Understanding How Personality Affects the Acceptance of Technology: A Literature Review

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Abstract

The aim of this literature review is to summarize the current state of research on the influence of the extended Big Five personality traits on the acceptance of technology and to uncover inconsistencies and gaps in knowledge. It focuses on the question of how the characteristics openness to experience, extraversion, agreeableness, conscientiousness, neuroticism and willingness to take risks affect people's acceptance of new technologies. Within the framework of the literature review, a total of 378 topic-relevant results were analyzed and ultimately a sample of 22 studies selected to reflect the current state of research. Upon review, most of these studies provide significant results for each of the six personality traits. Furthermore, it was found that most researchers use the Technology Acceptance Model (TAM) to measure technology acceptance and that the samples consisted mainly of students. In view of the increasing use of intelligent technologies in almost all areas of life, it is particularly important to continuously investigate the factors influencing technology acceptance – and to do so in a representative way for all social classes.

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1. Introduction

We live in a rapidly changing world. Central driving forces such as urbanization, climate change and digitalization present cities and citizens alike with numerous challenges (Mandl & Zimmermann, 2014). As centers of knowledge and development, cities in particular are subject to constant change. From the introduction of machine production in the first industrial revolution, through the second industrial revolution and automated mass production, up to the digital transformation that is taking place today, cities have long been pioneers of change processes (Etezadzadeh 2015).

In recent times, the demand for efficient concepts of urban development has grown ever stronger. Between 2010 and 2015, the number of Smart City strategies published by cities worldwide increased more than eightfold (Statista, 2018). A Smart City pursues the goal of making living together more streamlined and resource-efficient through the use of information and communication technology (ICT). Therefor, a Smart City can be considered as a symbol of the use of innovations. In addition to the economy and housing, the environment and mobility, the government and citizens of a city are important fields of action for a Smart City (Giffinger et al., 2007). Digitalization plays an important role in this development and influences almost all areas of the life of the population (Vogel, Weißer & Hartmann, 2018). Further, in Smart City programs the aim is to work constructively together. That is why it is important to sensitize the technology acceptance of the inhabitants of all social classes, to create an equal participatory access. With the help of a participatory approach and the citizens involvement, negotiations can be hold collectively on how the city should be further developed and designed.

At the same time, the digital transformation is rapidly driving the development of new business models. The Internet of Things and Big Data are opening up new areas of application for people and technology and service providers (Wittpahl, 2017). New technologies are being

used in the working environment, for example in the automation processes of production and storage facilities in Industry 4.0 (Müller-Seitz, Seiter & Wenz, 2016). However, this is also accompanied by new demands on professional skills with the focus increasingly on the competences of a person in interaction with the respective smart assistance systems (Wittpahl, 2017).

Furthermore, the digital revolution also affects people's private lives. For example, there are numerous companies that specialize in the use of smart home technologies, enabling the networking and automation of buildings. Services that are supported by home automation include security systems, lighting and ventilation, checking and optimizing the energy balance, and the entertainment sector (Nikayvin & De Reuver, 2013).

In summary, it can be said that the progressive digitalization and technologization of people's professional, public and private lives is increasing their technical requirements and demanding a high degree of acceptance from them. This applies in particular for cities that pursue Smart City strategies and want to offer and use ICT solutions. However, not only should the technical requirements for such initiatives be created, social issues should be considered too. To what extent do people accept new smart technologies? What factors influence their acceptance and adoption of new technologies?

Models such as the *Technology Acceptance Model* (*TAM*) according to Davis (1989) or the *Unified Theory of Acceptance and Use of Technology (UTAUT)* according to Venkatesh, Morris, Davis and Davis (2003), have established themselves for the empirical investigation of people's acceptance of new technologies. In addition to the recording of socio-demographic characteristics in empirical studies, it is helpful to use personality traits (the *Big Five*) to explain specific relationships (Rössler, 2011). The *Five-Factor Theory of Personality (FFT)* provides a framework for understanding and explaining the psychological functioning and behavior of people by considering different forms of the personality construct (Muck, 2004). Numerous

researchers have already implemented the approach of investigating the *Big Five* in the context of technology acceptance (e.g., Devaraj, Easley & Crant, 2008; Svendsen, Johnsen, Almås-Sørensen & Vittersø, 2013; Venkatesh, Sykes & Venkatraman, 2014).

This literature review aims to compile the existing research on the influence of the extended *Big Five* personality traits on technology acceptance to uncover inconsistencies and gaps in knowledge and to formulate open questions. Furthermore, an overview of the technologies tested in the respective studies is given. The literature review focuses on the following questions:

RQ1 Which personality factors relate to the use of technology?

RQ2 How do these personality factors influence the use of technology?

In order to answer the research questions, the personality structure based on the *Big Five* personality traits as well as the concept of acceptance will be explained. In a next step, the *TAM* and the *UTAUT* will be introduced, and the methodology of the literature review and the discussion of the results will follow.

2. Theoretical Foundations

2.1 The Big Five Personality Traits

The *Five-Factor Theory of Personality (FFT)* is based on the assumptions that people are knowledgeable, rational, variable and proactive. It explains the functioning of a universal personality system, which is defined by categories of variables and dynamic processes. These in turn provide information about the most important causal chains of reaction. The *FFT* distinguishes between the five dimensions of openness to experience, extraversion, conscientiousness, agreeableness, and neuroticism and analyzes their effects on the personality system (McCrae & Costa, 2008). Persons who are open to experiences are characterized by an interest in travel, many different hobbies, a variety of professional interests and openness to

foreign cuisine (ibid.). They are also said to be particularly open-minded regarding their norms and values (Muck, 2004). The central aspects of the personality trait of extraversion include a person's social competence, numerous friendships, their professional interests as well as their entrepreneurial spirit, which is evident, for example, in their participation in team sports activities and club memberships (McCrae & Costa, 2008). Furthermore, extraverts are described as sociable, talkative and assertive (Muck, 2004). A person's agreeableness is defined, among other things, by their belief in cooperation and their attitude of forgiving others (McCrae & Costa, 2008). Generally speaking, persons with a strong expression of this personality trait can be attributed a high degree of helpfulness and willingness to trust. Conscientiousness as a personality trait is characterized by a person's sense of duty, determination and willpower (Muck, 2004). It is also represented by technical expertise, long-term planning and leadership qualities. People with a high degree of neuroticism are characterized by low self-esteem, irrational perfectionist beliefs and pessimistic attitudes (McCrae & Costa, 2008). They also have a tendency to be sensitive and to be easily disturbed in stressful situations (Muck, 2004).

With the different manifestations of these five dimensions, the *FFT* provides a framework for understanding psychological functioning and human behavior (Muck, 2004). From the perspective of communication science, the *Big Five* is extended with the characteristic of **risk taking.** People who show a high willingness to take risks are described as hungry for experience, unrestrained, seeking adventure and showing a love for the unpredictable (Rössler, 2011).

2.2 The Concept of Acceptance

The concept of acceptance can be considered in the context of the use of innovations and includes components of both attitude and action (Harnischfeger, Kolo & Zoche, 1999; Kollmann, 1998). Regarding the use of new technologies, the focus is mainly on attitude, since

this predominantly influences future use. Attitude consists of an affective (emotional) and a cognitive (intellectual) component. The affective component refers primarily to feelings (positive, negative, indifferent), which relate to the handling of the innovation. The cognitive component links a weighing up of costs and benefits with a person's knowledge of the innovation. These two elements are supplemented by a conative component, which comprises the willingness to act or behave towards objects of attitude - in this case an innovation. At this point it should be noted that the basic willingness to act does not necessarily lead to concrete action (Pürer, 2003).

Furthermore, the adaptation of new technologies must be considered in the context of acceptance, because the innovation does not necessarily fit into a person's existing value system. Although there might be a general basic acceptance, new innovations can only be fully accepted if, in addition to the external pressure of development, there is also an internal, individual change on the side of the user (Kollmann, 1996).

Based on Rogers, individual factors for acceptance can also be derived (Rogers, 2003). The *Relative Advantage* describes the degree to which an innovation is considered better than previous versions. The user must therefore recognize an advantage in a new technology over its predecessors. *Compatibility* describes the degree to which an innovation is compatible with previous experiences, values and needs. It must take up existing user needs and make satisfying them easier. *Complexity* refers to the degree of difficulty in terms of the comprehensibility and use of the innovation. This factor primarily reflects the user-friendliness of an innovation. The easier a user can understand and use a new technology, the more likely they are to adopt it and integrate it into their everyday life. *Trialability* refers to the possibility of trying out the preliminary stages of the innovation to a certain extent. This also includes the continuous adaptation of the innovation to the needs of the users. Consequently, even before market launch, everyday users (not experts) should always be consulted to evaluate the technology. Finally,

observability should be mentioned, which describes the perceived degree of benefit of a new innovation. The more easily individuals can recognize the concrete benefit of an innovation, the more willing they will be to adopt it.

2.3 Models for Measuring Technology Acceptance

Different models have been established for the analysis of people's usage of and behavior towards new technologies. The *Technology Acceptance Model* (*TAM*) has proven to be a common method for investigating the factors influencing the acceptance and rejection of new technologies by users. According to Davis (1989), the behavioral intention to use a new technology (BI) is influenced by how a person perceives its usability and usefulness (ibid.). In both of his studies the perceived usefulness (PU) was found to be a stronger influencing factor on the BI than the perceived ease of use (PEOU). It is primarily the PU that influences a person's use of a new technology, and this is related to its functions. If those functions appear beneficial to a person, it is more likely that he or she will use the technology. The PU is also linked to the perception of how easily the desired functions can be used, and it is notable that users are willing to accept some difficulty in using a technology if it provides them with much needed functionality. These two dimensions result in the user adopting a positive or negative attitude towards the use of a new technology (ibid.).

With the *Unified Theory of Acceptance and Use of Technology (UTAUT)*, a technology acceptance model that integrates and combines the determinants of eight common models was presented and evaluated (Venkatesh et al. 2003). For the *UTAUT* model the performance expectancy, effort expectancy, attitude toward using technology, social influence, facilitating conditions, self-efficacy, anxiety and behavioral intention to use the system are examined (ibid.). Ultimately, this should make it possible to explain the intentions and the behavior of

users when using an information system. A special feature of the *UTAUT* model is that it is internationally and interculturally applicable (Oshlyansky, Cairns & Thimbleby, 2007).

3. Materials and Methods

The aim of this review is to compare literature that deals with the extended *Big Five* personality traits in the context of technologies, and to examine the acceptance and use intentions of the respondents towards these technologies. For the literature review, over the period from November 4th to November 20th 2019, *EBSCO* and *Google Scholar* were used as a database for scientific publications. The following keywords were applied:

(1) personality and technology acceptance

(2) big five personality traits and technology

(3) five factor model of personality and technology

(4) personality traits and acceptance

**(5)** risk taking and technology acceptance

In addition to the English keywords, their German translations were also tested in the literature search. However, this did not prove to be effective and produced duplications with the results of the English keyword search. Furthermore, the individual personality traits of the *Big Five* were used as keywords for the literature search. This approach, however, also proved not to be effective. During the literature search we noted that previous studies mostly focused on the *Big Five*, but not the extended version with the characteristic of risk taking. Therefore, in a final step, a special search was conducted for this characteristic and its influence on technology acceptance.

Due to the enormous amount of literature in *Google Scholar*, the first 50 hits for every keyword were analyzed in their entirety. In addition, every further 50th hit (up to N=1000) was

considered. It should be mentioned that *Google Scholar* was used to get access to related papers that were found via *EBSCO* but that were not accessible.

In summary, a total of 1666 hits were generated by the keyword search. Especially for the first keyword phrase many relevant results were found in both databases. After an analysis of the relevance of the literature found, the number of hits was reduced to 378. Among the hits of the keywords it could be noted that there were a lot of overlaps and divergent topics. With other studies the focus was frequently on the trust or self-efficacy expectation of a person as a variable influencing technology acceptance. Therefore, the abstracts and the table of contents were reviewed, and the articles were included in the sample if at least one of the following two criteria were fulfilled: (1) personality traits in the context of technology are the research subject of the article, and/or (2) at least one chapter is dedicated to personality traits in the context of technology. If none of these criteria were fulfilled, the article was excluded from the sample. After removing the duplicates, the number of hits was reduced to 22 studies that examine the extended *Big Five* personality traits and their influence on technology acceptance.

Figure I. Number of publications per year
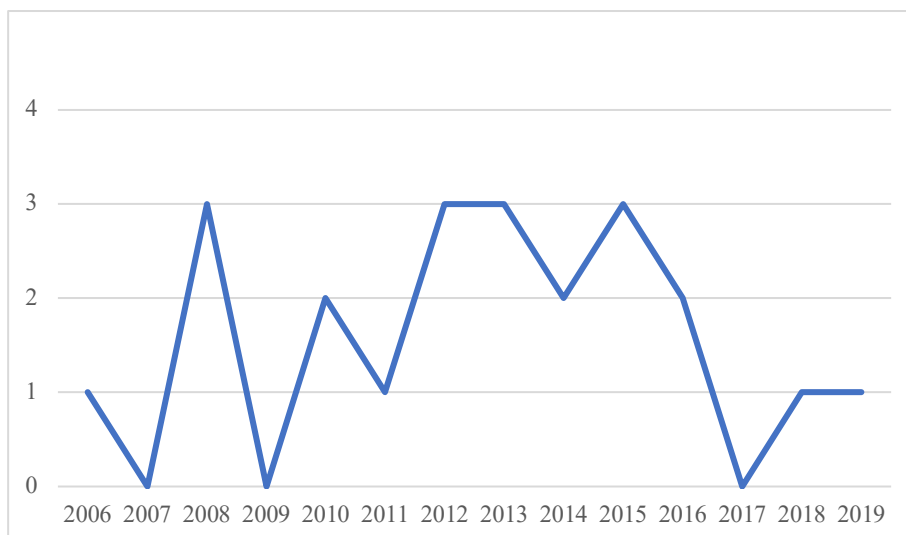
Table I. Overview of the selected literature

Focus	Technology	Authors	Method
Project Management & Organization	Data management tool for music and fotos	Svendsen et al. (2013)	Web panel of a statistical bureau; Online survey; 1004 Norwegians; TAM
	Project management tool	Devaraj et al. (2008)	Training on the technology and online survey about the personality one month later; 180 students; TAM
	Knowledge management system (KMS)	Prasetya et al. (2015)	Survey of a private company that uses KMS; 127 participants; TAM
	Business intelligence	Harb & Alhayajneh (2019)	Proposal to investigate the BI to use business intelligence tools; TAM
	App for event management	Behrenbruch et al. (2013)	Lab experiment for testing the app for different tasks and questionnaire; 344 undergraduate students; TAM
	Electronic blackboard	Lin & Ong (2010)	Online survey; 65 students; PU and information system continuance intention
	Organization system for university classes	Barnett et al. (2015)	Data collection at three points during the semester (assessing the UTAUT and the *Big Five*; perceived system use at the end; collection of logged system usage data; 382 students
	Web-based system for literature research	Nov & Ye (2008)	System introduction and survey; 121 students; PIIT
	Organization of music classes	Perkmen & Cevik (2010)	Survey during a class in university; 83 pre-service music teachers; motivation to use the technology
Social Network Sites & Messaging	Social network sites, Facebook	Blachnio et al. (2013)	Literature review
	Social network sites	Roses & Kluemper (2008)	Survey; 575 students; TAM
	Health information through social network sites	Boontarig (2016)	Online survey via Facebook; 212 participants, most of them students; UTAUT
	Instant messaging service	W. Wang et al. (2012)	Online survey; 228 students; PU, perceived enjoyment and continuance intention
	Commercial possibilities of social media	Hansen et al. (2018)	Online survey distributed through email campaign; 318 social media consumers; TAM
Commerce	Mobile commerce	Zhou & Lu (2011)	Questionnaire distributed at service halls (random selection); 268 participants; PU and BI
	Online shopping	S. Wang et al. (2006)	Survey; 492 students; attitude toward online shopping & intention to shop online
Government	E-government system	Venkatesh et al. (2014)	Field study in a village in India; participants: 311 heads of household; e-Government portal use
	E-government system	Taiwo et al. (2012)	Questionnaire distributed at university; 101 students; UTAUT
Security	Portable location system for catastrophe situations	Kwee-Meier et al. (2016)	Online survey: 2086 participants that took part in at least one cruise before; BI to use
	Privacy protection technologies	Brecht et al (2012)	Lab experiment and a questionnaire; 151 participants; PU and BI to use
Others	Autonomous driving	Choi & Ji (2015)	Online survey; 552 participants (drivers); TAM
	Smartphones	Özbek et al. (2014)	Online survey; 401 students; TAM

4. Results

The categorization of the results was derived inductively from the material. Due to the fact that the studies either focus on single personality traits or examine the *Big Five* in their entirety, the results are presented separately for each personality trait.

Openness to Experience

Several studies have found a significant positive influence of openness to experience on the acceptance of new technologies (e.g. Brecht, Fabian, Kunz & Müller, 2012; Nov & Ye, 2008; Venkatesh et al., 2014). These also include Svendsen et al. (2013), which surveyed around 1000 Norwegians on their acceptance of a data management tool for music and photos. Venkatesh et al. (2014) found the openness of the main earners from about 350 households had a positive influence on their acceptance of an e-government portal. Similar results are provided by Nov and Ye (2008) as well as Prasetya, Shihab and Sandhyaduhita (2015), who investigated openness as a factor influencing personal innovativeness in technology (PIIT). Nov and Ye (2008) presented a web-based system for the literature research in various databases and Prasetya, Shihab & Sandhyaduhita (2015) presented a knowledge management system and had it evaluated by about 120 respondents each. In both studies it became apparent that openness has a positive effect on a person's innovativeness in information technologies. It is assumed that this connection also prevails for the general acceptance of a technology. This is followed by the results of the study by Brecht et al. (2012), who examined the role of the personality traits of the participants on their acceptance of technologies for the protection of privacy on the Internet. In a laboratory experiment, they investigated to what extent and for how long participants are willing to wait longer when surfing on the Internet if they use anonymizing technologies. Openness to experience was found to have a significant positive influence on the BI to use the technology.

The use of social network sites (SNS), and Facebook in particular, is also the subject of study in the context of the *Big Five* personality traits (e.g., Blachnio, Przepiórka & Rudnicka, 2013; Rosen & Kluemper, 2008; Boontarig, 2016). Blachnio et al. (2013) state in their research review that several studies show a positive correlation between openness to experience and the use of social media and that this personality trait is thus an important factor influencing the acceptance of this technology. In contrast, Rosen and Kluemper (2008), in their survey of over 500 students, were unable to demonstrate a significant influence of openness on the perceived usefulness of SNS and thus on behavioral intentions towards SNS.

This non-significant correlation is followed by the study by Devaraj, Easley, and Crant (2008), in which 180 students evaluated a project management tool. No significant correlation was found between the openness of the students and their PU towards the technology that was presented. Also Wang, Ngai, and Wei (2012) could not confirm their hypothesis on the influence of openness on the PU of a technology (instant messaging service). Their survey of 228 students focused on the intention to continue using an already used messaging service.

Finally, a study in which around 400 students were asked about their technology acceptance in the context of smartphones should be mentioned (Özbek, Alnıaçık, Koc, Akkılıç & Kaş, 2014). Interestingly, a split influence of openness on the acceptance of this technology was revealed. Although a significant positive influence of this personality trait on the PEOU became visible, no significant effect on the PU could be proven.

The results of the literature review for the characteristic openness to experience as well as the other personality traits are presented in Table II. Further, it is classified which constructs (e.g., technology acceptance, personal innovativeness in technology) were tested in the individual studies and whether significant effects were found.

Table II. Personality and technology acceptance

Personality	Results	Authors
Openness to experience	Positive influence on technology acceptance	Svendsen et al. (2013); Venkatesh et al. (2014)
	Positive influence on PIIT	Nov & Ye (2008); Prasetya et al. (2015)
	Positive influence on BI to use the technology	Brecht et al. (2012)
	Positive influence on PEOU	Özbek et al., 2014
	No significant influence	Devaraj et al. (2008); Rosen & Kluemper (2008); W. Wang et al. (2012)
Extraversion	Positive influence on technology acceptance	Prasetya et al (2015); Rosen & Kluemper (2008); Svendsen et al (2013); Venkatesh et al (2014)
	Positive influence on motivation to use the technology	Perkmen & Cevik (2010)
	Positive influence on PU	Behrenbruch et al. (2013)
	No significant influence	Boontarig (2016); Özbek et al. (2014)
Agreeableness	Positive influence on technology acceptance	Svendsen et al. (2013)
	Positive influence on PU	Lin & Ong (2010); Devaraj et al. (2008)
	Positive influence on PEOU	Özbek et al. (2014),
	No significant influence	Rosen & Kluemper (2008); Venkatesh et al. (2014); W. Wang et al. (2012)
Conscientiousness	Positive influence on PU	Rosen & Kluemper (2008); Prasetya et al. (2015)
	Positive influence on motivation to use the technology	Perkmen & Cevik (2010)
	Positive influence on perceived and actual use of the technology	Barnett et al. (2015)
	Moderator variable between perceived value and intention to use the technology	Boontarig (2016)
	Positive influence on perceived enjoyment	W. Wang et al. (2012)
	No significant influence	Svendsen et al. (2013); Özbek et al. (2014); Zhou & Lu (2011)
Neuroticism	Negative influence on PEOU	Devaraj et al. (2008)
	Negative influence on PU	Özbek et al. (2014); Zhou & Lu (2011)
	Negative influence on PIIT	Prasetya et al. (2015)
	Positive influence on expected usefulness	Kwee-Meier et al. (2016
	No significant influence	Rosen & Kluemper (2008); W. Wang et al. (2012)
Willingness to take risks	Positive influence on BI to use the technology	Taiwo et al. (2012); Hansen et al. (2018)
	Positive influence on BI to buy online	S. Wang et al. (2006)
	No significant influence	Choi & Ji (2015)

Extraversion

With regard to the personality trait extraversion, Svendsen et al. (2013), Rosen and Kluemper (2008), Venkatesh et al. (2014) and Prasetya et al. (2015) all found a significant positive effect on technology acceptance. The research review by Blachnio et al. (2013) examined the influence of this personality trait in the context of SNS use. It became apparent that extraversion has a significant positive influence on Facebook usage and is therefore an important factor in the acceptance of this technology.

Perkmen and Cevik (2010) explored the relationship between the personality of music teachers and their motivation to teach using computer-based technologies, e.g., to learn an instrument or improve rhythmic skills. Extraversion was found not only to have a relevant influence on the motivation in general, but also to be a significant factor in integrating computer-based technologies into the teaching process.

Behrenbruch, Söllner, Leimeister and Schmidt (2013) presented an app for event organization to the 350 bachelor's students surveyed in their study and evaluated their technology acceptance. It was shown that extraversion is a significant factor influencing the PU of the presented technology and that PU in turn has a positive effect on the BI.

In contrast to the results that attribute a positive influence on technology acceptance to extraversion, Özbek et al. (2014) could not observe a significant influence of this *Big Five* factor on the acceptance of the presented technology in their study.

Not only is the direct influence of the *Big Five* on technology acceptance addressed in the previous research - the personality traits are also examined as moderators in the context of acceptance and BI towards new technologies. Boontarig (2016) considered their influence on attitudes towards the adoption of health information transmitted through social networks. The more than 200 participants in the online survey were asked to indicate their expectations of performance and to assess the perceived added value of the system. No moderating effect of

extraversion on performance expectations and the perceived added value of the system, and therefore on the intention to receive health information through social networks was found.

Agreeableness

Previous research into the relationship between a person's agreeableness and their technology acceptance also shows different results. Lin and Ong (2010) investigated the relationship between the personality traits and continued use of information systems where an electronic bulletin board for communication and data exchange was evaluated by the respondents. Regarding agreeableness, a significant influence on the PU of the technology was found, which in turn had a positive effect on the BI of continued use.

The positive influence of this factor on the use of technologies is also evident from the research review by Blachnio et al. (2013) - in this case regarding the use of Facebook. This is followed by the study by Svendsen et al. (2013), in which it became apparent that agreeableness has a significant influence on technology acceptance (PU and PEOU). Devaraj et al. (2008) were also able to show a positive influence of agreeableness on the PU of the presented technology.

In contrast, Venkatesh et al. (2014) had to reject the presumed positive influence of agreeableness on the use of the presented e-government portal. The study by Özbek et al. (2014) also shows contradictory results, in which only a positive influence of agreeableness on the PEOU of the presented technology could be proven, but no connection to the PU was observed. The results of Wang et al. (2012) and Rosen and Kluemper (2008) correspond with this. Again, no significant influence of agreeableness could be recorded with regard to the PU of the presented technology.

Conscientiousness

In the studies by Rosen & Kluemper (2008) and Prasetya et al. (2015), the analysis of a person's conscientiousness correlated significantly with the PU of the presented technologies. Furthermore, Perkmen & Cevik (2010) found that conscientiousness is a relevant influence on the motivation to integrate computer-based technologies into teaching. The study by Barnett, Pearson, Pearson and Kellermanns (2015) linked the five-factor model of personality with the *UTAUT* model and had about 380 bachelor's students apply and evaluate a web-based organization system for university courses. It became apparent that the conscientiousness of the participants had a significant positive influence on the actual as well as the perceived use of the presented technology.

The personality trait of conscientiousness was identified by Boontarig (2016) as a significant moderator variable, which explains the connection between the perceived value and the BI to use the presented technology. Wang et al. (2012) also produced similar findings, with the influence of conscientiousness here referring to the perceived pleasure regarding the usage of the technology. This in turn has a significant positive influence on the PU of the technology.

A contradiction to these results can be found in the studies by Svendsen et al. (2013) and Özbek et al. (2014), in which no significant correlations were found between the conscientiousness of a person and their technology acceptance. The study by Zhou & Lu (2011) regarding the effects of conscientiousness on the acceptance of mobile commerce by almost 270 respondents also showed no significant correlation. In addition, the results of Brecht et al. (2012), which also showed no influence of conscientiousness on the intended use of the presented technology, should be mentioned.

In addition to studies that have already been conducted, proposals for future studies focusing on the *Big Five* personality traits and technology acceptance include the essay by Harb and Alhayajneh (2019), which places the BI to use business intelligence technologies in the context of the *Big Five* and the *TAM*. Their proposal is based on the results of Svendsen et al.

(2013) and assumes a significant influence of conscientiousness on the PU of business intelligence technologies.

Neuroticism

The fifth personality trait of the *Big Five* - neuroticism - had a significant negative influence on the PEOU in the study by Devaraj et al. (2008) and a significant negative influence on the PU of the technology presented in the study by Özbek et al. (2014). In the study by Prasetya et al. (2015) on PIIT, a significant negative influence was also found for the characteristic of neuroticism. However, no connection to the PEOU could be found here.

Kwee-Meier, Bützler and Schlick (2016) analyzed the expected usefulness of a portable tracking system that could be used, for example, to search for missing persons in disasters on passenger ships, and considered the influence of neuroticism. More than 2000 people who had previously taken a cruise at least once were interviewed, and a significant positive correlation between neuroticism and the expected usefulness of the technology became apparent. This can be explained by the fact that a disaster situation is associated with a high level of stress. In this case, neuroticism can increases the inability to cope with *the idea* of the stress situation. Therefore, it is assumed that people with a high level of neuroticism will find the idea of the technology to be useful in a disaster situation.

Zhou and Lu (2011) explored trust and its influence on the BI for using mobile commerce in the context of neuroticism. This personality trait not only correlated significantly negatively with the PU of mobile commerce, but also had a significant negative impact on trust towards it. Both PU and trust were identified as relevant determinants that influence BI regarding the use of this technology.

In the study by Brecht et al. (2012), this personality trait was not examined as a direct influence on PU and BI, but as a factor influencing data protection concerns. Of the three

personality traits examined - agreeableness, extraversion and neuroticism - only the last one could be found to have a significant positive correlation with data protection concerns. These in turn have a significant influence on the PU of the technology and the BI to use it.

The findings of Rosen and Kluemper (2008) and Wang et al. (2012) are in contrast to the studies presented so far. In these two studies no significant correlation between neuroticism and technology acceptance could be found.

Willingness to Take Risks

While the majority of the research to date has only looked at the *Big Five* personality traits in terms of technology acceptance, there are a few studies that examine the extended *Big Five* with risk taking as the sixth personality trait. For this reason, a specific search was made to look for studies that focus on the influence of risk taking on technology acceptance. Taiwo, Mahmood and Downe (2012) examined user acceptance of an e-government system with regard to the determinants risk and trust and interviewed about 100 students. It was shown that the willingness to take risks had a significant positive influence on the BI to use the e-government system.

The study by Wang, Wang and Wang (2006) focused on attitudes towards online shopping and the influence of the personality traits openness to experience and willingness to take risks. The survey of nearly 500 students showed that the BI to buy online is positively influenced by their willingness to take risks. This means that people who take more risks seem to be more predisposed to making online purchases. Hansen, Saridakis and Benson (2018) also examined buying behavior in the context of technology acceptance, with the commercial possibilities of social media being the focus of the study. Approximately 320 social media users participated and it became apparent that an increased willingness to take risks significantly increased the BI to use social media for transactions. It was shown that respondents who are

more willing to take risks tend to take considerable risks, such as that of losing money or risks regarding personal data in order to shop online.

Finally, the study by Choi and Ji (2015), which examined the importance of trust in the introduction of autonomous vehicles, should be added. *Sensation-seeking* was considered as a variable influencing the BI with regard to the presented technology (ibid.). *Sensation-seeking* is defined by the extent to which a person is willing to take risks in order to experience intense sensations (Zuckerman, 1994). The survey of Choi and Ji (2015) of more than 550 drivers showed that there is no significant correlation between *sensation-seeking* and the BI towards autonomous driving.

5. Discussion

Various studies have investigated and confirmed the influence of the *Big Five* personality traits on the acceptance and the BI towards new technologies and have thus found a way to explain users' attitudes more precisely. First of all, it should be noted that mainly the *TAM* and *UTAUT* models were used to investigate the acceptance of the respondents to the presented technology. In addition, individual determinants of the *TAM*, such as the PU or the PEOU and resulting BI for the (continued) use of technologies were often integrated into the studies. It should be noted that personality traits were examined predominantly with regard to intended use of a technology (e.g., Brecht et al., 2012; Perkmen & Cevik, 2010; Taiwo et al., 2012). Furthermore, similar determinants such as the perceived enjoyment and PIIT, which are related to the BI to use a technology, were also examined in the context of the *Big Five* (e.g., Prasetya et al., 2015; W. Wang et al., 2012).

It should also be noted that in the selected studies a wide range of technologies and systems were tested or evaluated by the respondents. The technologies can be divided thematically into the main areas of project management and organization, social network sites and messaging, commerce, government, security and others. The most common technologies

were those related to data handling and project management. What is striking with regard to the Smart City development is that intelligent technologies have so far hardly been considered in the context of the personality traits.

Regarding methodological approach, it can be said that the online survey was used most frequently for data collection. However, in some cases laboratory experiments and test phases were also used to determine the technology acceptance (e.g., Behrenbruch et al., 2013; Brecht et al., 2012; Nov & Ye, 2008). One point of criticism that arose for several of the evaluated studies is that the samples often consisted only of students and the sample size was sometimes quite small so that no conclusions could be drawn for the total population (e.g., Barnett et al., 2015; Behrenbruch et al., 2013; Devaraj et al., 2008; Özbek et al., 2014; Rosen and Kluemper, 2008; W. Wang et al., 2012).

This literature review summarizes the current state of research on the influence of the *Big Five* personality traits on technology acceptance and draws attention to prevailing inconsistencies and gaps in knowledge. In the following, the research questions that are the focus of this review are answered.

RQ1 Which personality factors relate to the use of technology?

RQ2 How do these personality factors influence the use of technology?

As it turned out, most of the collected studies provide significant results for each of the six personality traits. The openness to experience, extraversion, agreeableness, conscientiousness and willingness to take risks have a positive influence on the acceptance and the BI to use technologies. For the characteristic neuroticism, a negative influence on the acceptance and the BI to use was determined in the majority of studies. It should be noted that not all of the suspected correlations could be confirmed. For example, there is disagreement in the research to date regarding agreeableness. While four studies show a positive influence of this personality

trait on technology acceptance, no significant correlation could be determined in three of the studies examined.

As already mentioned, previous studies on the *Big Five* often focus on the use of management tools that are primarily used in a professional context or on social network sites. One research gap that emerges in this context relates to the investigation of the use of smart technologies. Given that modern cities in particular are increasingly using ICT solutions, it is necessary to examine the acceptance of citizens towards them. In this context, the findings could be used to apply communication about smart technologies more effectively. For example, it is of research interest to investigate the extent to which people with a low level of extraversion and associated low social competence prefer to use online platforms instead of face-to-face meetings in order to be able to actively participate in shaping their city. Similarly, it could be investigated to what extent persons with a low level of conscientiousness, to whom a low sense of duty and disorganization is attributed, can achieve a better daily structure and organization through smart technologies (e.g. smart home services). Another example includes persons with a low degree of conscientiousness, to whom a high level of distrust and skepticism is attributed: Future researches could investigate to what extent transparent communication about new technologies, for example by showing advantages and disadvantages openly, influence their acceptance towards these technologies.

Furthermore, it is important to consider potential influencing factors such as socio-demographics and personality traits and to investigate the use of private technologies such as smart home services versus work-related technologies. In addition, given that students have mostly been the object of study thus far, it should be a research concern to ensure the representativeness of the data. With regard to the Smart City strategies published by cities, it would be conceivable to, on the one hand, ask the urban population about their acceptance of the technologies, and, on the other hand, extend such studies nationwide in order to capture a

picture of society as a whole and also to consider the acceptance and behavioral intentions of citizens in rural areas.

6. References

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