Music Consumers' Adoption of Smart Speakers in the Field of Music

How do music consumers adopt towards (musical) smart speakers with reference to music marketing?

Bachelor Thesis

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June 2019

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ABSTRACT

As more and more technologies are evolving in today's age, smart speakers are amongst the current leading media in in the realm of voice-assistant devices that incorporate artificial intelligence to facilitate the functionality for the user. Through its broad technical make-up, the smart speaker can connect and intertwine its different functional components with one another. Thus, it creates and establishes an elaborate experience for the user. In particular, music can be regarded as one of the smart speaker's key features. Since music has been going through a digital change in the last decade and streaming services have become listeners' preferred medium to consume it, the smart speaker offers new unique possibilities to implement and market music. Consequently, the field of music marketing can profit from the examination of music consumers' notion regarding the usage of (musical) smart speakers.

This study aims to investigate music consumers' intention to adopt towards (musical) smart speakers based on the adoption predictors *Perceived usefulness, Facilitating conditions, Enjoyment, Autonomy, Security,* and *Openness/Innovativeness.* Moreover, the relation of demographic variables such as *Age*, *Living situation,* and *Music anticipation* were included. Therefore, an online survey was conducted which measured 144 participants' adoption behavior towards (musical) smart speakers with regard to the aforementioned predictors. Overall, *Perceived usefulness, Enjoyment, Security*, and *Openness/Innovativeness* unveiled to be significant predictors for music consumers' intention to adopt. In contrast, *Facilitating conditions* and *Autonomy* did not have an effect on the intention to adopt which could be based on *Facilitating conditions'* broad scope in thematic variety and the fact that the user is aware of the device's quintessential aspect of *Autonomy* with respect to its artificial intelligence.

Hence, marketing implications could be formulated for the validated predictors to foster the adoption process and usage of the (musical) smart speaker. The main implications included, amongst others, advertisement campaigns, the creation and usage of exclusive voice-based tools, and informative instruction videos/tools.

Keywords: (musical) smart speakers, technology adoption, music, consumption, marketing

1. INTRODUCTION

Throughout the last decade, there has been a rapid rise and development in the field of artificial intelligence and smart devices for home and personal automation. These new technologies are aimed to be conceptualized and designed to enhance and foster efficiency, effectiveness, and the absence of friction for the user's intentions and purpose (Donnelly, 2016). One of the key aspects within this area of smart devices is the Internet of Things (IoT) which can be described as the interconnection and linkage of sensors and home devices with the background of sharing and facilitating information across different channels through a unified framework (Gubbi, Buyya, Marusic, & Palaniswami, 2013). Consequently, the system's "smartness" is achieved by the devices' connection through the IoT. Moreover, the elements of a smart home can be categorized into three groups; networking technology, intelligent control technology, and home automation technology (Georgiev & Schlögl, 2018). While the internal network can be wired or wireless, it is the essential part which connects the devices to each other. The intelligent control ensures that information can be sent and received while it simultaneously acts as a mediator between the user and the device. Lastly, home automation can be referred to the device's performance with reference to intelligent tasks and connection of the device's services to the systems outside the (smart) home (Georgiev & Schlögl, 2018). In general, the IoT can be considered as the current internet sphere's extension, wherefore it integrates a variety of different devices such as computers, smartphones,

cars, light bulbs, washing machines, etc. to the overall digital environment.

While in 2013, more than 9 billion devices in the world had a connection to the internet, estimations for the year 2020 forecast that between 50 billion up to one trillion devices will be connected to the internet and the IoT (Manyika, Chui, Bughin, Dobbs, Bisson, & Marrs, 2013). Several studies state that the IoT will have a great impact in the near future due to its integration in all kinds of industries and devices with reference to smart technology (Donnelly, 2016). Particularly, the IoT and the increasing growth of the interconnected smart home technology seem to revolutionize the music industry, specifically, the operation and engagement with consumers. As music consumers used to be tethered to a laptop or computer, the usage of smart technology provides the possibility for listeners to discover and stream music frictionless throughout their homes (Kotz, 2017).

The organic shift and movement toward digital media in the music industry has been rapidly changing the way consumers perceive, purchase, and consume music. While physical copies and digital downloads were the main sales products in 2009, digitalization enforced a shift in the industry through the establishment and development of streaming services such as Spotify and Apple Music causing rapid decreases in physical sales throughout the last years (IFPI, 2010). According to Christman (2018, para. 4) "CD sales totaled [at] 34.8 million [...] that number [went] down 19.7 [by] 19.7 percent year [after] year. Meanwhile, download albums are counted at 28.6 million, down from 36.3 million, a slightly larger 21.4 percent drop than the CD [sales], with track sales […] even further down". In contrast, the music industry also grew which is based on the uptake in streaming. There has been a significant move to mobile consumption which indicates a shift within the way people consume (their) music on a daily basis leading to expectations that this area will develop and grow further (Music Ally, 2018). With listeners consuming more than 100 billion streams of music in 2017, smart speakers are aimed to give streaming a further boost. Simultaneously, more casual listeners are aimed to be attracted into paid subscription music services through these smart devices (Music Ally, 2018). A (musical) smart speaker can be described as "an internet-connected speaker controlled by voice commands, with an artificial intelligence (AI) assistant responding to the owner's requests (Music Ally, 2018, p.5). Its features include, amongst others (Martin, 2019):

• Finding similar music

• Creating playlists and adding songs to playlists

• Creating a music alarm

• Playing music across multiple speakers

• Getting music news

• Personalized recommendations for music; artists, songs, playlists

According to Stassen (2019, para. 1) "the number of smart speakers in US households has increased by 78% year-over-year, from 66.7 million in December 2017 to 118.5m in December 2018". Furthermore, the average smart speaker household in the United States featured 2.3 smart speakers in 2018 which increases the average of 1.7 devices per household in comparison to 2017. Plus, 53 million people over the age of 18 own at least one smart speaker which makes 21% of the population (Stassen, 2019). Amongst the smart speakers, Amazon, Google, and Apple own the three most prominent devices; *Amazon's Echo*, *Google Home*, and *Apple HomePod*, while running their own music-streaming services as well (Music Ally, 2018). Moreover, the streaming services Spotify and Deezer are predicted to launch their own devices soon as well (Williams, 2018). Economic benefits of the usage of smart speakers besides the driving subscription growth are, amongst others, making music more ubiquitous, driving sales of physical music, and the potential for voice-based marketing (Music Ally, 2018). Nonetheless, the introduction of smart speakers in the music industry also poses challenges regarding consumers'

technology acceptance and user satisfaction – in general, the usage and perceived usefulness. Hence, from a theoretical perspective this topic can be linked to the Technology Acceptance Model (TAM) which has been one of the most influential models regarding technology acceptance implicating that an individual's intention to use new technologies is influenced by the two primary factors 'perceived usefulness' and 'perceived ease of use' (Monzavi, Zarei, & Ghapanchi, 2013). Thus, the TAM will be used as a foundation in this context with the addition of further technology acceptance models and theories to investigate music consumers' intention to adopt (musical) smart speakers into their lives.

Despite the rising relevance and implementation of smart speakers in society, few studies have been conducted to investigate music consumers' intentions to use them and how this would translate to the consumption of music. Consequently, the following research question arises:

"How do music consumers adopt towards (musical) smart speakers
with reference to music marketing?"

The research question will be answered by providing a theoretical framework which focuses on the technology acceptance regarding (musical) smart speakers. The overall framework will be built and amplified by the three technology acceptance models; *Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT)*, and the recent *Adaption of the TAM by Park, Kim, Kim, & Kwon.* As the first two models theorize the general process and predictors of technology acceptance, the latter one specifically elaborates on the context of smart devices. In general, the overall theoretical framework aims to discuss and identify relevant predictors of technology acceptance towards (musical) smart devices which might have an effect on (music) consumers' intention to adopt. Noteworthy predictors that are encompassed in the overall framework are, amongst others, *Perceived usefulness*, *Facilitating Conditions, Security,* and *Openness/Innovativeness*. Furthermore, a conceptual model regarding the technology acceptance towards (musical) smart devices will be created based on the examination of theoretical framework and it will be developed further through the input of an expert interview. To get more insight an online survey will be conducted to test the predictors and measure music consumers' intention to adopt (musical) smart speakers. Lastly, the results will be discussed and practical implications regarding marketing strategies in the field of music marketing through (musical) smart speakers will be stipulated based on (music) consumers' intention to adopt and its predictors.

2. THEORETICAL SUBSTANTIATION

2.1 Theoretical framework: Technology acceptance regarding (musical) smart speakers

Technology, specifically, new technologies such as smart devices offer no value unless they are socially accepted and used by consumers. If consumers do not perceive a technology as beneficial, they will most certainly neither adapt to it, nor use it. Hence, acceptance is a key determinant to a (new) technology's success. Technology acceptance encompasses a variety of different elements which play essential parts in the implementation and usage of a technology. In the following framework, different theories and models for technology acceptance will be discussed with regard to (musical) smart speakers in the field of music. Therefore, predictors of technology acceptance will be unveiled and determined.

The Technology Acceptance Model (TAM) is one of the most commonly used models in evaluating technology acceptance:
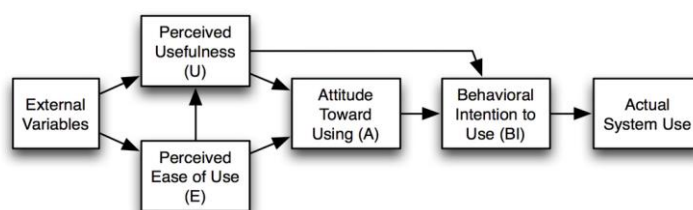

Figure 1: Technology Acceptance Model

The TAM is a model proposed by Davis (1989) which theorizes the process of accepting and using technologies. In addition, it is the first model which implements psychological factors and proposes factors which influence the aspects of 'how' and 'when' new technologies will be used based on the user's decision (Georgiev & Schlögl, 2018). TAM has been validated as a beneficial theoretical model for the exploration of smart services or information-oriented services. For instance, Chen, Yen and Chen (2009) used TAM to exemplify the intention to employ smart phone devices. In their study, they confirmed the original TAM's validation with self-efficacy as a noteworthy determinant. TAM is based on the *Theory of Reasoned Action (TRA)* and can be considered as an extension of this theory which has been proven in many different contexts due to its usage by several researchers with the aim to provide empirical evidence (Wolf, Menzel, & Renhak, 2018). TAM amplifies that a number of different factors influence the customer's attitude towards the usage of technology when new technologies are presented. Two key constructs are embedded into TAM which are 'perceived usefulness' and 'perceived ease of use' (Georgiev & Schlögl, 2018). Perceived usefulness can be defined as "the degree to which an individual believes that using a system would improve his/her performance" while perceived ease of use is related to the usability a person expects from the system; the degree of a minor degree of effort in using the technology (Georgiev & Schlögl, 2018, p.67). In general, TAM is predominately used to explain user behavior. Specifically, in the context of (musical) smart speakers, these two key constructs are likely to have a major influence in the adoption process since speakers could be hindered in usage due to their complexity in terms of usage or simply because users do not see any purpose in using them. Music consumers are most probably interested in the usage of a (musical) smart speakers based on its provision for an advanced music experience. For instance, a musical smart speaker's features include, amongst others, finding similar music, creating playlists, adding/deleting songs on playlists, and receiving music news (Martin, 2019). These features give a clear indication towards the overall perceived usefulness for music consumers and, hence, their potential adoption behavior.

Therefore, the hypothesis arises:

Hyp1: Perceived usefulness is positively related to the intention to adopt (musical) smart speakers

In addition to this, the Unified Theory of Acceptance and Use of Technology (UTAUT) aims for the unification of existing technology acceptance models:
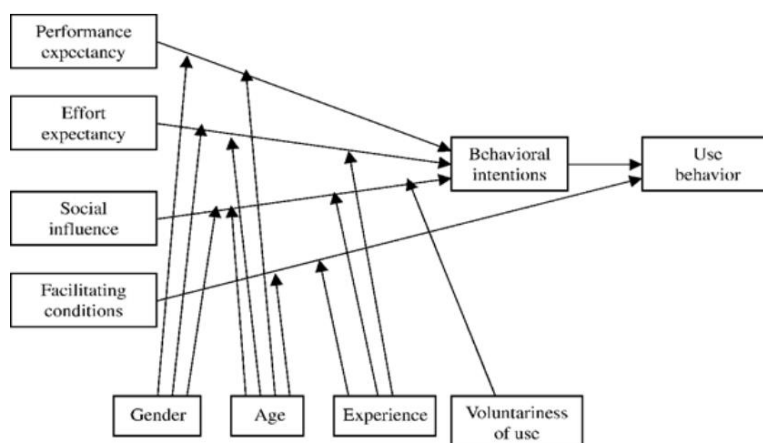

Figure 2: UTAUT

Four different constructs are integrated in this model: 'performance expectancy', 'effort expectancy', 'social influence', and 'facilitating conditions'. Thus, the UTAUT model provides a more holistic and cognitive approach in describing the acceptance of technologies (Venkatesh, Morris, Davis, & Davis 2003). On the one hand, the first three constructs influence behavioral intention which indicates the degree to which an individual believes that she/he will engage in a given behavior; an individual's act in using a particular technology (Berry, 2017). In general, their effect on 'behavioral intention' ultimately influences the usage behavior. According to Lai (2017, p.30) "constructs including perceived usefulness, extrinsic motivation, job outcome expectations form the 'performance expectancy' in the UTAUT model while 'effort expectancy' captures the notions of perceived ease of use and complexity". As the key elements of these two constructs are already covered in depth by the first hypothesis regarding perceived usefulness, they are not taken into consideration for the formulation of the upcoming hypotheses. Additionally, the construct 'social influence' can be defined as "the extent to which consumers perceive that important others (e.g., family and friends) believe they should use a particular technology" (Bozen, Parker, & Davey, 2016, p.11). In the context of (musical) smart speakers in Europe, it is very unlikely that the adoption process is influenced by social pressure since this technology is still in its early stages of implementation and usage. In addition, since the general public is generally not aware of the device's musical features and functions, potential consumers would certainly not be influenced by the social dimension in the adoption process.

On the other hand, the variable 'facilitating conditions' has a direct effect on usage behavior (Georgiev & Schlögl, 2018). According to Al-Qeisi (2009, p.318) "facilitating conditions is a construct that reflects an individual's perception about her/his control over the behavior". In general, it refers to individuals' perceptions of the availability of technological resources and it is linked to organizational resources that can remove barriers with regard to using a technology (Al-Qeisi, 2019). In the UTAUT, facilitating conditions also put an emphasis on the role of external factors, for instance, resources on usage directly without the mediation of behavioral intention (Venkatesh et al., 2003). In the context of (musical) smart speakers, facilitating conditions can be identified as money resources, availability of the

smart speaker in a specific country, price, language options, and the general functionality, amongst others, which play an essential part in the overall adoption behavior.

Besides, the variables 'gender', 'age', 'experience' and 'voluntariness of use' have moderating effects on the relations between the four core variables (Georgiev & Schlögl, 2018). With regard to (musical) smart speakers, all these variables play a part for the process of acceptance. However, facilitating conditions can be illustrated as a key determinant in this context since music consumers are potentially more likely to engage with and adopt new technologies such as the (musical) smart speaker to advance their music experience based on the device's features, functionality, and external factors making up its overall benefits. Accordingly, the following hypothesis arises:

Hyp2: Facilitating conditions is positively related to the intention to adopt (musical) smart speakers

In a more recent adaption of the Technology Acceptance model by Park, Kim, Kim, & Kwon (2018) they elaborated the TAM by adding different values (including services) and linkages to the key concepts of the original model; 'security value', 'economic value', 'comfortable value', and 'hedonic value' in the context of "smart home services" which they identify as "all-in-one remote control services that can handle all equipment and devices installed in the house […] such as electricity, water supply, air conditioning, boilers, refrigerators, and TVs" (p.176). The study investigated the core motivations for the adoption towards smart home services while exploring the processes and approaches through which the motivations were included in the original TAM and the services' acceptance. To achieve this, an online survey was conducted with users of smart home services from which 799 responses were used in total (Park et al., 2018).
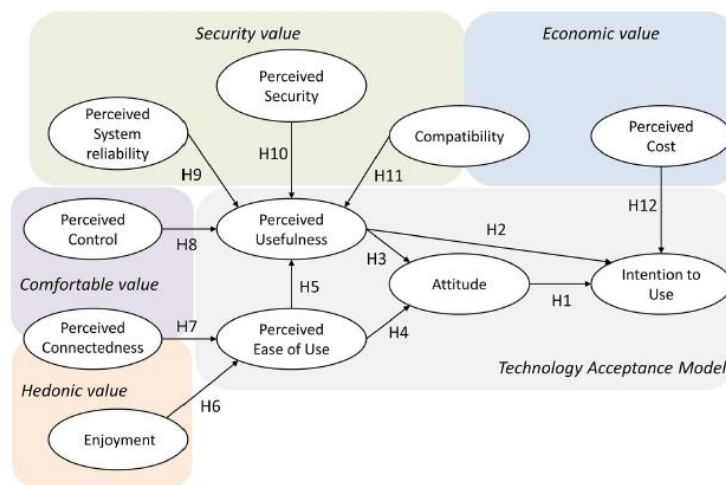
Figure 3: Recent adaption of the TAM by Park, Kim, Kim, & Kwon (2018)

With regard to this study, it would be wise to consider the hedonic value (specifically, 'enjoyment') and the security value (specifically, 'perceived security') as predictors for the adoption towards (musical) smart speakers. The economic and comfortable values merely play less relevant roles in this case. On the one hand, the economic value is already sufficiently covered within the original TAM's 'facilitating conditions' amongst other variables as Park et al. (2018, p.7) relate this value to 'perceived costs' which they define as "the concerns related to the costs used in purchasing, maintaining, and repairing the essential components in the [information] services and systems". On the other hand, the (musical) smart speaker can be regarded as an elaborated medium to consume music whereas a music consumer can easily link her/his preferred and already used paid-subscription music service to the device, for instance,

a smartphone. Thus, the economic value can be referred and reduced to the device's purchase price. Moreover, the basic models are targeted to be affordable for the mainstream audience with prices starting sub-50$ for the *Google Home Mini* and *Amazon Echo Dot* (Music Ally, 2018).

The comfortable value is related to 'perceived control' which can be identified as "the users' feeling of how proficient it is to achieve a selected activity" (Park et al., 2018, p.6). This can be linked to the device's interface and the potential consumer's own skills in comprehending and operating the device (Park et al., 2018). In the case of (musical) smart speakers, Music Ally (2018, p.35) states that "their voice interfaces are even more accessible than smartphone apps". This makes the comfortable value redundant in this context as using a smart speaker also entails some minor interaction by phone via a corresponding app. Since music consumers and the targeted user group for this device naturally require to have 21st-century skills, in particular, digital skills and competence, which covers, amongst others, technical operations, information management, communication and sharing, ethics and responsibility, and evaluation and problem-solving (van Laar, van Deursen, van Dijk, & de Haan, 2017). Hence, the comfortable value can be determined as a trivial and not as a decisive factor in the adoption process.

Moreover, the hedonic value is included to explore the motivational factors behind technology acceptance (Park et al., 2018). Its addition as an antecedent of the model incorporates the key concepts 'perceived enjoyment' and 'perceived connectedness' and their linkages to the antecedent 'perceived ease of use'. While 'perceived enjoyment' can be defined as the extent to which (musical) smart home devices are perceived to be enjoyable and playful, it has a direct connection to the user's perception towards the technology as 'perceived ease of use' in using information-delivering systems is influenced by the system's 'perceived enjoyment' (Park et al., 2018). (Musical) smart speakers aim to be entertaining and functional by offering an elaborated way how to consume and perceive music. Due to their interconnection with other functions they aim to create an advanced unique experience for the user in comparison to their old habits and consumer behavior (Music Ally, 2018). Their focus is on the user's enjoyment by simultaneously complementing on the key aspects of functionality and technological advancement. The concept 'perceived connectedness' entails the user's wish to interact with a service based on its components at convenience rather than on its physical inconvenience which is the case for smart speakers due to their voice-based content and the advancement of the musical experience (Park et al., 2018). In particular, active music consumers are likely to seek to be up-to-date with technological innovations in their preferred field of interest. Since the way people consume music has been constantly changing in the digital age, music lovers are likely to be the first group that adopt smart speakers due to their aforementioned benefits. Consequently, it is important for users that the product excels in its performance while working flawlessly and ultimately having an added value. All of this can only be achieved if the 'perceived connectedness' is provided for the user in advance, wherefore the system's reliability is ensured with reference to its functions and performance. In particular, regarding the device's AI aspect as it is designed to speak to and communicate with the user. Thus, this aspect must be sufficiently developed and work for the user's notion to offer and lead to an enhanced pleasant experience. Hence, the construct 'perceived connectedness' can be linked to 'perceived enjoyment' since it can be considered as a crucial component for the latter one's provision. Therefore, the following hypothesis arises:

Hyp3: Enjoyment is positively related to the intention to adopt (musical) smart speakers

Besides this, the lack of user autonomy has to be taken into consideration for music consumers as the usage of a (musical) smart device indicates that an AI smart device decides for the consumer what kind of music will be chosen to be played. This is due to the fact that smart devices make automatic decisions based on data and algorithms (van Deursen & Mossberger, 2018). As these types of devices are designed

to help users with huge amounts of data, they make autonomous decisions to facilitate the information flow and general processes through the incorporated algorithms. As a result, users will have less autonomy since former operational and formal skills are simply not required for smart devices anymore. This leads to users' passiveness and unawareness of what is happening (behind the scenes) as these types of technologies actually aim to replace human actions, judgements, and decisions (van Deursen & Mossberger, 2018).

If a smart speaker's streaming service, for instance, if Apple Music (via Apple's *HomePod*) starts to look for what the user should be listening to based on the device's judgement, then the user will be limited in his/her original choices. This can be regarded as an intervention to their identity to some extent as, specifically, music lovers have a strong sense of originality in finding and choosing (new) music which they want to listen to, get acquainted with, and identify with (Chamorro-Premuzic, 2011). In particular, the entire experience might develop into an automatic static process which could deteriorate the user's general way of consuming music. The consumer might lose control and autonomy in some parts by using the (musical) smart speaker which has been steadily provided in the traditional consumption by the computer or the smartphone. In contrast, regular music consumers who, for instance, prefer the radio as a medium to listen to music might profit from these algorithms and active suggestions by the device since they get to find, listen to, and discover music which is specifically recommended to their taste and preference without having to put in effort into this process. Consequently, autonomy might play an important aspect in the overall adoption process and the following hypothesis arises:

Hyp4: Autonomy is positively related to the intention to adopt (musical) smart speakers

Regarding the security value in the adapted TAM by Park et al. (2018), the construct 'perceived security' which is connected to 'perceived usefulness' can be described as the "users' perspectives toward the protection level against the potential threats when using smart home services" (Park et al., 2018, p.180). In general, it can be identified as digital security relating to privacy concerns. As the TAM indicates that 'perceived usefulness' is not only a significant determinant of 'customer attitude' but it also influences the intention to use the technology directly, a (musical) smart speaker's security and privacy features play important parts in the process of a user's technology acceptance as well (Davis, 1989). Particularly, as recent cases have emerged that scrutinize the trust in smart devices as they are able to record private conversations without the user's consent leading to major privacy risks and the invasion of privacy (Sacks, 2018). As the increasing amount of large-scale data breaches indicates that there is not only a rise in the number of security breaches but they are also increasing in severity on the internet, users tend to become more and more prudent and careful with their personal (digital) data (Varonis, 2019). Security directly affects the perception of a service, whereupon the consumer and adoption behavior will be influenced. Therefore, security can be considered as a factor which influences the consumer's adoption beforehand. For example, if a smart speaker is generally known for lacking crucial security measures, potential users might certainly be put off by the idea of a possible purchase of the product. Consequently, the hypothesis arises:

Hyp5: Security is positively related to the intention to adopt (musical) smart speakers

Furthermore, the constructs 'openness to new experiences' and 'innovativeness' can be regarded as determinants for technology acceptance in the context of (musical) smart devices. 'Openness' can be identified as one of the Big Five personality traits together with extraversion, neuroticism, conscientiousness, and agreeableness making up one's personality (Nov & Ye, 2008). Especially, a person's receptivity to new experiences, ideas, and thoughts can be linked to openness whilst it also facilitates a person's intelligence and intellectual interests. Individuals who have high levels of openness

in the Big Five test tend to be curious, non-conformist, and flexible, amongst others, by being highly likely to change their beliefs and ideas based on new information and experiences (Nov & Ye, 2008). Concerning technology acceptance, openness's effect on people's interaction with technology has been associated with both positive and negative linkages to technophobia and satisfaction in the context of the ongoing technological change (Nov & Ye, 2008). With regard to the AI-affiliated smart speakers, having an open-mind can be marked as a precondition since one has to accept a variety of aspects that come along with the key aspect of music consumption. For instance, talking to and communicating with an AI device, letting it use one's data, allowing it to be an active part in one's listening experience, etc. In addition to that, 'innovativeness' can be described as "the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system" (Rogers, 2002). Moreover, Agarwal and Parasad (1998, p.206) determine innovativeness as "an individual's willingness to try out any new information technology". Thus, an individual can be identified as innovative when he or she is early to adopt an innovation. In the context of (musical) smart speakers, active music consumers are likely to be identified as innovative since these (musical) smart speakers are generally aiming to create a better music experience for consumers (Music Ally, 2018). Furthermore, speakers are still in the early stages of being implemented into society, specifically, in the field of music consumption and can be regarded as something innovative. Consequently, the hypothesis arises:

Hyp6: Openness/Innovativeness is positively related to the intention to adopt (musical) smart speakers

Based on the theoretical substantiation and the formulation of the hypotheses, the following conceptual model for consumers' intention to adopt (musical) smart speakers could be build:
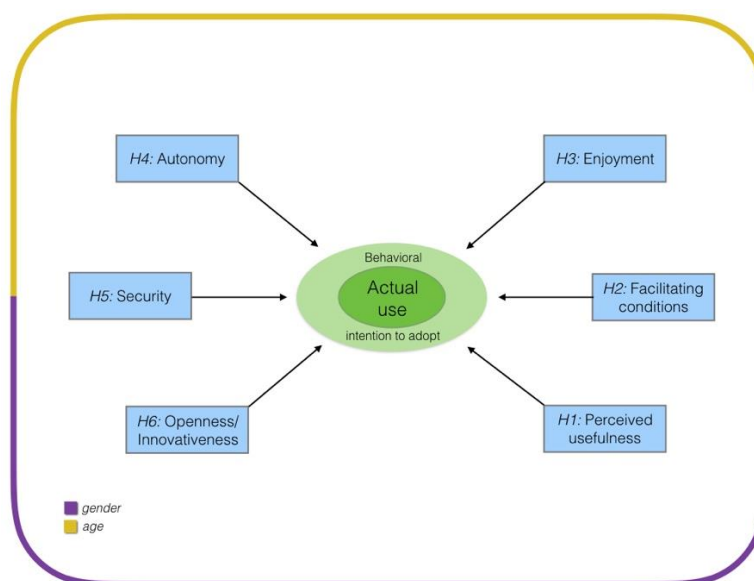
Figure 4: Conceptual model

The model visualizes the identified 6 constructs' prediction on the 'behavioral intention to adopt' leading to the 'actual use' of the technology. The latter two derive from the TAM as well as the construct *Perceived usefulness*. Moreover, the variables 'gender' and 'age' are predicted to have moderating effects on the different constructs. They derive from the UTAUT as well as the construct *Facilitating conditions*. The constructs *Enjoyment* and *Security* could derive from the adaption of the TAM by Park et al. Lastly, the constructs *Autonomy* and *Openness/Innovativeness* are created based on theory.

It has to be noted that the constructs contain further elements which are not illustrated in the model to keep it concise and comprehensive. To clarify, in the context of (musical) smart speakers, the

construct *Perceived usefulness* encompasses elements of the UTAUT's variables 'effort expectancy' (including perceived ease of use) and 'performance expectancy' which unveiled to be not as predictive as the other constructs in the inclusion of the model for the intention to adopt. In general, these elements could not be identified as autonomous predictive constructs for the conceptual model. Moreover, the construct *Facilitating conditions* encompasses aspects such as price, language options, and availability of the device in the county. Moreover, *Enjoyment* is intertwined with the aspects entertainment and connectedness. Lastly, *Autonomy* is connected to the aspect of control and *Security* is linked to privacy.

3. METHOD

An online survey was conducted to test the model's hypotheses. Prior to that, an expert from the music industry was consulted and interviewed to get further exclusive (practical) insights about the topic. Thus, the conceptual model could be elaborated.

3.1. Expert interview

In total 14 interview questions were formulated based on the input of the theoretical framework. The interview was held to acquire practical expertise on the topic to obtain further information through a different angle. Accordingly, an expert working in the digital marketing department of a major music label was consulted and interviewed about his view and opinion regarding this topic. The expert interview was structured and the questions were sent to the expert interviewee per email to avoid *interviewer judgement* and to give the expert enough time to reflect upon the questions and formulate his statements accordingly (IndianScribes, 2018). Hence, it was aimed to increase the breadth in the textual information regarding the topic via the expert. The expert interview was held in German and translated into English. Moreover, it had to be anonymized due to the company's policy where the expert is currently employed. The original German responses can be seen in the translated and transcribed interview in Appendix 1.

3.2. Findings expert interview

Overall, the expert had a positive attitude regarding the topic of (musical) smart speakers and consumers' potential adoption towards them. Throughout the interview, the benefits of consuming music via a (musical) smart speaker were highlighted. For instance, discovering artists, receiving news and background information via the smart speaker, having increased levels of entertainment, and that users would listen to music more consciously. Specifically, the latter benefit is provided due to the lack of textual and visual information. Thus, the user focuses on communicating with the smart speaker by vocalizing both artist and song titles. Moreover, this vocalization would lead to an increase in identification with the artist, hence, more appreciation and music would develop from a lean-back to a lean-forward medium. In addition to that, the interview illustrated that the users are in control via their own voice and do not depend on external factors such as playlists for music recommendations anymore. However, based on the fact that the user passes over the control to the speaker, this could also result in being trapped in an algorithm bubble. Accordingly, it would be harder to discover new music and there is the possibility for the user to have a rather static, uneventful music experience. With regard to further disadvantages and limitations, the interviewer stated that the biggest reason for rejection is consumers' lack of trust in the device concerning their privacy and the device's still ill-conceived technical makeup with respect to this. Nonetheless, the expert stated that these limitations would be marginalized in the near future and people will certainly adopt more easily towards smart devices since they are sort of similar to the omnipresent smartphones. Also, the expert put emphasis on the genres *Pop* and *Urban* and marked them to be the most convenient ones for using a (musical) smart speaker. Further, the expert identified the users for (musical) smart speakers as adults between 20 and 45 years. In general, it was stated that the device has the potential to revolutionize the music industry and the way people perceive and consume music (Appendix 1).

Accordingly, the expert interview's main findings could be linked to the different constructs:

Construct	Findings from the expert interview
Perceived usefulness	- Voice control → listening to music more consciously - Discovering new artists - Being able to acquire more background information about the artist(s) - Less text and visual information
Facilitating conditions	- Development - Upgrades - Music skills - Podcasts and audiobooks - Music's development from a lean-back to lean-forward medium
Enjoyment	- Experience - Entertainment - Appreciation - Consumer's identification with the artist through vocalization of artist/track
Autonomy	- Control through consumer's own voice - No dependence on external factors such as playlists anymore (for recommendations) - Consumer passes over the control to the listening behavior - Being trapped in an algorithm bubble - Obligation of memorizing the artist/track - Lean-forward medium
Security	- Biggest reason for rejection: lack of trust (Musical) smart speakers are as safe as smartphones - Technical makeup of the device will be made more secure in the future
Openness/Innovativeness	
Other	- Smart speakers have the potential to reform and revolutionize the music industry - Key genres: Pop and Urban - Main target group: (young) adults between 20 and 45 years

3.3. Elaboration of conceptual model

Based on the findings from the expert interview, the conceptual model regarding the technology adoption of (musical) smart speakers could be elaborated:
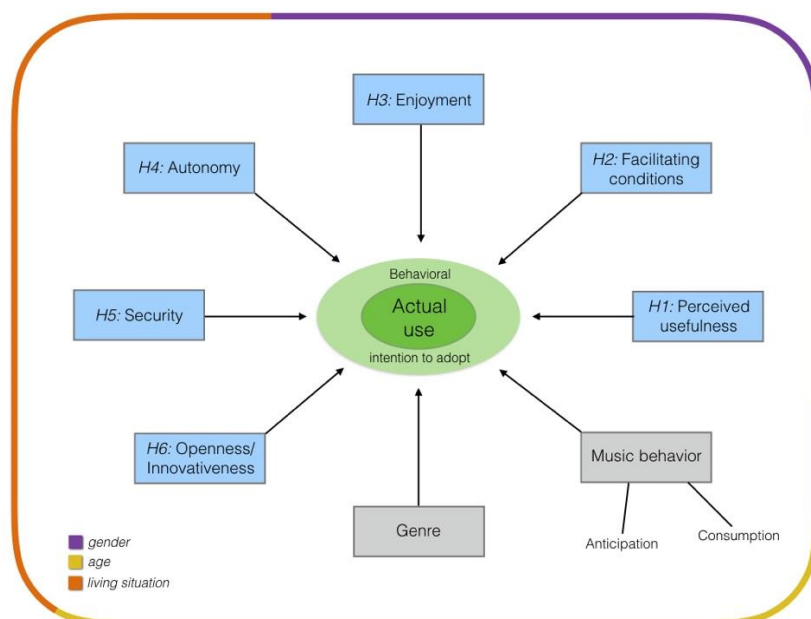

Figure 5: Elaborated Conceptual Model

The input and examination of the expert interview led to the elaboration of the conceptual model by the constructs 'genre' and 'music behavior' and the variable 'living situation'. While *living situation* can be determined to have a moderating effect on the constructs such as 'gender' and 'age', the constructs G*enre* and *Music behavior* are likely to have direct effects on the intention to adopt (musical) smart speakers. Living situation can be determined by how many people the potential user is living with, for instance, in a flat shared with two or more people. This might play an essential role in the adoption process as the potential user would want to use and communicate with the (musical) smart speaker alone by avoiding the potential to be disturbed. Moreover, the consumer's favorite music genre might influence the intention to adopt this new device. The speaker itself might be more convenient to use for certain genres such as *Pop* and *Hip-Hop/Rap* which are currently the most popular genres in the musical landscape. Consequently, some functions of the speaker might not even be as convenient or functional for the usage based on the respective genre the user prefers. Additionally, the construct *Music behavior* which entails the elements 'anticipation' and 'consumption' revealed itself to be a promising predictor for the adoption as well since it could be crucial that the consumer anticipates the music on a regular basis and listens to music to a certain number of hours of music per day.

3.4. Research design:

An online survey was conducted which aimed to reveal the participants' attitudes and notions regarding the intention to adopt (musical) smart speakers. Therefore, the hypotheses could be tested. In total, the survey included 36 questions/statements. It was created by the researcher and evaluated by the participants via *Qualtrics*.

Since (musical) smart speakers are still relatively new on the market and this technology has never been experienced by most (music) consumers yet, the device's features and functions are probably not certain to potential consumers/adopters. Consequently, the conducted online survey included a short introduction to the topic, the definition of a (musical) smart speaker, and its functions to provide the

participants with sufficient background information beforehand to evaluate the survey's questions/statements in a reliable way.

3.5. Procedure

The survey started by introducing the participants to the topic of the research "music consumers' adoption to smart devices in the field of music" on a first introduction and information page which included the duration of the survey (8 minutes), a definition of the term "smart speaker", its relation to music consumption, and a visualization of the device. Moreover, 5 key features of a (musical) smart speaker were mentioned and highlighted in bold. Last, the participant was informed about the survey's anonymity and that the data would be treated confidentially and used solely for the purpose of this research. Further, the researcher's contact information was provided on the bottom of the page:

UNIVERSITY OF TWENTE.

Dear participant,

thank you for participating in this online survey for my bachelor thesis "Music consumers' adoption to smart devices in the field of music". In the following, you will get a short introduction to the topic. After that, there will be an online questionnaire which approximately takes you 8 minutes to fill in.

The term 'smart speaker' describes an internet-connected speaker controlled by voice commands, with an artificial intelligence (AI) assistant responding to the owner's requests. Amazon's Echo with its Alexa assistant was the first to launch in late 2014, but it has since been joined by Google Home (with Google Assistant) and Apple's HomePod (with Siri) and many more.

As people consume and listen to music in all sorts of different ways on a daily basis, whether via their phone, radio, computer, streaming services, YouTube, CDs, vinyls, etc., the (musical) smart speaker is aimed to be another medium to experience music.

A musical smart speaker's features include, amongst others:

· Finding similar music
If you're tired of listening to the same songs all the time, you can say something like,
"Alexa, play music similar to Fleet Foxes."

· Create playlists
"Alexa, add this song to my [playlist name] playlist."

· Create a music alarm
"Alexa, wake me up to relaxing music."
"Alexa, set an alarm to rock music."

· Play music across multiple speakers

· Get music news

It is advised to conduct the survey via a laptop or a computer. Please answer the questions carefully. This is an anonymous survey; all the information you provide is confidential and will only be used for this research.

If you have any questions or need other related information, please feel free to contact me (t.schudzich@student.utwente.nl).

Tim Schudzich
Communication Science
University of Twente

On the next page the participant was asked whether he or she wants to participate in this survey by providing the two options 'yes' and 'no'. By clicking on 'yes' the survey would begin and 'no' would immediatelylead the participant to the end of the survey (which was noted underneath the question: "Do you want to participate in this survey?".

On the next page, the participant was asked about their gender, respectively, how they identify ("What is your gender/How do you identify?") by providing 3 options; 1) female, 2) male, and 3) non-binary. After that, the participant was asked about their age where one could give information regarding their age via a text entry box. In the following, the participant was asked about their profession by the statement "I am currently…" where the participant could choose 1 out of the 7 options; 1) a student, 2) a university student, 3) a part-time employee, 4) a full-time employee, 5) retired, 6) unemployed, and 7) unable to work. On the next page, the participant was asked about their favorite music genre ("What is your favorite music genre?) where one could tick off multiple options out of the provided 11 genres; 1) Pop, 2) Hip-Hop/Rap, 3) R&B/Soul, 4) Alternative, 5) EDM, 6) Rock, 7) Jazz, 8) Metal, 9) Techno, 10) Country, and 11) Other. Subsequently, the participant was asked about their current living situation ("How many people are you living with?") where only a single answer was possible again out of the options; 1) alone, 2) +1, 3) +2, 4) +3, 5) +4, 6) +5, and 7) more than 5. Next, the participant was asked about their weekly music consumption ("How many hours a week do you listen to music?") which included a scale ranging from 1) 0 hours - 3½ hours, to 2) 3½ hours - 7 hours, to 3) 7 hours - 10½ hours,

to 4) 10½ hours - 14 hours, to 5) 14 hours or more, where one had to select one singular answer. Last, the participant was asked whether they anticipate new music releases ("Do you anticipate the release of new music on a regular basis?) which included a scale indicating 1 = never, 2 = seldom, 3 = sometimes, 4 = often, and 5 = almost always.

Once the participant filled out these questions regarding their characteristics and the demographic, the second part of the survey begins where 4 statements have to be evaluated on each page. Each one of these statements has to be evaluated via the 5-point Likert scale with the options; 1 = strongly disagree, 2 = somewhat disagree, 3 = neither agree nor disagree, 4 = somewhat agree, and 5 = strongly agree. To see the full questionnaire for the online survey, see Appendix 2.

3.6. Instrument

For this research, 6 independent variables were chosen to test their effect on the dependent variable 'intention to adopt'. The independent variables (adoption constructs) are *Perceived usefulness*, *Facilitating conditions*, *Enjoyment*, *Autonomy*, *Security*, and *Openness/Innovativeness*. In general, 7 constructs were measured including 'intention to adopt'. Moreover, the demographic constructs; *Gender*, *Age*, *Profession*, *Living situation*, *Music consumption*, *Music anticipation*, and *Favorite Genre* were included.

For the participant's evaluation regarding the demographic constructs *Music consumption* and *Music Anticipation,* two different 5-point Likert scales were used. For the latter one, the scales were derived from Brown (2010) and adapted to this specific variable (see Appendix 2). For *Music consumption*, the scales were created inductively based on the suggestion from the World Health Organization regarding music consumption (Gallager, 2015). Hence, it was decided to take 30 minutes a day as a starting point and adding 30 minutes per day per scale to indicate 1 = 0 hours - 3½ hours, 2 = 3½ hours - 7 hours, 3 = 7 hours - 10½ hours, 4 = 10½ hours - 14 hours, 5 = 14 hours or more.

Further, all other statements testing the independent variables had to be evaluated on a 5-point Likert scale in which 1 = strongly disagree, 2 = somewhat disagree, 3 = neither agree nor disagree, 4 = somewhat agree, 5 = strongly agree (see, statements 9 – 36, Appendix 2). These scales were derived from Bertram (2016) and were adapted to the particular context of this study. To measure the effect of the 6 independent variables on the dependent variable, 4 statements were formulated for each variable. In total, the participants had to evaluate 28 statements . Since each construct was evaluated by 4 statements (items), item scales had to be created via SPSS before a reliability analysis could be performed.

Perceived usefulness was measured with 4 items. An example of an item is *"I expect a (musical) smart speaker to be helpful in giving me personalized music recommendations"*. The items can be found in Appendix 2. The Cronbach's alpha for the 4 items was .73 which indicated a reliable scale.

Four individual item scales had to be created for *Facilitating conditions* since the reliability analysis resulted in an unacceptable Cronbach's alpha and no item could have been deleted to increase it. An example of an individual item scale is *Facilitating conditions_item2 "I expect a (musical) smart speaker to work flawlessly with a normal WI-FI connection"*. The items can be found in Appendix 2.

Enjoyment was measured with 4 items. An example of an item is *"I expect a (musical) smart speaker to be entertaining"*. The items can be found in Appendix 2. Since the Cronbach's alpha for the 4 items was .38 which indicated an unreliable scale, the item *"I expect a (musical) smart speaker to make my music experience more joyful/lively"* was deleted to increase the reliability of the scale. Hence, another scale was created out of the three remaining items. The Cronbach's alpha for these 3 items was .68 which indicated a somewhat reliable scale.

Autonomy was measured with 4 items. An example of an item is *"I expect a (musical) smart speaker to share my data without my consent"*. The items can be found in Appendix 2. As Cronbach's alpha for the 4 items resulted in an unacceptable value of .41 indicating an unreliable scale, the item *"I expect a (musical) smart speaker to avoid me from pushing buttons on my phone or computer"* had to

be deleted to increase the reliability of the scale. Thus, a new scale was created for the 3 remaining items. The Cronbach's alpha for these 3 items was .64 indicating a somewhat reliable scale.

Security was measured with 4 items. An example of an item is *"I expect a (musical) smart speaker to delete/add/suggest tracks without my consent (e.g. to my playlists)"*. The items can be found in Appendix 2. The Cronbach's alpha for the 4 items was .82 which indicated a reliable scale.

Openness/Innovativeness was measured with 4 items. An example of an item is *"I think using new technologies has a positive impact on my life"*. The items can be found in Appendix 2. The item *"I consider a (musical) smart speaker to be a great development for my consumption of music"* had to be reverse coded since it had a negative correlation with the other items so that the Cronbach's alpha for the 4 items was .60 indicating a somewhat reliable scale.

Moreover, *Intention to adopt* was measured with 4 items. An example of an item is *"I consider a (musical) smart speaker to be a great development for my consumption of music"*. The items can be found in Appendix 2. The Cronbach's alpha for the 4 items was .91 which indicated a reliable scale.

3.7. Overview of adoption constructs & included items (Table 2)

Construct	Included items	M	SD	Cronbach's alpha
Perceived usefulness	• *"I expect a (musical) smart speaker to make my music consumption more efficient" (Q9)* • *"I expect using a (musical) smart speaker to be a beneficial addition to my music experience" (Q10)* • *"I expect a (musical) smart speaker to be helpful in giving me personalized music recommendations" (Q11)* • *"I expect a (musical) smart speaker to connect my music experience with its other features (Managing the calendar and shopping lists, ordering items, searching the web, control lighting, climate control, and other smart devices around the house)"*	3.18	1.05	.73
Facilitating conditions_1	• *"I find (musical) smart speakers to be expensive"*	3.51	.98	
Facilitating conditions_2	• *"I expect a (musical) smart speaker to work flawlessly with a normal WI-FI connection"*	4.60	.76	
Facilitating conditions_3	• *"I expect a (musical) smart speaker to work without any problems"*	3.88	1.07	

Facilitating conditions_4	• *"I expect a (musical) smart speaker to operate in my mother tongue besides English"*	3.88	1.07	
Enjoyment	• *"I expect a (musical) smart speaker to help me in enjoying my music"*	3.50	.86	.68
	• *"I expect a (musical) smart speaker to be entertaining"*			
	• *"I expect a (musical) smart speaker to be the coolest device in consuming music"*			
Autonomy	• *"I expect (musical) smart speakers to restrain me from making my own musical choices"*	2.35	.71	.82
	• *"I expect a (musical) smart speaker to make decisions for me"*			
	• *"I expect a (musical) smart speaker to delete/add/suggest tracks without my consent (e.g. to my playlists)"*			
Security	• *"I trust a (musical) smart speaker in terms of using my data"*	2.87	1.06	.64
	• *"I expect a (musical) smart speaker to be a threat to my security/data"*			
	• *"I expect a (musical) smart speaker to share my data without my consent"*			
	• *"I expect a (musical) smart speaker to invade my privacy"*			
Openness/ Innovativeness	• *"I would consider buying a (musical) smart speaker"*	3.85	.57	.60
	• *"I would recommend people to buy a (musical) smart speaker"*			
	• *"I expect a (musical) smart speaker to make my music experience better"*			
	• *"I consider a (musical) smart speaker to be a great development for my consumption of music"*			

Intention to adopt	• *"I would consider buying a (musical) smart speaker"*	3.19	1.04	.91
	• *"I would recommend people to buy a (musical) smart speaker"*			
	• *"I expect a (musical) smart speaker to make my music experience better"*			
	• *"I consider a (musical) smart speaker to be a great development for my consumption of music"*			

_____

3.8. Participants

For the online survey, participants were recruited that were above the age of 18. There was no further age restriction. The survey was spread online via e-mail and the researcher's social media. It was targeted to have a minimum of 120 respondents. Since the online survey was spread in Germany and the Netherlands, the questionnaire was created in English. In general, it was aimed to have people from different ages, occupational groups, and with different favorite music genres.

The convenience sample was recruited via the researcher's social media network which resulted in 146 responses when the survey was closed after its two-week data collection in May 2019. In general, 1 person who opened the survey decided not to continue. Out of these 146 responses, 8 had to be deleted because of missing data in more than half of the questions. Furthermore, 5 respondents had to be deleted due to the fact that they were under the age of 18 years. In total, the final cleaned up data set included 133 reliable responses (*Mean* age= 26.66, age range: 18 - 68) where 68 people identified as female (51.1%), 59 as male (44.4%), and 6 as non-binary (4.5%).

3.9. Sample composition

Out of the sample's 133 participants, its largest *Age* groups were '22 years' with 18 respondents (13.5%), followed by '23 years' with 17 respondents (12.8%), and '21 years' with 15 respondents (11.3%). Regarding the participants' *Profession*, 55 people were 'university students' (41.4%), followed by 31 participants who were 'full-time employees' (23.3%). Moreover, with respect to their current *Living situation* 48 participants stated that they were living with one other person ('+1') (36.1%), followed by 40 participants who stated that they were living 'alone' (30.1%). Merely, 3 participants noted that they were living with four more people ('4') and 'more than 5' (2.3%). Concerning the participants' *Music consumption*, 40 people stated they listen to music '7 hours - 10½ hour' a week (30.1%), followed by 29 people who listen to music '14 hours or more' a week (21.8%), and 28 people who listen to music between '3½ hours - 7 hours' on a weekly basis (21,1%). In addition, the biggest group that is *Anticipating* the release of new *music* were 44 participants who do it 'sometimes' (33.1%), followed by 33 people who stated that they anticipate new music 'seldom' (24.8%), and 30 people who do it 'often' (22.6%). Regarding the 133 participants' *Favorite genre*, 'Pop' scored the highest with 72 responses (54.1%), followed by 'Alternative' with 53 responses (39.8%), and R&B/Soul with 45 responses (33,8%).

Table 2
Descriptives 'Gender'

Gender	Frequency	Percent
Female	68	51.1%
Male	59	44.4%
Non-Binary	6	4.5%
Total	133	100%

Table 3
Descriptives 'Profession'

Profession	Frequency	Percent
Student	20	15%
University student	55	41.4%
Part-time employee	13	9.8%
Full-time employee	31	23.3%
Retired	5	3.8%
Unemployed	7	5,3%
Unable to work	2	1,5%
Total	133	100%

Table 4
Descriptives 'Living situation'

Living situation	Frequency	Percent
Alone	40	30.1%
+1	48	36.1%
+2	21	15.8%
+3	14	10.5%
+4	4	3%
+5	3	2.3%
More than 5	3	2.3%
Total	133	100%

Table 5
Descriptives 'Music consumption'

Music consumption	Frequency	Percent
0 hours – 3½ hours	18	13.5%
3½ hours – 7 hours	28	21.1%
7 hours – 10½ hours	40	30.1%
10½ hours – 14 hours	18	13.5%
14 hours or more	29	21.8%
Total	133	100%

Table 6
Descriptives 'Music anticipation'

Music anticipation	Frequency	Percent
Never	9	6.8%
Seldom	33	24.8%
Sometimes	44	33.1%
Often	30	22.6%
Almost always	17	12.8%
Total	133	100%

Table 7
Distribution 'Favorite Genre'

Place	Genre	Frequency	Percent
1	Pop	72	54.1%
2	Alternative	53	39.8%
3	R&B/Soul	45	33.8%
4	Hip-Hop/Rap	42	31.6%
5	Techno	31	23.3%
6	Rock	26	19.5%
7	Other	23	17.3%
8	Jazz	16	12%

9	EDM	12	9%
10	Metal	8	6%
11	Country	7	5.3%

Table 8

Means and standard deviations of demographic constructs

Construct	*Included items*	*M*	*SD*
Age	"What is your age?" (Q3)	26.74	9.96
Living situation	"I am currently" (Q4)	2.37	1.43
Music consumption	"How many hours a week do you listen to music?" (Q7)	3.11	1.31
Music anticipation	"Do you anticipate the release of new music on a regular basis?" (Q8)	3.12	1.13

3.10. Preparation of analysis:

With regard to the analysis of the data IBM's program *SPSS* was used to import the data which was gathered via *Qualtrics*. In addition, SPSS was used to organize, structure, and analyze the data. For the preparation of the analysis, the data set was cleaned by deleting participants who had merely filled out the survey halfway through, hence, values were missing. Also, participants were deleted who stated that they were under 18 years of age. Furthermore, the items were named according to the corresponding variables/constructs. Values and labels were changed which were messed up due to the import of the data from Qualtrics to SPSS.

In addition to that, for instance, the statement *"I expect a (musical) smart speaker to be helpful in giving me personalized music recommendations"* had to be recoded because its values ranged from 34 to 38 and not from 1 to 5 (with respect to the 5-point Likert scale). Hence, its new values had to be assigned to a new label as well. Moreover, the variables of the statement *"I expect a (musical) smart speaker to make my music consumption more efficient"* had to be recoded since its scale somehow ranged from 1 = totally agree to 5 = totally disagree, whereas it should have been the other way around as for all other variables.

4. RESULTS

4.1. Means and standard deviation of adoption constructs

Findings
Measuring the mean and standard deviation for the 6 reliable adoption constructs and 4 single items scales of *Facilitating conditions*, the third single item scale of *Facilitating conditions, Facilitating conditions_3 ("I expect a (musical) smart speaker to work without any problems")* scored the highest mean ($M = 4.44$, SD = .88), followed by the second single item scale; *Facilitating conditions_2 ("I expect a (musical) smart speaker to work flawlessly with a normal WI-FI connection")* ($M = 3.49$, SD = .83), and the *Openness/Innovativeness* ($M = 4.15$, SD = .78). Subsequently, *Facilitating conditions_4 ("I consider a (musical) smart speaker to be a great development for my consumption of music")* had the fourth highest mean ($M = 3.89$, SD = 1.06), followed by the first single item scale of *Facilitating conditions; Facilitating conditions_1 ("I expect a (musical) smart speaker to operate in my mother tongue besides English")* ($M = 3.52$, SD = .98). *Perceived usefulness's* mean was (M = 3.49, SD = .83), followed by *Enjoyment* which scored ($M = 3,51$, SD = .86), *Intention to adopt* which resulted in ($M = 3.19$, SD = 1.04), *Security* ($M = 2.85$, SD = 1.06) and *Autonomy* ($M = 2.37$, SD = .72) (see Table 2).

4.2. ANOVA-test for Music consumption

Findings
An ANOVA-test was conducted to test the *Intention to adopt* across the 5 groups of *Music consumption*. The one-way ANOVA showed that the *Music consumption* groups did not differ in their intention to adopt $F (4, 127) = .83$, $p = .501$).

Table 9
Mean and Standard Deviation of Music consumption on Intention to adopt

		Intention to adopt	
Music consumption	*n*	*M*	*SD*
0 hours - 3½ hours	18	2.81	.98
3½ hours - 7 hours	28	3.13	.99
7 hours - 10½ hours	40	3.26	1.02
10½ hours - 14 hours	17	3.31	1.10
14 hours or more	29	3.31	1.10

Note. Maximum score is 132.

4.3. ANOVA-test for Music anticipation

Findings
An ANOVA-test measured the *Intention to adopt* across the 5 groups of *Music anticipation*. The one-way ANOVA showed that the *Music anticipation* groups did not differ in their intention to adopt $F (4, 127) = .48, p = .796$.

Table 10
Mean and Standard Deviation of Music anticipation on Intention to adopt

		Intention to adopt	
Music anticipation	*n*	*M*	*SD*
Never	9	.98	.33
Seldom	32	3.14	.91
Sometimes	44	3.23	1.12
Sometimes	30	3.22	1.07
Almost always	17	2.96	1.09

Note. Maximum score is 132.

4.4. Correlations
A Pearson correlation analysis was used to test the different constructs for correlations. An overview of the results can be found in Table 11. Significant results can be considered above the threshold 0.60. There is a strong correlation (r = .62) between *Perceived usefulness* and *Enjoyment*. This means that the higher the expectations the consumers have regarding the usefulness of a (musical) smart speaker, the higher the enjoyment of this device. Moreover, *Facilitating conditions_3 (functionality)* has a strong correlation (r = 1.00) with *Facilitating conditions_4 (language options)*. This means that the smart speaker's functionality and usability, respectively, that it works correctly is intertwined with the consumer's view regarding its language options. Besides this, the results show that there are no further significant correlations between the independent variables. Merely, the correlation between *Enjoyment* and *Openness/Innovativeness* (r = .46) is the only one of the correlations between the different independent variables that is the closest to the crucial threshold. A noteworthy result is that *Perceived usefulness* (r = .63) and *Enjoyment* (r = .71) have strong correlations with the dependent variable *Intention to adopt*. Moreover, *Openness/Innovativeness* can be considered to have a somewhat significant correlation with *Intention to adopt* as its correlation (r = .57) is close to the threshold and *Security* has a significantly negative correlation (r = -.58) with *Intention to adopt*.

Table 11
Correlation for each construct

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Perceived usefulness	1									
2. Facilitating conditions_1	-.062	1								
3. Facilitating conditions_2	.350**	.051	1							
4. Facilitating conditions_3	.009	.166	.030	1						
5. Facilitating conditions_4	.009	.166	.030	1.000**	1					
6. Enjoyment	.619**	.053	.298**	-.005	-.005	1				
7. Autonomy	.128	.088	-.039	-.042	-.042	.065	1			
8. Security	-.337**	.110	-.103	.144	.144	-.473**	-.003	1		
9. Openness/Innovativeness	.367**	.044	.277**	-,095	-.095	.457**	-.011	-.356**	1	
10. Intention to adopt	.634	-.077	.233**	.052	.052	.708**	.060	-.547**	.565**	1

** path is significant at the 0.01 level

4.5. Regression analysis

To test the model presented in Figure 4, a linear regression analysis has been performed to estimate the proportion of variance in *intention to adopt* (dependent variable) from *perceived usefulness, facilitating conditions_1 (price), Facilitating conditions_2 (WIFI connection), Facilitating conditions_3 (functionality), Facilitating conditions_4 (language options), Enjoyment, Security, Autonomy,* and *Openness/Innovativeness* (adoption constructs) in step 1. Furthermore, in step 2 the demographic constructs; *Age*, *Living situation*, *Music consumption*, and *Music anticipation* were added as independent variables as well as additional predictors to analyze whether their addition has a positive effect on the adoption constructs. This would increase the variance of the model, and ultimately increases the effect on the *Intention to adopt*. Consequently, two models were created; model 1 which included the adoption constructs as independent variables and predictors and model 2 which included the adoption constructs and the demographic constructs as independent variables and predictors.

Findings

Model 1 of the regression analysis explained 66,7% of variance in intention to adopt (R^2 = .66, F (8, 119) = 29.28, p < .001)). When the demographic constructs were added (Model 2), R^2 changed and decreased from .66 to .63, (ΔR^2 = .003, ΔF(4, 115) = .23, p = .92). In other words, the addition of demographic constructs accounted for a decrease to 0,3% of the variance in *Intention to adopt* in contrast the 66,7% of variance which was accounted for just by the adoption constructs (see Appendix 3). Hence, the addition of the demographic constructs was of no added significant value. Overall, none of the demographic constructs are significant predictors of the *Intention to adopt*.

With regard to the ANOVA table (Model 1), the 9 predictors (adoption constructs) collectively accounted for a statistically significant proportion of the variance in *Intention to adopt*, F (8, 119) = 29.28, p = .001. Overall, the entire model significantly predicts *Intention to adopt*.

Moreover, *Perceived usefulness, Enjoyment, Security*, and *Openness/Innovativeness* emerged as the significant predictors capable of explaining a significant proportion of unique variance in

Intention to adopt, as *Perceived usefulness*, $t(119) = 3.94$, $p < 001$; *Enjoyment*, $t(119) = 4.79$, $p < 001$; *Security* $t(119) = -4.32$, $p < 001$; *Openness/Innovativeness*, $t(119) = 3.26$, $p < 001$.

4.6. Hypotheses

To test the hypotheses, a multiple linear regression analysis was run to measure each adoption construct's effect on *intention to adopt*. The model explained 66,7% of variance in *intention to adopt* and was significant, $F(8, 119) = 29.28$, $p = .001$.

 Perceived usefulness significantly predicted intention to adopt, $b = .28$, $t(8, 119) = 3.94$, $p = .001$. *Facilitating conditions_1 (price)* did not significantly predict intention to adopt, $b = -.077$, $t(8, 119) = -1.37$, $p = .173$. *Facilitating conditions_2 (WI-FI connection)* did not significantly predict intention to adopt, $b = -.05$, $t(8, 119) = -.88$, $p = .380$. *Facilitating conditions_4 (language options)* did not significantly predict intention to adopt, $b = .10$, $t(8, 119) = 1.90$, $p = .060$. *Enjoyment* significantly predicted intention to adopt, $b = .36$, $t(8, 119) = 4.79$, $p = .001$. *Autonomy* did not significantly predict intention to adopt, $b = .012$, $t(8, 119) = .22$, $p = .837$. *Security* significantly predicted intention to adopt, $b = -.27$, $t(8, 119) = -4.32$, $p = .001$, and *Openness/Innovativeness* significantly predicted intention to adopt, $b = 0.19$, $t(8, 119) = -3,26$, $p = .001$ (see Appendix 3).

 In total, 3 hypotheses could be confirmed (Hyp1: Perceived usefulness is positively related to the intention to adopt (musical) smart speakers; Hyp3: Enjoyment is positively related to the intention to adopt (musical) smart speakers; and Hyp6: Openness/innovativeness is positively related to the intention to adopt (musical) smart speakers). Moreover, 1 hypothesis could be partly confirmed (Hyp5: Security is positively related to the intention to adopt (musical) smart speakers) since Security had a negative relation with the intention to adopt. Overall, 2 hypotheses had to be rejected (H2a: A higher level of facilitating conditions leads to a higher intention to adopt; and H4a: A higher level of autonomy leads to a higher intention to adopt).

Table 12 *Overview of stated hypotheses*

Hypothesis	Stand	Result
Hyp1	Perceived usefulness is positively related to the intention to adopt (musical) smart speakers	Supported
Hyp2	Facilitating conditions is positively related to the intention to adopt (musical) smart speakers	Rejected
Hyp3	Enjoyment is positively related to the intention to adopt (musical) smart speakers	Supported
Hyp4	Autonomy is positively related to the intention to adopt (musical) smart speakers	Rejected
Hyp5	Security is positively related to the intention to adopt (musical) smart speakers	Partly Supported
Hyp6	Openness/Innovativeness is positively related to the intention to adopt (musical) smart speakers	Supported

5. DISCUSSION/CONCLUSION

5.1. Main findings

The objective of this study was to answer the research question *"How do music consumers adopt towards (musical) smart speakers with reference to music marketing"*. Therefore, an online survey was conducted to investigate potential consumers' intention to adopt based on the adoption constructs/predictors *Perceived usefulness, Facilitating conditions, Enjoyment, Autonomy, Security,* and *Openness/ Innovativeness*. In general, 133 participants evaluated the survey in a reliable way from which 66% were between 19 and 25 years old, indicating a two-thirds majority of all participants, and overall a significant high number of (young) adults.

The results showed that *Perceived usefulness, Enjoyment, Security, and Openness/ Innovativeness* significantly predicted the *Intention to adopt,* whereas *Facilitating conditions* and *Autonomy* did not. In general, the adoption constructs significantly explained 66% of variance in *Intention to adopt*. Moreover, the inclusion of the demographic constructs *Age, Living situation, Music consumption, and Music anticipation* did not offer an added value to the *Intention to adopt*.

Enjoyment measured the extent to which consumers perceive a (musical) smart speaker to be entertaining and playful in their music experience. Simultaneously, it incorporates the dimension of perceived ease of use as the user operates with the device in a playful way due to its communication component which includes an AI voice. Hence, the (musical) smart speaker offers an advanced way to perceive and consume music. It is a noteworthy finding that *Enjoyment* had the highest predictive value for the *Intention to adopt* ($b = .362$, $p = .001$). It can be concluded that the hedonic value of (musical) smart speakers plays a crucial role in the adoption behavior leading to an increase in enjoyment and entertainment in the music experience. As the expert interview revealed, the device's aspect of controlling it via one's own voice lets the consumer appreciate music through a different new context. Hence, the vocalization of artist and track leads to the consumer's identification with the music which can be regarded as an important determinant for the *Enjoyment* and overall the *Intention to adopt*. Additionally, as the (musical) smart speaker is the leading device to offer this kind of voice-based feature, in comparison to other devices such as the iPhone's virtual assistant *Siri*. In general, the fact that consumers would adopt to the (smart) speaker based on the (musical) smart speaker's positive association with fun and pleasure can be defined as the most significant predictor. Furthermore, *Enjoyment* had a significant correlation with *Perceived usefulness*. Consequently, it was manifested that the higher consumers' expectations for the smart speaker's perceived usefulness, the higher the enjoyment of this device. (Musical) smart speakers offer a broad array of functions and features such as giving personalized recommendations for the consumer's taste, receiving music news, or providing exclusive content via artist applications. Hence, the device's unique functionality is intertwined with its dimension of pleasure. Ultimately, this leads to an advanced music experience.

Overall, *Perceived usefulness* measured the extent to which consumers perceive a (musical) smart speaker to be of value for their music experience. Naturally, this is linked to the device's technical make-up and functionality. The results presented that *Perceived usefulness* is a significant predictor for the intention to adopt ($b = .282$, $p = .001$). Thus, it is important for (potential) consumers that the device entails useful functions for their music experience for them to use it. In addition, this aspect can be linked to the (musical) smart speaker's general make-up excluding the musical dimension as consumers are likely to engage in technology adoption based on the device's multifunctionality and versatility (Sääksjärvi & Samiee, 2011).

Furthermore, *Openness/Innovativeness* could be determined as a significant predictor for the intention to adopt ($b = .191$, $p = .001$). This predictor measured the degree to which a consumer is likely to adopt to new technologies, specifically, in this context to an AI operated music consumption device. Since (musical) smart speakers are still a rather new and recent development in consuming music,

technophobia and openness to experience are two aspects that can naturally be included in the adoption process. Consumers differ in their adaption towards technological change which is a decisive factor for the adoption process. In particular, in the context of the (musical) smart speaker. The results presented that *Openness/Innovativeness* predicts *the Intention to adopt*. Consequently, people who are less eager to experience technological change and advancement are more likely to refuse to adopt to the device. In contrast, people who consider themselves as open-minded and innovative are more likely to adopt to (musical) smart speakers.

Lastly, *Security* measured the extent to which consumers are concerned about their digital security, personal data, and privacy when using a (musical) smart speaker. *Security* proved to be a significant predictor for the *Intention to adopt* ($b = -.267$, $p = .001$). While the expert has already pointed out that the main reason for the device's rejection is consumers' lack of trust, people are more prone to adopt when security is definitely ensured. Since consumers tend to become more and more vigilant and careful nowadays in terms of sharing their personal data online, it is likely that companies will adapt to this fundamental condition and focus more on assuring consumers that their privacy and data is secured. Also, it can be expected that potential consumers will converge more to the idea to using a (musical) smart speakers as this type of technology will progressively become more common to use (in daily life). To some extent, the adoption towards them can be compared to the one towards smartphones (Park, Kwak, Lee, & Ahn, 2018)

To answer the research question, it can be concluded that music consumers adopt (musical) smart devices based on their expectations and the given functionality, specifically, with regard to having a hedonic experience, the added value in terms of the device's (unique) functions for the personal music consumption, and the device's digital security. Consumers adopt faster when they identify themselves as open and innovative.

5.2. Theoretical implications

In a theoretical perspective, the conceptual model which was conceptualized based on the original TAM, the UTAUT, and the adaption of the TAM by Park et al. (2018) could be validated even though *Facilitating conditions* and *Autonomy* resulted in not having a predictive value towards the *Intention to adopt*. In general, this study presented an elaborated model for technology acceptance in the context of (musical) smart speakers and incorporated different (adoption) constructs/predictors.

The results revealed that *Facilitating conditions,* which was formed by aspects such as price, WI-FI connection, functionality and language options, to be not predictive. It can be assumed that the construct encompassed and merged too many different thematic dimensions with one another which caused the construct's unreliability in the first place. In the study by Park et al. (2018) they investigated more individual constructs which differed from one other in their theoretical dimension, for instance, 'perceived cost' and 'compatibility' which unveiled to be two of the biggest predictors for motivation. Hence, this leads to the suggestion that the conceptual model can be re-evaluated by splitting the construct *Facilitating conditions* into different autonomous adoption constructs. Furthermore, it has to be noted that this construct was derived from the UTAUT with the theoretical justification that it has a direct effect on the usage behavior. Comparatively, this needs to be re-evaluated in the context of (musical) smart speakers based on the results.

In addition to that, *Autonomy* did not predict the adoption process in this context either in comparison to the study from Park et al. (2018) where it was manifested as a significant factor. It has to be noted that the construct differed in both studies in its terminology as Park et al. (2018, p.180) defined it as 'perceived control' and the "users' perceptions on their capability, resources, and skills for naturally per-forming the behavior and usage of a particular service or system". This amplified the proficiency of performance regarding the device's functions. Here, in the context of (musical) smart speakers, *Autonomy* measured consumers' notion regarding passing over control to the device in their music experience as it is designed to make (autonomous) decision for the user to facilitate the flow. Moreover,

the formulated questions for measuring this construct focused on the aspects 'restraint' and 'consent' (see Appendix 2). In retrospect, it can be considered to rephrase the questions/statements which measured this construct in the online survey to broaden the dimension of it since they had a rather negative connotation. It can be assumed that this might have led to a non-significant prediction. In contrast, *Autonomy* might simply not be a decisive predictor for consumers' adoption as it potentially does not play a huge role for consumers' consideration.

Moreover, the measured demographic constructs *Age, Living situation, Music consumption,* and *Music anticipation* did not have a predictive value for the *Intention to adopt* either. Nonetheless, the findings unveiled that most participants were either living with one more person or alone which leads to the assumption that potential consumers from this sample live in a space which is not intruded upon by many other people, for instance, roommates or family members. It is noteworthy to mention that, overall, the study's participant sample accurately reflected today's (digital) music consumer demographics with reference to music marketing as it mainly consisted of (young) adults until 25 years of age whose genres were revealed to be Pop and Urban (Hip-Hop/Rap and R&B/Soul). Additionally, the vast majority listens to music at least 30 minutes a day up until 2 hours a day or more. This indicates that the sample can be identified and validated as true music consumers which can be regarded as a crucial foundation for the study's reliability and practicality with respect to its marketing implications.

5.3 Practical implications

In a practical perspective, the study offers valuable information for the music industry, specifically the field of marketing, since its findings illustrate what music consumers consider to be essential with regard to a potential adoption and usage of (musical) smart speakers. Simultaneously, this practically determines the potential consumers' listening behavior. As the musical landscape has been constantly changing throughout the last decade, this study illustrates what marketers should definitely be aware of when it comes to music consumers' attitudes towards (musical) smart speakers and what they can rather ignore. Moreover, this study gives marketers an exclusive insight into the current changing zeitgeist and consumers notion towards (musical) smart devices since this type of technology is still relatively new on the market, specifically in Europe, and neither an active component of music consumers' music experience yet, nor their medium of choice.

Overall, it is crucial to reiterate that the sample accurately reflected today's music demographics in the target group of young adults until 25 years since *Pop* and *Urban* (Hip-Hop/Rap & R&B/Soul) were revealed to be the most favorite genres as they were amongst the top 4 favorite genres including the genre *Alternative*. Hence, (musical) smart speakers can be used by marketers to facilitate the attraction of the core target group of modern music marketing by linking it to the most prominent genres.

With regard to the research question's marketing implication, music industry marketers are advised to point out the (musical) smart speaker's enjoyment levels to potential consumers as this is highly predictive for the adoption. Therefore, for instance, advertisement strategies for making people aware of the device and its functions should allude to the device's entertainment and its hedonic aspects in the music experience. This could be achieved by a commercial which specifically puts emphasis on this, for example, where the protagonists communicate with the speaker in a joyful way while highlighting its benefits for the music experience and how much enjoyment the (musical) smart speaker will bring to the consumer's life.

Besides this, it is important to accentuate consumers about how useful the device is. This is particularly crucial since *Perceived usefulness* is highly predictive for the adoption process and most music consumers are not aware of (musical) smart speakers and its functions yet. This can be achieved through social media marketing on artists' profiles where these upload a short video or simply post a picture, for instance, on their Instagram to feature the specifically created exclusive tool for the (musical) smart speaker. Consequently, followers and fans of these artists would become aware of the tool which might increase their interest and curiosity at the same time leading to a potential purchase of the device

for using and experiencing the tool. Moreover, potential consumers could be targeted through possibilities for meet-and-greets or concert tickets which can merely be won through the usage of the device. In addition to that, this could be connected through the device's useful functions such as the example to turn on music news for a specific artist to get hints for winning exclusive tickets or simply the provision of exclusive news and updates about the artists via their personal voiceovers.

Furthermore, music marketers are advised to consider the importance of digital security as it is a high predictor for consumers' adoption towards (musical) smart devices. Additionally, it is advised to make consumers stop worrying about the device's security levels as *Security* predicted *Intention to adopt* negatively. This can be achieved through awareness and information campaigns or simply through informative (instruction) videos that can be incorporated through, for instance, QR codes on the smart speaker's packaging, websites, or (outdoor) stickers. The more consumers become aware of the enforced levels of security and the assurance from companies and creators that this is a core value these are continuously aiming to advance and focus on, the more consumers are likely to adapt to the device. It is utterly crucial that potential consumers feel secure with regard to their personal data as a lack in security and trust is a main reason to reject the device's usage. Moreover, it is recommended that marketers try to relate the usage of a (musical) smart speaker to the usage of the common smartphones which are fully implemented and accepted in society to facilitate the adoption process and simultaneously reduce safety threats.

In general, it is advised that marketers target music consumers who can be identified as innovative and open when it comes to using (new) technologies as *Openness/Innovativeness* was manifested as a predictor for the adoption process. Especially, (young) adults can be considered to be eager to use a (musical) smart speaker for their consumption of music since they are naturally curious about technological developments and advancements in society. Moreover, they are most likely to adopt to new technologies first as they grew up with the internet and possess internet skills unlike people from the older generation who might not have these skills (Cresci, Yarandi, & Morell, 2010). Overall, this is in line with the general marketing of (musical) smart speakers as this target group is the main demographic for the two most prominent genres *Pop* and *Urban* which are expected to be marketed and facilitated through (musical) speakers.

As these 4 factors could be validated as predictors for the adoption process with reference to music marketing, it can be suggested that further research could be conducted to investigate the relation of other factors regarding the intention to adopt. Thus, this could foster marketers' notion regarding (musical) smart speaker's possibilities in terms of marketing strategies and promotion while simultaneously augmenting their expertise on it.

5.4 Limitations & suggestions for future research

The study is limited and could be re-evaluated with regard to investigating how many people are familiar with (musical) smart devices and have already been using them. The awareness about the device could neither be derived from the evaluation in this context, nor from the findings. In addition, it can be suggested to test further adoption constructs, for instance, 'Design' or 'User skills' to investigate their prediction on the intention to adopt. Consequently, the breadth could be increased. Additionally, music consumers' wishes and needs regarding (musical) smart speakers could be examined by future research through the conduction of individual interviews. Another method would be through focus groups, to investigate consumers' attitudes and views in more detail through qualitative research.

5.5. Relevance of the research study

The added value of this study is that the investigation of music consumers' adoption towards (musical) smart devices which has not been conducted before. Hence, it offers valuable information regarding music consumers' adoption towards these types of devices for the music industry, specifically, the field of marketing and its (marketing) implications. In addition to that, this study provides further valuable

information for developers and manufacturers of general smart devices who can profit from the study's evaluation and findings on consumers' adoption behavior as well, as music is merely one of many components of a smart speaker. Accordingly, the device's musical component could be used to connect and facilitate its other functional components with one another, whereupon the general intention to adopt smart speakers could be fostered. Thus, this study gives an added value for the overall general implementation of smart speakers in today's society.

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APPENDICES

Appendix 1: Expert Interview

Expert Interview

<u>Disclaimer:</u> the interview had to be anonymized due to the company's policy where the expert is employed. Nonetheless, it can be stated that the expert works in a digital marketing department of a major music label.

Q1: How do you think of new technology in music? Do people adapt to it easily?

German:
Expert: "Ich denke, dass neue Technologien in der Musik vor Allem deshalb schnell Verbreitung finden, da Menschen hier einen einfachen und direkten Nutzen finden können und daher bereit sind, sich mit diesen auseinanderzusetzen. Musik ist also ein Träger bzw. Katalysator für neue Technologien, da der Nutzen dieser vom Konsument direkt verstanden wird."

English:
Expert: "I think that new technologies in music have a fast distribution since people can find an easy and direct way in using them for their benefits and therefore they want to deal with them. Music is a channel and a catalyst for new technologies because consumers understand the use of these technologies."

Q2: What do you think about (musical) smart devices?

German:
Expert: "Musik ist für Smart Speaker die derzeit wichtigste Anwendung. Auch wenn Musik-Skills nur einen winzigen Bruchteil der angebotenen Skills/Apps ausmachen, so ist deren Nutzung doch mit Abstand die Größte. Für die Musik bedeuten Smart Speaker jedoch noch einen weiteren Vorteil: Durch den Zwang, sich Titel und Interpret zu merken um den Song abzuspielen erfährt der Künstler wieder eine größere Wertschätzung, als es z.B. durch Mood-Playlists geschieht. Gleichzeitig zeigt es der Musikindustrie aber auch, wie wichtig vollständig und genaue Metadaten sind."

English:
Expert: "Music is currently the most important application for smart speakers. Even though music skills make up a small percentage of the offered tools/apps [of the smart speaker], their usage have the biggest magnitude so far. Regarding music, smart speakers however have another advantage: Due to the consumer's obligation to memorize track title and artist to play the song, there is a higher appreciation for the artist, in comparison to, for instance, mood playlists. Simultaneously, this [the smart speaker] visualizes how important complete and accurate metadata are for the music industry."

Q3: Do you think that (musical) smart devices have a positive impact on the general consumer's music consumption?

German:
Expert: "Ich finde es schwierig, das zu beurteilen, da durch Küchenradios und Bluetooth-Speaker bereits jetzt Musik in Situationen gehört werden kann, in denen sich Smart Speaker besonders anbieten – nämlich beim Kochen bzw. im Badezimmer. Nichtsdestotrotz halte ich es für möglich, dass

durch Smart Speaker an diesen Orten mehr Musik bzw. bewusster Musik gehört wird, da man nun nicht mehr von der Auswahl eines Fremden (Playlist, Radio) abhängt, sondern jederzeit die Musik mithilfe der eigenen Stimme ändern kann. Durch den Zwang, das Gerät mit der eigenen Stimme zu steuern und dem Fehlen der direkten Empfehlung von Playlisten bin ich der Meinung, dass dem Künstler selbst durch Smart Speaker wieder mehr Bedeutung und Erinnerungskraft zukommt. Während in der Vergangenheit diese Wertigkeit in Form der Visibilität immer weiter zurückging (Verkleinerung der Coverfläche durch Wiedergabemedien: Vinyl, CD, Mp3, Playliste im Streaming (gar kein Künstlercover mehr)) muss sich der Konsument nun konkret an den Künstler bzw. den Titel erinnern und diesen aussprechen. Dies führt folglich auch zu einer erhöhten Identifizierung mit dem Künstler.”

English:
Expert: “I find it difficult to evaluate this since kitchen radios and Bluetooth speakers already offer possibilities for music to be listened to in situations where smart speakers tend to be most convenient, for instance, while cooking or in the bathroom. Nonetheless, I think that it is possible to listen to music in these types of situations on a more conscious level because one is not dependent on the choice of an external factor anymore (e.g. a playlist, or the radio) since one is able to change the music at any time by simply using their own voice.
Due to the obligation to control the device through your own voice and the lack of the direct recommendation of playlists, I think that artists gain in significance, awareness, and status through the smart speaker. As these factors have declined throughout the past in terms of visibility (the minimization of the cover surface through the audio medium: vinyl, CD, MP3, playlists on streaming platforms (no artist covers anymore at all)) the consumer is now obligated [in the context of the smart] to recall the artist or the track title and to vocalize these [to listen to music]. Consequently, this leads to an increased identification of the consumer with the artist.”

Q4: What about music lovers?

German:
Expert: “Für Musikliebhaber ist insbesondere die einfache und direkte Steuerung des Speakers ein großer Vorteil. Auch die Möglichkeit durch Künstler-Apps/Skills mehr Hintergrundinformationen und/oder Zugang zu exklusivem Content zu erhalten macht Smart Speaker für Musikliebhaber interessant.”

English:
Expert: “In particular, for music lovers the easy and direct control of the smart speaker is a huge advantage. Also, the possibility to acquire more background information about artist apps/skills and access to exclusive content makes the smart speaker for music lovers interesting.”

Q5: What do you think is people's motivation to use a (musical) smart speaker with regard to their music consumption?

German:
Expert: “Vor Allem die bequeme Möglichkeit Musik über diesen abspielen zu können und dabei lediglich die eigene Stimme nutzen zu müssen macht Smart Speaker für Nutzer interessant. So kann in nahezu jeder Situation das Gerät über einfache Sprachkommandos der eigenen Vorliebe angepasst werden und bspw. die Lautstärke verändert oder die Musik gewechselt werden. Musik wird so vom Lean-Back zum Lean-Forward Medium.”

English:
Expert: “In particular, the convenient possibility to play music via them by only using your own voice makes smart speakers interesting for the user. Thus, the device can be adapted to the user's own preferences via voice commands in almost every situation, e.g., changing the volume or changing the track. Therefore, music evolves from a lean-back to a lean-forward medium.”

Q6: Why do you think that people would be against using it?

German:
Expert: "Ich denke, dass der größte Ablehnungsgrund von Smart Speakern im fehlenden Vertrauen in den Datenschutz besteht. Die Angst davor, seine Privatsphäre zu verlieren und sein gesamtes (hörbares) Leben mit den Anbietern der Geräte zu teilen, schreckt sicherlich Viele von der Anschaffung eines solchen Geräts ab. Dass durch die Nutzung von Smartphones dies längst Alltag geworden ist, wird dabei leicht vergessen. Auch die noch nicht hundertprozentig ausgereifte Technologie in der Spracherkennung und den Möglichkeiten eines solchen Geräts kann zu einer Ablehnung oder erst späteren Anschaffung führen. So können beispielsweise die Geräte der aktuellen Generation noch nicht die simple Aufgabe einer Zeitschaltuhr erfüllen und beispielsweise das Radio und/oder die Lampe in 30 Minuten abschalten."

English:
Expert: "I think that the biggest reason for rejection of smart speakers is related to the lack of trust and the protection of data privacy. Most people might be concerned about losing their privacy with reference to the potential fact to share their entire audible life with the supplier of these devices. This might scare off a lot of people to purchase these kinds of devices. People tend to forget that this is already omnipresent in our everyday life through the usage of smartphones. Also, the not fully developed technology in the area of voice recognition and the general features of these kinds of devices might lead to a rejection or a later purchase in time. The devices [the smart speaker] of the current generation are not able to do simple tasks yet such as being an accurate timer or turning off the radio or a lamp in 30 minutes."

Q7: What do you think about a (musical) smart speaker using people's data to give personalized recommendations?

German:
Expert: "Ich halte das für eine angenehme Eigenschaft des modernen Musikkonsums, die sich nicht nur bei Smart Speakern finden lässt. Individualisierte Playlisten lassen den Hörer die Musik hören, die ihm mit einer hohen Wahrscheinlichkeit gefällt und verhindern so ein Abschalten/Umschalten und machen das Hörerlebnis angenehmer. Natürlich bieten solche Playlisten die auf der Basis der Hörhistorie basieren bieten natürlich die Gefahr, nur noch eine Art Einheitsbrei zu hören und seinen eigenen Horizont nicht zu erweitern bzw. den eigenen Geschmack nicht vollständig abzubilden. Dem lässt sich jedoch entgegnen, dass individualisierte Playlists nicht die einzige Möglichkeit sind, Musik zu hören und zu entdecken und bei solchen Playlisten sehr wohl häufig neue Künstler entdeckt werden, die dem eigenen Musikgeschmack entsprechen."

English:
Expert: "I think that it is a pleasant feature of the modern music consumption which is not only incorporated in smart speakers. Customized playlists enable the listener to listen to the kind of music they like to a high probability and therefore prevent turning off or changing [the music] which makes the listening experience overall more pleasant. Certainly these types of playlists which are based on the consumer's music history also include the danger of being trapped in a bubble of the same kind of music wherefore one might not be able to broaden one's mind to different kinds of artists and songs. Consequently, one might not be able to develop an own acquired taste. Though, this can be refuted by the fact that customized playlists are not the only possibility to listen to and explore music. Also, oftentimes these types of playlists offer the listener to discover new artists which appeal to one's own personal taste in music."

Q8: Do you think (musical) smart speakers are safe/trustworthy?

German:
Expert: "Nicht mehr oder weniger sicher/vertrauensvoll als Smartphones. Hier stellt sich die Frage,

wie wir Sicherheit definieren und was wir als Privatsphäre ansehen und was wir bereit sind an Transparenz hinzunehmen um ein höheres Maß an Komfort zu erhalten."

English:
Expert: "Not more and not less safe/trustworthy than smartphones. Here, the question arises how we define security and what we see as privacy and what we want to accept as transparency to receive a higher level of comfort."

Q9: Do you think using a (musical) smart speaker makes the music experience for advanced and efficient for consumers?

German:
Expert: "Ich denke, dass Smart Speaker vor Allem die Macht haben, die Musikbranche hinsichtlich der Wichtigkeit von Metadaten wachzurütteln und zu reformieren. Dies wird sich in einem nachgelagerten Schritt logischerweise auch auf die User Experience auswirken. Innovativ ist vor Allem der Ansatz, dass dem Nutzer die Macht über sein Hörverhalten zurückgegeben wird und somit kuratierte Playlisten, wozu man auch Radio im weitesten Sinne zählen kann, an Einfluss verlieren. Es findet sozusagen eine Revolution über die Macht der Konsumenten statt."

English:
Expert: "I think that smart speakers have the power to shake up and reform the music industry regarding the importance of metadata. It will logically have an effect on the user experience in the next step in the future. What is innovative about this is the approach that the user will pass his/her power over to the listening behaviour. Thus, curated playlists which can be linked to the radio as well will lose influence. Here, a revolution regarding the consumers' power is happening."

Q10: Do you think (musical) smart speakers make the music experience more fun?

German:
Expert: "Ich denke, dass Smart Speaker vor Allem das Potenzial haben, die Music Experience unterhaltsamer zu machen in dem künstlereigene Apps integriert werden können und so bspw. beim Hören der Interpret selbst den nächsten Titel ansagt."

English:
Expert: "I think that smart speakers have the potential to make the music experience more entertaining by integrating customized artist apps and by announcing the artist's name and the next track title while listening to music."

Q11: What are the barriers of (musical) smart speaker?

German:
Expert: "Momentan sind die größten Einschränkungen von Smart Speakern deren unausgereifte Technologie sowie Bedenken bzgl. des Datenschutzes. Beides sind meiner Meinung nach jedoch Punkte, die sich in den nächsten Jahren marginalisieren werden, da die Geräte technologisch immer besser werden und gleichzeitig das Verständnis über die Nutzung von Daten zunimmt bzw. Konzerne immer mehr in die Pflicht genommen werden, verantwortungsvoll mit Daten umzugehen."

English:
Expert: "At the moment, the biggest limitations of smart speakers are their ill-conceived technological makeup and the concern regarding the protection of privacy laws. In my opinion, both points will be marginalized in the upcoming years because the devices will naturally advance their technological makeup while the comprehension of the data usage will increase simultaneously. Consequently,

enterprises will naturally be challenged to have more responsibility in terms of operating and dealing with data."

Q12: Who do you think would use a (musical) smart speaker?

German:
Expert: "Aktuell sehe ich die Hauptkundengruppe bei jungen Erwachsenen zwischen 20 und 45 Jahren."

English:
Expert: "At the moment, I would define the main target group as young adults between 20 and 45 years."

Q13: What kind of genre fits best to the usage of (musical) smart speakers?

German:
Expert: "Ich glaube, dass alle Genres sich für die Nutzung eines Smart Speakers eignen, der Großteil der Nutzung wird jedoch auf Pop und Urban entfallen, da dies die verbreitetsten Musikrichtungen sind. Insbesondere aber im Bereich Podcasts und Hörbücher sehe ich sehr großes, kurzfristiges Wachstumspotenzial."

English:
Expert: "I think that all genres would fit to the use of a smart speakers, although the bigger part of usage would focus on the genres Pop and Urban because these are the most common music genres. In particular, I can foresee a big and rapid increase in the area of podcasts and audio books."

Q14: Where do you see this technology in 5 to 10 years?

German:
Expert: "Ich glaube, dass in den nächsten 5 to 10 Jahren sich die Anzahl an Smart Speakern signifikant erhöhen wird und eine enorme Marktdurchdringung erzielt wird. Dies führt sich vor Allem auch darauf zurück, dass die drei großen Hersteller Amazon, Apple und Google versuchen durch technologische Vorteile und harte Preiskämpfe den Markt jeweils für sich zu gewinnen. Diese Grundvoraussetzung sowie die Annahme, dass sich Technologie exponentiell verbessert wird dazu führen, dass Smart Speaker uns beinahe überall in unserem täglichen Leben begegnen und wir auf natürliche Art und Weise mit ihnen interagieren."

English:
Expert: "I think that the number of smart speakers will significantly rise in the next 5 to 10 years. Moreover, a vast market penetration will happen. This can be based on the fact that the three biggest manufacturers Amazon, Apple, and Google will try to win the biggest share in the market through technological benefits and though price wars. This prerequisite as well as the assumption that technology will advance in general lead to the fact that smart speakers will be an active and omnipresent part of our daily lives. Thus, we will interact with them in a natural way."

Appendix 2: Online Survey

Dear participant,

thank you for participating in this online survey for my bachelor thesis "Music consumers' adoption to smart devices in the field of music". In the following, you will get a short introduction to the topic. After that, there will be an online questionnaire which approximately takes you 8 minutes to fill in.

The term 'smart speaker' describes an internet-connected speaker controlled by voice commands, with an artificial intelligence (AI) assistant responding to the owner's requests. Amazon's Echo with its Alexa assistant was the first to launch in late 2014, but it has since been joined by Google Home (with Google Assistant) and Apple's HomePod (with Siri) and many more.

As people consume and listen to music in all sorts of different ways on a daily basis, whether via their phone, radio, computer, streaming services, YouTube, CDs, vinyls, etc., the (musical) smart speaker is aimed to be another medium to experience music.

A musical smart speaker's features include, amongst others:

• Finding similar music
If you're tired of listening to the same songs all the time, you can say something like, "Alexa, play music similar to Fleet Foxes."

• Create playlists
"Alexa, add this song to my [playlist name] playlist."

• Create a music alarm
"Alexa, wake me up to relaxing music."
"Alexa, set an alarm to rock music."

• Play music across multiple speakers

• Get music news

It is advised to conduct the survey via a laptop or a computer. Please answer the questions carefully. This is an anonymous survey; all the information you provide is confidential and will only be used for this research.

If you have any questions or need other related information, please feel free to contact me (t.schudzich@student.utwente.nl).

Tim Schudzich
Communication Science
University of Twente

Q1: Do you want to participate in this survey? Note: if you answer 'no', you will be taken to the end of the survey

- yes
- no

Q2: What is your gender/How do you identify?

- Female
- Male
- Non-Binary

Q3: What is your age?

Q4: I am currently

- a student
- a university student
- a part-time employee
- a full-time employee
- retired
- unemployed
- unable to work

Q5: What is your favorite music genre?

☐Pop

☐Hip-Hop/Rap

☐R&B/Soul

☐Alternative

☐EDM

☐Rock

☐Jazz

☐Metal

☐Techno

☐Country

☐Other

Q6: How many people are you living with?

- alone
- +1
- +2
- +3
- +4
- +5
- more than 5

Q7: How many hours a week do you listen to music?

0 hours - 3 1/2 hours	3 1/2 hours - 7 hours	7 hours - 10 1/2 hours	10 1/2 hours - 14 hours	14 hours or more

---

Q8: Do you anticipate the release of new music on a regular basis?

Never	Seldom	Sometimes	Often	Almost always

PERCEIVED USEFULNESS

Q9: I expect a smart speaker to make my music consumption more efficient

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q10: I expect using a (musical) smart speaker to be a beneficial addition to my music experience

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q11: I expect a (musical) smart speaker to be helpful in giving me personalized music recommendations

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q12: I expect a (musical) smart speaker to connect my music experience with its other features (Managing the calendar and shopping lists, ordering items, searching the web, control lighting, climate control, and other smart devices around the house)

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

FACILITATING CONDITIONS

Q13: I find (musical) smart speakers to be expensive

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q14: I expect a (musical) smart speaker to work flawlessly with a normal WI-FI connection

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q15: I expect a (musical) smart speaker to work without any problems

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q16: I expect a (musical) smart speaker to operate in my mother tongue besides English

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

ENJOYMENT

Q17: I expect a (musical) smart speaker to help me in enjoying my music

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q18: I expect a (musical) smart speaker to be entertaining

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q19: I expect a (musical) smart speaker to make my music experience more joyful/lively

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q20: I expect a (musical) smart speaker to be the coolest device in consuming music

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

AUTONOMY

Q21: I expect a (musical) smart speaker to avoid me from pushing buttons on my phone or computer

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q22: I expect (musical) smart speakers to restrain me from making my own musical choices

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q23: I expect a (musical) smart speaker to make decisions for me

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q24: I expect a (musical) smart speaker to delete/add/suggest tracks without my consent (e.g. to my playlists)

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

SECURITY

Q25: I trust a (musical) smart speaker in terms of using my data

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q26: I expect a (musical) smart speaker to be a threat to my security/data

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q27: I expect a (musical) smart speaker to share my data without my consent

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q28: I expect a (musical) smart speaker to invade my privacy

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

OPENNESS/INNOVATIVENESS

Q29: I like to use new technologies

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q30: I like to be one of the first people to make use of new ideas

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q31: I think using new technologies has a positive impact on my life

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q32: I am usually worried about using new technologies, especially, technologies with artificial intelligence

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

INTENTION TO ADOPT

Q33: I would consider buying a (musical) smart speaker

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q34: I would recommend people to buy a (musical) smart speaker

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q35: I expect a (musical) smart speaker to make my music experience better

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

Q36: I consider a (musical) smart speaker to be a great development for my consumption of music

Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree

We thank you for your time spent taking this survey.
Your response has been recorded.

Appendix 3: Output Regression Analysis

Model Summary[a]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.814[a]	.663	.640	.630	.663	29.247	8	119	.000
2	.816[b]	.631	.631	.638	.003	.226	4	115	.923

a. Predictors: (Constant), Perceived usefulness, Facilitating conditions_1, Facilitating conditions_2, Facilitating conditions_3, Facilitating conditions_4, Enjoyment, Autonomy, Security, Openness/Innovativeness

b. Predictors: (Constant), Perceived usefulness, Facilitating conditions_1, Facilitating conditions_2, Facilitating conditions_3, Facilitating conditions_4, Enjoyment, Autonomy, Security, Openness/Innovativeness, Age, Living situation, Music consumption, Music anticipation

c. Dependent Variable: Intention to adopt

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	92.748	8	11.594	29.247	.000[a]
	Residual	47.171	119	.396		
	Total	139.920	127			
2	Regression	93.117	12	7.760	19.066	.000[b]
	Residual	46.803	115	.407		
	Total	139.920	127			

a. Predictors: (Constant), Perceived usefulness, Facilitating conditions_1, Facilitating conditions_2, Facilitating conditions_4, Enjoyment, Autonomy, Security, Openness/Innovativeness

b. Predictors: (Constant), Perceived usefulness, Facilitating conditions_1, Facilitating conditions_2, Facilitating conditions_4, Enjoyment, Autonomy, Security, Openness/Innovativeness, Age, Living situation, Music consumption, Music anticipation

c. Dependent Variable: Intention to adopt

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.022	.601		-.037	.971
	Perceived usefulness	.351	.089	.282	3.943	.000
	Facilitating conditions_1	-.082	.060	-.077	-1.370	.173
	Facilitating conditions_2	-.071	.081	-.051	-.881	.380
	Facilitating conditions_4	.102	.054	.104	1.896	.060
	Enjoyment	.441	.092	.362	4.793	.000
	Security	-.264	.061	-.267	-4.318	.000
	Autonomy	.018	.081	.012	.219	.827
	Openness/Innovativeness	.355	.109	.191	3.259	.001
2	(Constant)	.376	.747		.503	.616
	Perceived usefulness	.358	.091	.288	3.950	.000
	Facilitating conditions_1	-.097	.066	-.090	-1.465	.146
	Facilitating conditions_2	-.073	.082	-.053	-.887	.377
	Facilitating conditions_4	.110	.057	.113	1.946	.054
	Enjoyment	.441	.094	.362	4.692	.000
	Security	-.265	.062	-.268	-4.245	.000
	Autonomy	.008	.086	.005	.092	.927
	Openness/Innovativeness	.336	.114	.181	2.941	.004
	Age	-.004	.007	-.033	-.538	.591
	Living situation	-.014	.042	-.019	-.328	.744
	Music consumption	-.017	.047	-.021	-.357	.722
	Music anticipation	-.039	.052	-.042	-.741	.460

a. Dependent Variable: Intention to adopt

Excluded Variables[c]

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics Tolerance
1	Facilitating conditions_3	.[a]	.	.	.	.000
	Security	.[a]	.	.	.	.000
	Age	-.030[a]	-.489	.626	-.045	.770
	Living situation	-.012[a]	-.215	.830	-.020	.918
	Music consumption	-.010[a]	-.174	.862	-.016	.883
	Music anticipation	-.03[a]	-.681	.497	-.063	.948
2	Facilitating conditions_3	.[b]	.		.	.000
	Security	.[b]	.		.	.000

a. Predictors in the Model: (Constant), Perceived usefulness, Facilitating conditions_1, Facilitating conditions_3, Facilitating conditions_4, Enjoyment, Autonomy, Security, Openness/Innovativeness

b. Predictors in the Model: (Constant), Perceived usefulness, Facilitating conditions_1, Facilitating conditions_3, Facilitating conditions_4, Enjoyment, Autonomy, Security, Openness/Innovativeness. Age, Music consumption, Music anticipation

c. Dependent Variable: Intention to adopt

FORMAT LITERATURE STUDY LOG

Mandatory appendix A

Research questions literature study

Formulate research questions regarding your literature study. These question(s) can differ
from the research question(s) that are used in your research proposal

· Sub questions literature study (if applicable)
· Concepts in research questions (most important terms in the research questions)

"How do people adapt to smart devices in the field of music?"
"How do music consumers adpt smart devices and their output of music?"

Criteria preferred materials *(books/articles, recency, language)*
Formulate the criteria to use in selecting materials.

The preferred materials for finding literature will be online libraries, e.g. Google Scholar or Researchgate.
Therefore, studies and journals will be thoroughly examined before being considered for the
implementation of this research study.

Selected Databases *(e.g. Scopus, Web of Science, Psyinfo, Picarta)*
Discuss why these are the most appropriate databases to use.

Scopus, Google Scholar, and Researchgate are appropriate databases to use based on their reliability in
terms of theoretical good. The literature in these databases is peer-reviewed, wherefore they offer a great
value for theoretical substantiations.

Relevant terms

Concept	Related terms	Smaller terms	Broader terms
Concept 1 (e.g. ICT)	Information- and communication technologies	Computers	Technology
Concept 2 Smart Speakers	Smart Devices	Smartphone	Technology
Concept 3 Technology adoption	Technology acceptance	To get used to something	Adoption

Search actions

	Date	Database/Setnumber	Search action + technique	Total hits
1	3.4.19	Research Gate	Smart home technology	n.a.
2	5.4.19	Google Scholar	smart speakers	509.000
3	5.4.19	Google Scholar	smart speakers music	207.000
4	7.4.19.	Google Scholar	music consumption smart speaker	47.600
5	9.4.19.	Research Gate	adoption smart speaker music	n.a.

6	10.4.19	Google	Smart speakers music consumption	14.200.000

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Reflection

Reflect on the following issues:

What important choices have you made in your search process to get to the qualitative good information?

When I found a valuable source with qualitative good information regarding my topic, I scanned the reference list in this specific study to get lead to further potential studies concerning my topic. Moreover, I selected my sources carefully by reading them first and evaluating them whether they fit for my study or not.

How did you orientate yourself on the subject?

I oriented myself on the subject by the practical experience I could acquire during my internship and time as a working student. Therefore, I got a view for what I should be looking for. I scanned several sources to see whether they fit.

Which (combinations of) terms were important. Which databases? Which searching techniques?

The most important databases were Google Scholar and Researchgate. In particular, Researchgate was of great value to me since related studies are linked there with another. Important search terms were, amongst others, smart speakers, smart devices, and music consumption.

To what extent did they deviate from the terms which you have initially used?

They were more specific. Thus, I got better results for valuable sources.

How did you assess the relevance and quality of found articles, books or other materials?

I assessed the relevancy based on year of publication, topic, and whether the source has been cited and used often or not. For instance, UTAUT and TAM are fundamental models for technology acceptance.

What would you do differently in a next search operation?

I would spent even more time in searching for sources to build a framework carefully in advance. Moreover, I would use further databases to increase the broadness of theoretical input, for instance, through books.