an important aspect of a voice assistant's functioning for online shopping. Furthermore, injunctive social norm is an important predictor through which brand awareness can be created by triggering through mass media. Since social norms increase the perceived usefulness of a voice assistant, opinions and reviews of others can be an important approach to convince people that a voice assistant for online shopping can be useful.

These research's findings contribute to the knowledge and understanding of successful adoption of online shopping using a voice assistant among Dutch consumers. Furthermore, these findings can be used as a basis for future research in the area of voice shopping.

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Appendices

Appendix A: Pre-test

Demographics

	Original question	Feedback	Final question
D1	Wat is je leeftijd in jaren?	Geen	Wat is je leeftijd in jaren?
D2	Wat is je geslacht? Mannelijk; vrouwelijk; anders	Sommige mensen willen zich niet identificeren als man of vrouw. Daarom bij “anders” een invulvakje toevoegen	Wat is je geslacht? Mannelijk; vrouwelijk; anders
D3	Wat is je hoogst genoten opleiding? Praktijkonderwijs; VMBO; HAVO; VWO; MBO; HBO; WO	Geen	Wat is je hoogst genoten opleiding? Praktijkonderwijs; VMBO; HAVO; VWO; MBO; HBO; WO
D4	Wat is je nationaliteit? Nederlands; anders	Deze vraag kan weg sinds de survey in het Nederlands is en al wordt gevraagd waar in Nederland de respondent woonachtig is	Wordt verwijderd
D5	Welke provincie woon je op dit moment? Overijssel; Gelderland; Brabant; Limburg; Groningen; Friesland; Flevoland; Noord-Holland; Zuid-Holland; Zeeland; Drenthe; Utrecht	“In welke provincie”	In welke provincie woon je op dit moment? Overijssel; Gelderland; Brabant; Limburg; Groningen; Friesland; Flevoland; Noord-Holland; Zuid-Holland; Zeeland; Drenthe; Utrecht

Knowledge question

	Original question	Feedback	Final question
Inleidend stuk voorafgaand aan de stellingen	Geef aan in hoeverre je het met de stellingen eens bent, van helemaal mee oneens aan de linkerkant tot helemaal mee eens aan de rechterkant (1=helemaal oneens; 2=oneens; 3=niet mee eens of oneens; 4=eens; 5=helemaal eens)	Eens/oneens of waar/niet waar in plaats van schaling. Het gaat om goed of fout en niet een beetje fout of een beetje goed.	Beantwoord de volgende stellingen naar aanleiding van de video: *Geef per stelling aan of deze waar of niet waar is*
S1	De stem assistent stelt je in staat om op een traditionele manier een online aankoop te doen	Traditioneel werd niet altijd direct begrepen, daarom wordt traditioneel gespecificeerd	De stem assistent stelt je in staat om op een traditionele manier (= via het web) een online aankoop te doen
S2	Met de stem assistent kunt je een handsfree online aankoop doen.	Geen	Met de stem assistent kunt je een handsfree online aankoop doen.

S3	De stem assistent is alleen beschikbaar via een smart speaker	Geen	De stem assistent is alleen beschikbaar via een smart speaker

Follow-up question

	Original question	Feedback	Final question
F1	Heb je een stemassistent in het algemeen? (een stemassistent is zowel beschikbaar via een smartphone als via een smart speaker) Ja/nee	Het is nog niet in één oogopzicht duidelijk wat een stemassistent via smartphone of smart speaker is dus misschien voorbeelden noemen	Heb je een stemassistent in het algemeen? (een stemassistent is zowel beschikbaar via een smartphone (bv. Siri) als via een smart speaker (bv. Google Home)) Ja/nee
F2	Hoe vaak gebruik je een stemassistent? Dagelijks; wekelijks; maandelijks; nooit	Geen	Hoe vaak gebruik je een stemassistent? Dagelijks; wekelijks; maandelijks; nooit
F3	Heb je ooit een stemassistent gebruikt voor online winkelen? Regelmatig; een of twee keer; nooit	Het gat tussen regelmatig en één of twee keer is erg groot. Daarom zal dit gat kleiner worden gemaakt	Heb je ooit een stemassistent gebruikt voor online winkelen? Meer dan twee keer; een of twee keer; nooit

Intention to use

	Original question	Feedback	Final question
IU1	Als de kans zich voordoet, ben ik van plan om een online aankoop te doen met behulp van een stemassistent.	Geen	Als de kans zich voordoet, ben ik van plan om een online aankoop te doen met behulp van een stemassistent.
IU2	Gezien de mogelijkheid, voorspel ik dat ik in de nabije toekomst een online aankoop zal doen met behulp van een stemassistent	IU1 en IU2: als de kans zich voordoet en gezien de mogelijkheid lijken te veel op elkaar. Het verschil beter duidelijk maken	Ik ben bereid om in de nabije toekomst een online aankoop te doen met behulp van een stemassistent
IU3	Het is waarschijnlijk dat ik een online aankoop zou doen met behulp van een stemassistent	Geen	Het is waarschijnlijk dat ik een online aankoop zou doen met behulp van een stemassistent
IU4	Ik zie geen probleem om een online aankoop te doen met behulp van een stemassistent	Geen	Ik zie geen probleem om een online aankoop te doen met behulp van een stemassistent

Performance expectancy

	Original question	Feedback	Final question
PE1	Ik denk dat het gebruik van een stemassistent voor online winkelen nuttig zou zijn.	Geen	Ik denk dat het gebruik van een stemassistent voor online winkelen nuttig zou zijn.

PE2	Ik geloof dat het gebruik van een stemassistent voor online winkelen mij zou helpen om sneller dingen te kopen.	Geen	Ik geloof dat het gebruik van een stemassistent voor online winkelen mij zou helpen om sneller dingen te kopen.
PE3	Ik denk dat het gebruik van een stemassistent voor online winkelen handiger is dan de traditionele manier.	Traditionele manier specificeren	Ik denk dat het gebruik van een stemassistent voor online winkelen handiger is dan de traditionele manier (= via het web)
PE4	Ik verwacht dat ik door middel van een stemassistent efficiënter online kan winkelen.	Geen	Ik verwacht dat ik door middel van een stemassistent efficiënter online kan winkelen.

Effort expectancy

	Original question	**Feedback**	**Final question**
EE1	Ik denk dat het gemakkelijk zou zijn om te leren hoe je een stemassistent kunt gebruiken voor online winkelen	Geen	Ik denk dat het gemakkelijk zou zijn om te leren hoe je een stemassistent kunt gebruiken voor online winkelen
EE2	Ik verwacht dat een stemassistent gemakkelijk te gebruiken is voor online winkelen	Geen	Ik verwacht dat een stemassistent gemakkelijk te gebruiken is voor online winkelen
EE3	Ik verwacht dat de commando's voor het bedienen van een stemassistent voor online winkelen duidelijk en begrijpelijk zijn voor mij.	Wat bedoel je men commando's? Specificeren door middel van een voorbeeld	Ik verwacht dat de commando's voor het bedienen van een stemassistent voor online winkelen duidelijk en begrijpelijk zijn voor mij (een voorbeeld van een commando is 'Hey Alexa, koop tandpasta)
EE4	Ik ben van mening dat de werking van een stemassistent voor online winkelen niet veel mentale inspanning zou vergen.	Geen	Ik ben van mening dat de werking van een stemassistent voor online winkelen niet veel mentale inspanning zou vergen.

Injunctive social norm

	Original question	**Feedback**	**Final question**
INJ1	Mensen die mijn beslissingen beïnvloeden, vinden dat ik een stemassistent moet gebruiken voor online winkelen	Geen	Mensen die mijn beslissingen beïnvloeden, vinden dat ik een stemassistent moet gebruiken voor online winkelen
INJ2	Mensen waarvan ik de mening waardeer, zouden mij aanmoedigen om een stemassistent te gebruiken voor online winkelen	Geen	Mensen waarvan ik de mening waardeer, zouden mij aanmoedigen om een stemassistent te gebruiken voor online winkelen

INJ3	Mensen die belangrijk voor me zijn, zouden mijn gebruik van een stemassistent voor online winkelen goedkeuren.	Geen	Mensen die belangrijk voor me zijn, zouden mijn gebruik van een stemassistent voor online winkelen goedkeuren.

Descriptive social norm

	Original question	**Feedback**	**Final question**
DES1	Mensen in mijn directe omgeving gebruiken een stemassistent voor online winkelen	Geen	Mensen in mijn directe omgeving gebruiken een stemassistent voor online winkelen
DES2	Ik heb gehoord dat andere mensen positieve ervaringen hebben met het gebruik van een stemassistent voor online winkelen	Geen	Ik heb gehoord dat andere mensen positieve ervaringen hebben met het gebruik van een stemassistent voor online winkelen
DES3	Ik weet dat het gebruik van een stemassistent voor online winkelen populair aan het worden is	Geen	Ik weet dat het gebruik van een stemassistent voor online winkelen populair aan het worden is

Hedonic motivation

	Original question	**Feedback**	**Final question**
HM1	Ik denk dat het gebruik van een stemassistent voor online winkelen plezierig is.	*Plezierig, leuk, vermakelijk, aangenaam* lijkt op elkaar. Aangezien dit een vooraf bepaalde schaal is wordt dit niet aangepast	Ik denk dat het gebruik van een stemassistent voor online winkelen plezierig is.
HM2	Ik verwacht dat het gebruik van een stemassistent voor online winkelen leuk zou kunnen zijn.	".."	Ik verwacht dat het gebruik van een stemassistent voor online winkelen leuk zou kunnen zijn.
HM3	Ik geloof dat het vermakelijk is om een stemassistent te gebruiken voor online winkelen.	".."	Ik geloof dat het vermakelijk is om een stemassistent te gebruiken voor online winkelen.
HM4	Ik denk dat het gebruik van een stemassistent voor online winkelen aangenaam zou zijn	".."	Ik denk dat het gebruik van een stemassistent voor online winkelen aangenaam zou zijn

Personal innovativeness

	Original question	**Feedback**	**Final question**
PIT1	Ik beschouw mezelf als een early adopter (=vroege gebruiker) met nieuwe technologieën.	Geen	Ik beschouw mezelf als een early adopter (=vroege gebruiker) met nieuwe technologieën.
PIT2	Ik beschouw mezelf als een expert als het gaat om nieuwe trends in de technologie.	Geen	Ik beschouw mezelf als een expert als het gaat om nieuwe trends in de technologie.

PIT3	Ik gebruik nieuwe technologische apparaten, voordat anderen ze hebben uitgeprobeerd.	Geen	Ik gebruik nieuwe technologische apparaten, voordat anderen ze hebben uitgeprobeerd.
PIT4	Ik geef om nieuwe trends in de technologie	Geen	Ik geef om nieuwe trends in de technologie

Trust in developer

	Original question	**Feedback**	**Final question**
TR1	Ik denk dat mijn persoonlijke gegevens niet worden geëxploiteerd door de ontwikkelaar van de technologie wanneer ik een stemassistent gebruik voor online winkelen	Misschien goed om een voorbeeld te noemen van een ontwikkelaar van een stemassistent, bijvoorbeeld Apple	Ik denk dat mijn persoonlijke gegevens niet worden geëxploiteerd door de ontwikkelaar van de technologie (bv. Apple) wanneer ik een stemassistent gebruik voor online winkelen
TR2	Ik geloof dat de ontwikkelaar van de technologie rekening zou houden met mijn voorkeuren bij het gebruik van een stemassistent voor online winkelen.	Voorkeuren is niet duidelijk, misschien specifiëren wat er wordt bedoeld met voorkeuren	Ik geloof dat de ontwikkelaar van de technologie rekening zou houden met mijn interesses bij het gebruik van een stemassistent voor online winkelen.
TR3	Ik denk dat de juiste aanbevelingen zouden worden gedaan door de ontwikkelaar van de technologie bij het gebruik van een stemassistent voor online winkelen.	Aanbevelingen is niet duidelijk. Wat wordt er bedoeld met aanbevelingen	Ik denk dat bij het gebruik van een stemassistent, de ontwikkelaar van de technologie mij de juiste aanbevelingen geeft bij online winkelen
TR4	Ik geloof dat de ontwikkelaar van de technologie de privacy van de verzamelde gegevens zou waarborgen als ik een stemassistent gebruik voor online winkelen.	Geen	Ik geloof dat de ontwikkelaar van de technologie de privacy van de verzamelde gegevens zou waarborgen als ik een stemassistent gebruik voor online winkelen.

Privacy risk

	Original question	**Feedback**	**Final question**
PR1	Ik ben bang dat mijn persoonlijke gegevens worden misbruikt bij het gebruik van een stemassistent voor online winkelen.	Geen	Ik ben bang dat mijn persoonlijke gegevens worden misbruikt bij het gebruik van een stemassistent voor online winkelen.
PR2	Ik ben bang dat mijn persoonlijke informatie wordt gemanipuleerd als ik een stemassistent gebruik voor online winkelen	Wat wordt er bedoeld met gemanipuleerd? *Manipuleren van gegevens betekent opzettelijk invoegen, wijzigen, vernietigen en*	Ik ben bang dat mijn persoonlijke informatie opzettelijk wordt gewijzigd, vernietigd of verspreid als ik een stemassistent gebruik voor online winkelen

		verspreiden van gegevens.	
PR3	Ik ben bezorgd dat er gevoelige gegevens zouden worden verzameld bij het gebruik van een stemassistent voor online winkelen	Geen	Ik ben bezorgd dat er gevoelige gegevens zouden worden verzameld bij het gebruik van een stemassistent voor online winkelen
PR4	Ik ben bang dat mijn persoonlijke gegevens zonder mijn medeweten en toestemming worden gebruikt door een stemassistent voor online winkelen	Geen	Ik ben bang dat mijn persoonlijke gegevens zonder mijn medeweten en toestemming worden gebruikt door een stemassistent voor online winkelen

Security risk

	Original question	**Feedback**	**Final question**
SE1	Ik ben bang dat mijn betalingsgegevens niet veilig zijn bij het gebruik van een stemassistent voor online winkelen	Geen	Ik ben bang dat mijn betalingsgegevens niet veilig zijn bij het gebruik van een stemassistent voor online winkelen
SE2	Ik ben bang dat de transactie met een bedrijf bij het gebruik van een stemassistent voor online winkelen niet veilig is.	Geen	Ik ben bang dat de transactie met een bedrijf bij het gebruik van een stemassistent voor online winkelen niet veilig is.
SE3	Ik ben bang dat er een derde partij betrokken is die online aankopen via een stemassistent onveilig maakt.	Geen	Ik ben bang dat er een derde partij betrokken is die online aankopen via een stemassistent onveilig maakt.
SE4	Ik ben bezorgd dat mijn betalingsinformatie zou worden gebruikt door derden.	Geen	Ik ben bezorgd dat mijn betalingsinformatie zou worden gebruikt door derden.

Appendix B: Survey English

Introduction

Dear respondent, I am a Communication Science master student at the University of Twente and doing research into the use of a voice assistant for online shopping. I am, therefore, requesting your cooperation by completing the survey as honestly as you could. Your participation will greatly contribute to the successful completion of my research.

This online survey will take approximately 10 minutes of your time. Within this survey your opinion is important, hence, there are no right or wrong answers. Your participation in this research is voluntary and you may decide not to participate or when participating you may withdraw at any time. Your responses will be confidential, and I will not collect identifying

information such as you name, email address, etc. All the data will only be used for this research.

If you have any questions about the survey, don't hesitate to contact me via this e-mail address: j.hedeman@student.utwente.nl

Thank you in advance!

Jitske Hedeman
Communication Studies
University of Twente

"I agree to voluntarily participate in this study."
- Yes
- No → end of survey

Demographic information
1. What is your age in years? Indicate your age from 1 till 101
2. What is your gender? male; female; other
3. What is your highest level of education? Praktijkonderwijs; VMBO; HAVO; VWO; MBO; HBO; WO
4. What is your nationality? Dutch; other (if other, excluded from survey)
5. Location: which province are you currently residing? Overijssel; Gelderland; Brabant; Limburg; Groningen; Friesland; Flevoland; Noord-Holland; Zuid-Holland; Zeeland; Drenthe; Utrecht

Carefully watch this video and please take into account while answering the following questions:

"Here a video will be shown in Qualtrics"

Answer the following question in response to this video:
Indicate to what extent you agree with the statements, from strongly disagree to strongly agree on the right side (1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4=agree; 5=strongly agree)

- The voice assistant allows you to make a purchase in a traditional way
- The voice assistant allows you to make a hands-free online purchase
- The voice assistant is only available via a smart speaker

Follow-up question for experience with voice assistant
1. Do you have a voice assistant in general? (a voice assistant is available via a smartphone as well as via a smart speaker) Yes/no
2. How often do you use a voice assistant? daily; weekly; monthly; never
3. Have you ever used a voice assistant for online shopping? regularly; once or twice; never

Measurement items

Items	Scale

Intention to use (IU) IU1: If the opportunity arises, I intend to buy online using a voice assistant IU2: Given the chance, I predict that I would shop online using a voice assistant in the near future IU3: It is very likely that I will purchase a product online using a voice assistant IU4: I don't see a problem buying a product online using a voice assistant	1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4=agree; 5=strongly agree
Performance expectancy (PE) PE1: I think using a voice assistant for online shopping will be useful PE2: I believe that using a voice assistant for online shopping will help me to buy things more quickly PE3: I think that the use of q voice assistant for online shopping is more convenient than the traditional way PE4: I expect that the use of a voice assistant will improve my efficiency of online shopping	1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4=agree; 5=strongly agree
Effort expectancy (EE) EE1: I think it will be easy to learn how to use a voice assistant for online shopping EE2: I expect that a voice assistant is easy to use for online shopping EE3: I expect that the commands for operating a voice assistant for online shopping are clear and understandable to me EE4: I believe that the operation of a voice assistant for online shopping will not require much mental effort	1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4=agree; 5=strongly agree
Injunctive social norm (INJ) INJ1: People who influence my decisions think I should use a voice assistant for online shopping INJ2: People whose opinions I value support me using a voice assistant for online shopping INJ3: People who are important to me would approve of my usage of a voice assistant for online shopping	1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4=agree; 5=strongly agree
Descriptive social norm (DES) DES1: People within my immediate environment use a voice assistant for online shopping DES2: I heard that other people have positive experiences with using a voice assistant for online shopping DES3: I know that the use of a voice assistant for online shopping is becoming popular	1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4=agree; 5=strongly agree
Hedonic motivation (HM) HM1: I think using a voice assistant for online shopping is enjoyable HM2: I expect that using a voice assistant for online shopping will be fun HM3: I believe it is entertaining to use a voice assistant for online shopping HM4: I think the use of a voice assistant for online shopping will be pleasurable	1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4=agree; 5=strongly agree
Personal innovativeness (SIT) PIT1: I consider myself as an early adopter with new technologies	1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4=agree; 5=strongly agree

PIT2: I consider myself as an expert when it comes to new trends in technology. PIT3: I use new technological devices, before others have tried them PIT4: I care about new trends in technology	
Trust (TR) TR1: I think that my personal information will not be exploit by the developer of the technology using a voice assistant for online shopping TR2: I believe my preferences will take into account by the developer of the technology when using a voice assistant for online shopping TR3: I think correct recommendations will be given by the developer of the technology when using a voice assistant for online shopping TR4: I believe that the developer of the technology will ensure the privacy of collected data by using a voice assistant for online shopping	1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4=agree; 5=strongly agree
Privacy risk (PR) PR1: I am concerned that my personal data will be abused when using a voice assistant for online shopping PR2: I am afraid that my personal information will be manipulated when using a voice assistant for online shopping PR3: I am concerned that sensitive data will be collected when using a voice assistant for online shopping R4: I'm afraid that my personal data will be misused without my knowledge and consent using a voice assistant for online shopping	1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4=agree; 5=strongly agree
Security risk (SR) SE1: I am concerned that my payment information will not be secure when using a voice assistant for online shopping SE2: I am afraid that the exchange with a company using a voice assistant for online shopping is not secure SE3: I am concerned that there might be a third party involved which makes buying online through voice not really secure SE4: I am concerned that my payment information will be used in unrelated areas	1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4=agree; 5=strongly agree

Appendix C: Survey Dutch

Introductie

Beste respondent, ik ben masterstudent Communication Studies aan de Universiteit Twente en doe onderzoek naar het gebruik van een stemassistent voor online winkelen. Hiervoor vraag ik om je medewerking door het onderzoek zo eerlijk mogelijk in te vullen. Je deelname zal een grote bijdrage leveren aan het succesvol afronden van mijn onderzoek.

Deze online enquête neemt ongeveer 10 minuten van je tijd in beslag. Binnen deze enquête is jouw mening belangrijk, vandaar dat er geen goede of foute antwoorden zijn. Deelname aan dit onderzoek is vrijwillig en daarom kun je besluiten niet deel te nemen of je ten aller tijde terugtrekken uit het onderzoek. De antwoorden zijn vertrouwelijk en er wordt geen identificerende informatie verzameld zoals naam, e-mailadres, etc. Alle gegevens worden uitsluitend gebruikt voor dit onderzoek.

Als je vragen hebt over het onderzoek, aarzel dan niet om contact met mij op te nemen via dit e-mailadres: j.hedeman@student.utwente.nl.

Bij voorbaat dank!

Jitske Hedeman
Communication Studies
Universiteit Twente

"Ik ga akkoord om vrijwillig deel te nemen aan dit onderzoek."
o Ja
o Nee → einde van het onderzoek

Demografische informatie

1. Wat is je leeftijd in jaren?
2. Wat is je geslacht? Mannelijk; vrouwelijk; anders (invulvakje met anders)
3. Wat is je hoogst genoten opleiding? Praktijkonderwijs; VMBO; HAVO; VWO; MBO; HBO; WO
4. In welke provincie woon je op dit moment? Overijssel; Gelderland; Brabant; Limburg; Groningen; Friesland; Flevoland; Noord-Holland; Zuid-Holland; Zeeland; Drenthe; Utrecht

Bekijk deze video zorgvuldig en houd de informatie in gedachten bij het beantwoorden van de volgende vragen

"Hier wordt een video weergegeven in Qualtrics"

Beantwoord de volgende stellingen naar aanleiding van de video:
Geef per stelling aan of deze waar of niet waar is

o De stem assistent stelt je in staat om op een traditionele manier (= via het web) een online aankoop te doen
o Met de stem assistent kun je een handsfree online aankoop doen.
o De stem assistent is alleen beschikbaar via een smart speaker

Vervolgvraag betreft ervaring met stemassistent

1. Heb je een stemassistent in het algemeen? (een stemassistent is zowel beschikbaar via een smartphone (bv. Siri) als via een smart speaker (bv. Google Home)) Ja/nee
2. Hoe vaak gebruik je een stemassistent? Dagelijks; wekelijks; maandelijks; nooit
3. Heb je wel eens een stemassistent gebruikt voor online winkelen? Meer dan twee keer; een of twee keer; nooit

Measurement items

Items	Scale
Intention to use (IU) IU1: Als de kans zich voordoet, ben ik van plan om een online aankoop te doen met behulp van een stemassistent. IU2: Ik ben bereid om in de nabije toekomst een online aankoop te doen met behulp van een stemassistent IU3: Het is waarschijnlijk dat ik een online aankoop zou doen met behulp van een stemassistent IU4: Ik zie geen probleem om een online aankoop te doen met behulp van een stemassistent	1=helemaal oneens; 2=oneens; 3=niet mee eens of oneens; 4=eens; 5=helemaal eens
Performance expectancy (PE) PE1: Ik denk dat het gebruik van een stemassistent voor online winkelen nuttig zou zijn. PE2: Ik geloof dat het gebruik van een stemassistent voor online winkelen mij zou helpen om sneller dingen te kopen. PE3: Ik denk dat het gebruik van een stemassistent voor online winkelen handiger is dan de traditionele manier (= via het web) PE4: Ik verwacht dat ik door middel van een stemassistent efficiënter online kan winkelen	1=helemaal oneens; 2=oneens; 3=niet mee eens of oneens; 4=eens; 5=helemaal eens
Effort expectancy (EE) EE1: Ik denk dat het gemakkelijk zou zijn om te leren hoe je een stemassistent kunt gebruiken voor online winkelen. EE2: Ik verwacht dat een stemassistent gemakkelijk te gebruiken is voor online winkelen. EE3: Ik verwacht dat de commando's voor het bedienen van een stemassistent voor online winkelen duidelijk en begrijpelijk zijn voor mij (een voorbeeld van een commando is 'Hey Alexa, koop tandpasta) EE4: Ik ben van mening dat de werking van een stemassistent voor online winkelen niet veel mentale inspanning zou vergen.	1=helemaal oneens; 2=oneens; 3=niet mee eens of oneens; 4=eens; 5=helemaal eens
Injunctive social norm (INJ) INJ1: Mensen die mijn beslissingen beïnvloeden, vinden dat ik een stemassistent moet gebruiken voor online winkelen. INJ2: Mensen waarvan ik de mening waardeer, zouden mij aanmoedigen om een stemassistent te gebruiken voor online winkelen INJ3: Mensen die belangrijk voor me zijn, zouden mijn gebruik van een stemassistent voor online winkelen goedkeuren.	1=helemaal oneens; 2=oneens; 3=niet mee eens of oneens; 4=eens; 5=helemaal eens

Descriptive social norm (DES) DES1: Mensen in mijn directe omgeving gebruiken een stemassistent voor online winkelen. DES2: Ik heb gehoord dat andere mensen positieve ervaringen hebben met het gebruik van een stemassistent voor online winkelen. DES3: Ik weet dat het gebruik van een stemassistent voor online winkelen populair aan het worden is.	1=helemaal oneens; 2=oneens; 3=niet mee eens of oneens; 4=eens; 5=helemaal eens
Hedonic motivation (HM) HM1: Ik denk dat het gebruik van een stemassistent voor online winkelen plezierig is. HM2: Ik verwacht dat het gebruik van een stemassistent voor online winkelen leuk zou kunnen zijn. HM3: Ik geloof dat het vermakelijk is om een stemassistent te gebruiken voor online winkelen. HM4: Ik denk dat het gebruik van een stemassistent voor online winkelen aangenaam zou zijn.	1=helemaal oneens; 2=oneens; 3=niet mee eens of oneens; 4=eens; 5=helemaal eens
Personal innovativeness (SIT) PIT1: Ik beschouw mezelf als een early adopter (=vroege gebruiker) met nieuwe technologieën. PIT2: Ik beschouw mezelf als een expert als het gaat om nieuwe trends in de technologie. PIT3: Ik gebruik nieuwe technologische apparaten, voordat anderen ze hebben uitgeprobeerd. PIT4: Ik geef om nieuwe trends in de technologie	1=helemaal oneens; 2=oneens; 3=niet mee eens of oneens; 4=eens; 5=helemaal eens
Trust (TR) TR1: Ik denk dat mijn persoonlijke gegevens niet worden geëxploiteerd door de ontwikkelaar van de technologie (bv. Apple) wanneer ik een stemassistent gebruik voor online winkelen. TR2: Ik geloof dat de ontwikkelaar van de technologie rekening zou houden met mijn interesses bij het gebruik van een stemassistent voor online winkelen. TR3: Ik denk dat bij het gebruik van een stemassistent, de ontwikkelaar van de technologie mij de juiste aanbevelingen geeft bij online winkelen TR4: Ik geloof dat de ontwikkelaar van de technologie de privacy van de verzamelde gegevens zou waarborgen als ik een stemassistent gebruik voor online winkelen.	1=helemaal oneens; 2=oneens; 3=niet mee eens of oneens; 4=eens; 5=helemaal eens
Privacy risk (PR) PR1: Ik ben bang dat mijn persoonlijke gegevens worden misbruikt bij het gebruik van een stemassistent voor online winkelen. PR2: Ik ben bang dat mijn persoonlijke informatie opzettelijk wordt gewijzigd, vernietigd of verspreid bij het gebruik van een stemassistent voor online winkelen PR3: Ik ben bezorgd dat er gevoelige gegevens zouden worden verzameld bij het gebruik van een stemassistent voor online winkelen. PR4: Ik ben bang dat mijn persoonlijke gegevens zonder mijn medeweten en toestemming worden gebruikt door een stemassistent voor online winkelen.	1=helemaal oneens; 2=oneens; 3=niet mee eens of oneens; 4=eens; 5=helemaal eens

Security risk (SR) SE1: Ik ben bang dat mijn betalingsgegevens niet veilig zijn bij het gebruik van een stemassistent voor online winkelen. SE2: Ik ben bang dat de transactie met een bedrijf bij het gebruik van een stemassistent voor online winkelen niet veilig is. SE3: Ik ben bang dat er een derde partij betrokken is die online aankopen via een stemassistent onveilig maakt. SE4: Ik ben bezorgd dat mijn betalingsinformatie zou worden gebruikt door derden	1=helemaal oneens; 2=oneens; 3=niet mee eens of oneens; 4=eens; 5=helemaal eens