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Reshaping the Financial Landscape: Contributions to Research on the Acceptance of Innovative Financial Services in Payment, Investment Management and Insurance

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*Für meine Eltern und meine Familie, meine Freunde und Freundin
- für deren Unterstützung ich stets dankbar bin!*

Abstract

Digital megatrends and technological innovations have significantly changed the nature of the financial industry. The disruptive potential of financial innovations highly depends on societal demand and acceptance of consumers, which has been an essential research domain in the field of information systems. Hence, a deep and profound understanding of the consumers' decision-making processes regarding their perception, attitudes and intentions to use financial information systems is of vital importance for theory and practice. The objective of this dissertation is therefore, on one side, to investigate factors that influence the potential consumers' intention to use financial information systems, and on the other side to illustrate possibilities to accelerate the diffusion process of such innovations.

Within the first chapter of this dissertation, the financial technologies under investigation are introduced and embedded into a definitional context of innovations. Afterwards, the Innovation Diffusion Theory as well as the proposed acceptance research models are introduced. The succeeding section summarizes the objective and structure of the dissertation and embeds the included research paper into a synoptic framework. The methodology section illustrates a summary of applied empirical methods in this dissertation, before the discussion concludes with highlighting the most striking results, their research implication and a demonstration of limitations and suggestions for future research.

Research paper 1 and 2 deal with the acceptance of proximity mobile payment and enhance previous literature by embedding the aspects of security and privacy into established research models. Research paper 3 analyzes the acceptance of a novel approach in the sector of investment management by being the first study to develop and empirically validate an acceptance model in the context of social trading platforms. Research paper 4 addresses innovations regarding "connected insurance", focusing on the acceptance of wearable fitness tracking devices in particular. In comparison to the first four research papers, research paper 5 focuses on the communication process regarding innovations and aims to identify potential consumers of novel technological products and services.

The results of this dissertation indicate that consumers of financial innovations highly

value the aspects of security and privacy in their decision-making processes throughout all the financial innovations under investigation. Most strikingly, the impact of perceived security (research paper 1 and 3) as well as privacy concerns (research paper 4) illustrated a high influence on the consumer's intention to use financial innovations compared to effort-related costs, which have been the focus of established research models so far. Research paper 2 shows the importance of addressing privacy-related issues in marketing and identifies that innovative and technological-affine consumers demonstrate low privacy concerns. Herein, research paper 5 offers a novel approach of classifying technological early adopters and illustrates ways to reach potential technological early adopters online.

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1 Synopsis

1.1 Motivation

Digital megatrends and technological innovations have led to fundamental changes within the financial industry. Financial technology (FinTech) companies have greatly challenged established financial institutions (Gomber, Koch, & Siering, 2017) such as banks, insurance companies and service providers (McWaters, 2015). A growing Internet-based economy, changing usage patterns of new digital services and devices among consumers as well as the loss of credibility in established financial intermediaries as a result of the financial crises in 2007 are proposed to be the key drivers of the structural change within the financial sector (e.g., Cruciani, 2017; Gomber et al., 2017). Furthermore, sophisticated technological capabilities enable information technology (IT) companies to respond to the quick and dynamic changes of financial markets (Gomber et al., 2017), herein posing a tangible threat to existing services. Gomber et al. (2018) conclude that three key forces are responsible for the massive changes within the financial ecosystem: technological innovations, process disruption and service transformation. In this context, the world economic forum provided a consolidated taxonomy of disruptive financial innovations with a high potential to challenge traditional institutions. The study identified six core functions of financial services, namely “payments”, “market provisioning”, “investment management”, “insurance”, “deposits and lending” and “capital raising”, which will change dramatically due to the impact of digital technology (McWaters, 2015).

This impending paradigm shift in the global financial market significantly increases the importance of comprehensively understanding the decision-making and communication processes of consumers to meet their needs and address their concerns regarding new technologies. Previous research has illustrated that it is vital to consider technological innovations from a sociotechnical rather than a purely technical perspective (Rogers, 2003). Only if financial innovations gratify the societal demand, these products and services can lead to process disruption and transformation (Gomber et al., 2018).

Consequently, identifying the determining needs of the consumer is crucial for managers and marketers of financial institutions and FinTechs (Frank, Enkawa,

Schvaneveldt, & Herbas Torrico, 2015; Gomber et al., 2018). An anchor of factors which determine the adoption of innovations is provided by Rogers' (1962; 2003) Innovation Diffusion Theory (IDT), indicating that the five variables “relative advantage”, “ease of use”, “compatibility”, “observability” and “trialability” are essential characteristics of a successful diffusion process. Rogers' (1962) IDT has been adapted by information systems (IS) researchers (Moore & Benbasat, 1991) and used as theoretical foundation of various IS acceptance models, namely the Technology Acceptance Model (TAM) (Davis, 1989) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003). Therefore, the IDT provides a powerful basis to investigate acceptance factors of financial products and services and to provide a nomological structure to these research models. Considering the unique research context of financial innovations, an adjustment and reconsideration of established IS models is required (Chandra, Srivastava, & Theng, 2010; Lee, 2009).

Hence, one objective of this dissertation is to investigate the antecedents of consumers' intention to use financial innovations in the sectors of payment, investment management and insurance. In order to enhance the understanding of potential consumers' needs and concerns regarding financial innovations, established acceptance models have been reconsidered and adjusted according to the financial and data-related contexts of IS. In detail, research paper 1 and 2 investigate the acceptance of “mobile payment”, research paper 3 examines the acceptance of “social trading” and research paper 4 deals with the acceptance of wearable “fitness tracking devices”, which are proposed to significantly alter the calculation of insurance policies (McWaters, 2015).

These financial innovations have been selected as all of them require consumers to disclose highly sensitive personal and financial information (Phelps, Nowak, & Ferrell, 2000). Previous research demonstrates that the disclosure of personal information triggers privacy concerns, which is proposed to be one of the main barriers for potential consumers to use IS technology (Dinev, McConnell, & Smith, 2015; Smith, Dinev, & Xu, 2011). However, this essential barrier has not yet been considered appropriately in Rogers' (1962) theory and by established IS research models such as the TAM (Davis, 1989) or the UTAUT (Venkatesh et al., 2003). The original TAM has utilized the cost-benefit paradigm to provide a theoretical basis for the inclusion of perceived use-

fulness (benefits) and ease of use (effort costs). As particularly financial data are perceived to be more sensitive compared to other personal information (Sheehan & Hoy, 2000), the usage of financial IS does not only include effort costs but also data-related costs such as privacy risks. Therefore, the aspects of “perceived security” (research paper 1 and 3) and “privacy concerns” (research paper 2 and 4) have been integrated into the TAM and the UTAUT to account for potential adoption barriers. This is consistent with the privacy calculus theory, indicating that individuals perform a risk-benefit analysis before disclosing personal information (Culnan & Armstrong, 1999; Dinev & Hart, 2006). Furthermore, this dissertation bridges IS acceptance research with a marketing perspective by integrating the gadget-loving concept of Bruner and Kumar (2007) (research paper 2) into a privacy-based acceptance model for mobile payment solutions.

In addition to the identification of relevant acceptance factors of potential consumers, the identification of potential early adopters of new technologies is crucial (Rogers, 1962). Research paper 5 deals with a novel classification approach of technological early adopters, herein accounting for the communication process postulated by Rogers (1962). Hence, the second contribution of this dissertation is to classify potential innovators and early adopters of technological products and services and analyze their Internet usage behavior in order to illustrate ways how to reach this crucial consumer group within the Internet. Therefore, research paper 5 also includes a marketing perspective and provides useful insights for marketers and practitioners on how to speed up the rate of diffusion of novel technologies.

From a theoretical lens, the research papers 1 to 4 deal with the decision-making process on the micro-level of the individual consumer. Herein, the “innovation-decision process” postulated by Rogers (1962) is used as a theoretical basis. In a first step, survey participants were informed about the financial innovation through a neutral description. Afterwards, pre-defined attributes of the financial innovation under consideration were evaluated by a potential consumer and formed into a research model based on theory. Thus, two research models for mobile payment (research paper 1 and 2), one research model for social trading (research paper 3) and one model to explain the acceptance of fitness tracking devices (research paper 4) are proposed and validated in this dissertation. The subsequent part (research paper 5) deals with the communication process of Rogers' (1962) theory on a macro-level. The paper shows a

novel classification approach to categorize technological innovators and early adopters and compares the Internet usage behavior of the classified early adopters with the Internet usage behavior of the majority of the German population (Rogers, 2003). Before applying the theory of Rogers (2003), a definition of the underlying concept of innovation as well as an overview of established acceptance research is essential and will be proposed in this chapter.

Consequently, the remainder of this synopsis is structured as follows: the subsequent section provides a definition of financial innovations and embeds the included research papers into a definitional context. Afterwards, the Innovation Diffusion Theory of Rogers (1962) is introduced as the theoretical foundation of this dissertation. The succeeding section highlights the objective and the structure of the dissertation as a whole and subsumes the research papers under the umbrella of Rogers' (1962) Innovation Diffusion Theory. The methodology gives an overview of the statistical methods used in this dissertation before the synopsis concludes with the research findings, an illustration of theoretical and practical implications and the limitations of this dissertation. The following chapter presents the abstracts of the included research papers, which built the basis of this dissertation. Research papers 1 and 2 deal with the development of appropriate research models in the context of mobile payment. Research paper 3 endeavors to be the first to validate a research model for the unique context of social trading platforms. Research paper 4 deals with the acceptance of fitness tracking devices as an innovative technology to the sector of connected insurance. Research paper 5 presents a novel classification of potential technological innovators and early adopters and illustrates differences in their Internet usage behavior compared to the majority of the German population. Therefore, the fifth manuscript is not limited to financial technology and can be applied for technological innovations in a more general context.

1.2 Research context

According to the broad and pioneering definition of Schumpeter (1934: 66), the innovation process can be defined as “carrying out new combinations” such as “(1) The introduction of a new good”, “(2) The introduction of a new method of production”, “(3) The opening of a new market”, “The conquest of a new source of supply of raw materials or half-manufactured goods” and “(5) The carrying out of the new organiza-

tions of any industry”. Schumpeter (1934: 88) postulated that innovations must be carried out into practice, herein distinguishing innovations from inventions, which “are not carried out into practice”. Accordingly, innovations can be defined as results of new combinations of existing knowledge and resources, which are economically more viable than existing solutions (Schumpeter, 1934). However, innovation theory has merely emerged on the basis of technological innovations in manufacturing activities rather than service activities, resulting in a diminution of the original scope of Schumpeter’s classification (Drejer, 2004; Gallouj & Weinstein, 1997). Consequently, researchers have questioned the application of Schumpeter's (1934) definition for innovative services. Against this background, Coombs and Miles (2000) identified three different approaches of dealing with the different concepts underlying innovations in manufacturing and services: an assimilation approach, a demarcation approach and a synthesis approach. The first approach of Coombs and Miles (2000) treats service and manufacturing innovations as equal. The demarcation approach calls this similarity into question and presents both forms of innovations to be distinctively different, whereas the synthesis approach endeavors to highlight the relevance of both, service- and manufacturing-related features and elements, to define an innovation (Drejer, 2004). The latter seems to be most feasible from the perspective of IS, as Barras (1990: 216) emphasizes the universal applicability of IS technology, which “is impacting upon all branches of economic activity, whether located in what are traditionally identified as manufacturing or service industries”.

Particularly for financial services, the original distinction between manufactured goods and services is blurring, as new services emerge to support or substitute traditional goods and vice versa (Barras, 1990). To provide an example, the traditional good of cash is likely to be substituted by the emergence of cashless payment services, such as online or mobile payment. Other services such as personalized insurance policies can only be offered if insured individuals support the disclosure of their personal data by using for instance self-tracking devices such as fitness tracking devices.

Therefore, it is a necessary approach to apply and adjust the original definition of Schumpeter (1934) for financial services. According to the work of Schumpeter (1934), an innovation should be economically viable, which means that an innovation has to be carried out into practice and provide an economic value to several stakeholders (Drejer, 2004). The economic value for more than just a specific customer group

is vital, as the application of Schumpeter's (1934) definition for services would be imprecise, as many services are performed by a particular customer group and imply a certain level of uniqueness (Drejer, 2004).

Schumpeter (1934) categorized five types of innovations, namely, product innovations, process innovations, market innovations, input innovations and organizational innovations. Product innovations refer to new products or products with an enhanced quality. A process innovation is an introduction and implementation of a significantly improved production method. Market innovations are characterized by the opening of a new target market. Input innovations are categorized through the conquest of a new source of supply, a novel raw material or an intermediate input and organizational innovations carry out a new organization of industry (Drejer, 2004; Schumpeter, 1934). These types of innovations are not necessarily connected with each other.

In accordance with Schumpeter (1934), financial innovations in the context of IS can be defined as a new creation and popularization of financial products and services, processes, markets, technologies and institutions. Similar definitions are established within the financial research, albeit lacking a closer approach to consider the five innovation types proposed by Schumpeter (1934) (e.g., Lerner & Tufano, 2011; Tufano, 2007). With this categorization, we are now able to embed the three financial services and products “mobile payment”, “social trading” and “fitness tracking devices”, on which this dissertation is focusing, accordingly into the financial innovation context.

The first technology, proximity mobile payment, is a subcategory of mobile payment which provides users with the ability to initiate, authorize, and complete a financial transaction through the use of a mobile device (Chandra et al., 2010) and by using the physical infrastructure in trade, such as Near-Field Communication (NFC) technology (Slade, Williams, Dwivedi, & Piercy, 2015). Consequently, proximity mobile payment is a novel combination of existing technologies, which is economically more viable than existing solutions, as the payment process is more convenient to the consumer and reduces costs. Additionally, these services facilitate the payment process and can be categorized as process innovations according to Schumpeter's (1934) definition for services.

As a second financial innovation, this dissertation investigates the acceptance of social trading platforms. These platforms facilitate connections within a community of in-

vestors, in which users can fully observe and automatically, simultaneously and unconditionally replicate investment strategies (copy trading) of other users based on relatively low costs (Pelster, 2017; Wohlgemuth, Berger, & Wenzel, 2016). Therefore, social trading platforms can be categorized as product innovations due to the novelty of the copy trading function. Additionally, the transparency of social trading platforms provides an opportunity for both, experienced and unexperienced investors to gain an easy and convenient access to security trading, which results in an attraction of new consumers and opens a new target market. Consequently, social trading platforms can also be categorized as market innovations according to Schumpeter (1934).

The third product, fitness tracking devices, are self-tracking wearables, which can be worn on the body, interact with multi-sensor platforms on the Internet of Things (Swan, 2012) and collect data about daily activities, exercises and vital body data (Gimpel, Nißen, & Görlitz, 2013). Fitness tracking devices can be classified as product innovations, as existing tracking technology is combined with a wearable device to provide users with useful personalized information regarding their fitness level and physical health. Additionally, the analysis of the collected data will enable insurance companies to highly personalize services, proactively manage clients' risks and consequently reduce service costs (McWaters, 2015). Therefore, fitness tracking devices can also be classified as process innovations in accordance with the definition of Schumpeter (1934).

In summary, the above-mentioned technological products and services can be classified as innovations according to the definition of Schumpeter (1934). In the context of innovations, Rogers (2003) suggests a consumer-based approach and claims, that the answer to whether a technology should be categorized as an innovation ought to be provided by potential adopters who actually do the perceiving. Consequently, a successful diffusion is a matter of the subjective perception of potential adopters rather than objective values or technological advantages (Rogers, 2003). Following Rogers' (2003) approach, this dissertation endeavors to investigate financial innovations from the perspective of potential users and analyzes, which factors thrive and dampen the adoption of such innovations.

Regarding the identification of relevant acceptance factors and barriers, the theory of Rogers (1962) has laid the foundation for behavioral change models across sociological research (Valente & Rogers, 1995). The object of Rogers' (1962) research is the

investigation of the adoption process of innovations, particularly with regard to those factors that influence this process. Herein, the fifth version of the diffusion of innovation proposed by Rogers (2003) included five perceived attributes of innovations and additionally provided a classification of different adopter types (Rogers, 2003), to which a plethora of authors referred to in various financial research contexts (Laukkanen & Pasanen, 2008). Rogers (2003) emphasized that the diffusion of innovations significantly depends on the consumers' perceptions of five main attributes. The first characteristic "relative advantage" is described as "the degree to which an innovation is perceived as better than the idea it supersedes" (Rogers, 2003: 15). The second construct "compatibility" is "the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 2003: 15). Herein, one can identify the strong focus on the potential consumer's individual perception. "Complexity" as the third characteristic is defined as "the degree to which an innovation is perceived as difficult to understand and use" (Rogers, 2003: 16) and is one of the main reasons for the hesitant acceptance of innovations. Additionally, Rogers (2003: 16) proposed the construct "trialability", which he described as "the degree to which an innovation may be experimented with on a limited basis", referring to the consumer's need to try new innovation on a partial basis. Fifth, "observability" has been introduced as "the degree to which the results of an innovation are visible to others" (Rogers, 2003: 16). Rogers (2003) identified these characteristics as crucial factors to explain different rates of diffusion, which is defined as "the process in which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 2003: 5). Moore and Benbasat (1991) used the approach of Rogers (1962) to refine a set of variables to investigate the acceptance of technology. Various IS researchers found support for the predictive power and the validity of the proposed innovation characteristics (e.g., Agarwal & Prasad, 1997, 1998; Karahanna, Straub, & Chervany, 1999). Furthermore, the theory of Rogers (1962) provided a theoretical basis for technology acceptance research in the field of IS (Davis, 1989; Venkatesh et al., 2003).

The most prominent acceptance models are the Theory of Reasoned Action (Fishbein & Ajzen, 1975), the Social Cognitive Theory (Bandura, 1986), the Technology Acceptance Model (TAM) (Davis, 1989), the Theory of Planned Behavior (TPB) (Ajzen,

1991), the Model of PC Utilization (Thompson, Higgins, & Howell, 1994), the Motivational Model (Davis, Bagozzi, & Warshaw, 1989) and the Combined TAM and TPB Research Model (Taylor & Todd, 1995). The Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Venkatesh et al. (2003) combined the IDT of Rogers (2003) with the seven models mentioned above into a unified framework to investigate the acceptance of technology. As the TAM and the UTAUT are used as the theoretical basis by numerous investigations regarding financial technologies (e.g., Baptista & Oliveira, 2015; Lee, 2009; Mallat, 2007), these models are explained in the following part.

The TAM suggested by Davis (1989) based on the Theory of Reasoned Action and was originally tailored to predict the acceptance and usage of computer technology in organizational settings. The model theorizes that the effects of external variables such as system characteristics and development processes on the intention to use are mediated by the two variables “perceived ease of use” and “perceived usefulness” (Davis, 1989; Venkatesh & Davis, 2000). Davis (1989: 320) defined perceived usefulness as “the degree, to which a person believes that using a particular system would enhance his or her job performance”. Perceived ease of use is described as “the degree, to which a person believes that using a particular system would be free of effort” and is suggested to have a positive influence on perceived usefulness (Davis, 1989: 320). Both factors relate to the individual’s attitude towards using a technological system. Furthermore, they affect the behavioral intention, which then impacts the actual use (Davis, 1989). The perceived usefulness construct of TAM can be compared to the relative advantage construct of IDT and the perceived ease of use variable is comparable to the complexity characteristic of IDT.

As mentioned above, the UTAUT (Venkatesh et al., 2003) combined the TAM (Davis 1989), the IDT (Rogers, 1962) and six other established acceptance models of IS and sociological research in order to provide a unified theory to investigate the acceptance of IS technology. From the combination of eight theories, the UTAUT emerged and proposed four main constructs, namely “performance expectancy”, “effort expectancy”, “social influence” and “facilitating conditions” to predict the behavioral intention to use a certain technology (Venkatesh et al., 2003). Herein, performance expectancy was defined as “the degree to which an individual believes that using the system will help him or her to attain gains in job performance” (Venkatesh et al., 2003: 447).

Effort expectancy referred to the “degree of ease associated with the use of the system” (Venkatesh et al., 2003: 450). The variable social influence was described as “the degree to which an individual perceives that important others believe he or she should use the new system” (Venkatesh et al., 2003: 451). The fourth construct, facilitating conditions reflects “the degree to which an individual believes that an organizational or technical infrastructure exists to support use of the system” (Venkatesh et al., 2003: 453). The UTAUT with its four predictors was confirmed to outperform each of the eight original models by explaining nearly 70 percent of the variance of intention to use IS (Venkatesh et al. 2003). Furthermore, age, gender, experience and voluntariness of use were identified as crucial moderators (Venkatesh et al., 2003).

Research identified these models to provide a powerful basis to predict behavioral intentions to use new financial technologies such as mobile payment (MP) (e.g., Mallat, 2007; Schierz, Schilke, & Wirtz, 2010), mobile stock trading (e.g., Tai & Ku, 2013) or wearable technology (e.g., Gao, Li, & Luo, 2015; Wu, Wu, & Chang, 2016). However, the specific characteristics of financial innovations require an adjustment of the general IS models’ basic structure and a reconsideration of their relationships, which is consistent with the approach of other researchers in the financial domain (e.g., Baptista & Oliveira, 2015; Tai & Ku, 2013; Zhou, Lu, & Wang, 2010).

Although the TAM and the UTAUT provide valuable frameworks to investigate technology acceptance of IS innovations, the models have been criticized for being too parsimonious (Taylor & Todd, 1995; Venkatesh, Thong, & Xu, 2012). Alvesson and Kärreman (2007) note that new contexts can lead to significant changes in established theories, such as changes regarding the magnitude and salience of originally theorized relationships. Therefore, Venkatesh, Thong and Xu (2016) call for a contextual integration of UTAUT and emphasize the importance of showing how the model works differently in new contexts.

With the increasing integration of IS technology into everyday activities (Yoo, 2010) such as payment systems and self-tracking sports devices, IS users constantly disclose highly valuable personal information (Phelps et al., 2000). Consequently, it is vital to consider the data-related context of financial IS. Accordingly, an integration of privacy-related antecedents into established acceptance models is necessary. Privacy research indicates that privacy concerns of IS users have changed dramatically and pri-

vacy became a crucial antecedent of privacy-related behavior (Dinev et al., 2015; Kokolakis, 2017; Smith et al., 2011). It has also been shown that individuals are concerned about their privacy and cautious regarding the collection and use of personal information (Dinev et al., 2015; Grossklags & Acquisti, 2007), especially with regard to financial and health information (Lancelot Miltgen, Popovič, & Oliveira, 2013; Phelps et al., 2000). However, in contrast to most economic exchanges, individuals are usually not able to estimate the amount and economic value of privacy and personal data they disclose and pay with (Grossklags & Acquisti, 2007; Spiekermann, Acquisti, Böhme, & Hui, 2015). This begs the question if consumers are aware and concerned about the sensitive data they disclose when using financial IS such as mobile payment, social trading or fitness tracking devices.

In accordance with the neoclassical perspective, users are proposed to undertake an anticipatory, rational weighing of risks and benefits which comprise a set of elements in a calculus (Culnan & Armstrong, 1999; Dinev & Hart, 2006). In the context of privacy, this cost-benefit analysis is described as the “privacy calculus” (Culnan & Armstrong, 1999; Dinev & Hart, 2006). Transferring the privacy calculus to acceptance research, users weigh the risks of disclosing personal data against the economic or social benefits of innovation and decide to adopt or reject an innovation based on their personal calculus. Consequently, the consumers’ perception of security (research paper 1 and 3) and privacy concerns (research paper 4) have been introduced as vital antecedents of the intention to use financial innovations and embedded into the nomological structure of the TAM and the UTAUT. Herein, the previously validated variables of the TAM and the UTAUT serve as complementing beneficial variables (e.g., perceived usefulness, performance expectancy) and additional costs of effort (e.g., ease of use, effort expectancy). Instead of the TAM or the UTAUT, research paper 2 based on the “Antecedent -Privacy Concerns - Outcomes” (APCO) Model (Dinev et al., 2015; Smith et al., 2011), viewing privacy concerns as a dependent and independent variable of the proposed research model.

The adjustment of established IS models gains in importance considering Yoo's (2010: 215) perspective of experiential computing, addressing “digitally mediated embodied experiences in every activities through every artifacts with embedded computing capabilities”, such as paying with a smartphone at the point of sale. Yoo (2010) argues that the new generation of IS users, the “Digital Natives” (Prensky, 2001) will

use computing technology in a much broader context, such as in the context of mobile payment (research paper 1). Particularly the Digital Natives have spent their entire lives surrounded by IS technology, leading to significant changes in the perception of IS (Yoo, 2010). Yoo (2010) suggests that important issues of the past, such as user training with IS will become irrelevant for the generation of Digital Natives, indicating that effort costs will play a minor role in the decision-making process of technology adoption.

As a second objective, this dissertation based on the communication process postulated by Rogers (1962) and particularly on his classification of different adopter categories, namely (1) innovators, (2) early adopters, (3) early majority, (4) late majority and (5) laggards. Rogers (1962) applied the mean time of adoption of an innovation and the standard deviation to distinguish between different adopter groups. Accordingly, innovators adopt a new technology two standard deviations before the mean time of the entire adopters and represent the first 2.5 percent, followed by early adopters, who make up the next 13.5 percent (McDonald & Alpert, 2007). As the time-dependency and one-dimensionality of Rogers' (1962) definition has been doubted (e.g., Midgley & Dowling, 1978) and even called a purely statistical artefact (McDonald & Alpert, 2007), research paper 5 proposes a new classification approach of technological innovators and early adopters based on personal traits. Consequently, technological early adopters are characterized by a high level of technological innovativeness (Bruner, Kumar, & Heppner, 2007), independent decision making (Midgley & Dowling, 1978) and opinion leadership (Goldsmith & Witt, 2003). This adjustment of Rogers (1962) classification, based on personal characteristics, provides more predictive power and offers new insights into what is behind the action of adoption (McDonald & Alpert, 2007). Therefore, research paper 5 represents an essential contribution to research on the diffusion of technological innovations.

1.3 Objectives and Structure of the Dissertation

The objective of this dissertation is to contribute to a more profound understanding of the diffusion of financial IS based on Rogers' (1962) IDT. Therefore, this dissertation is divided into two parts, each dealing with the diffusion of innovations from a different perspective. Research paper 1 to 4 address the innovation-decision process postulated by Rogers (1962) and investigate the acceptance of financial innovations on the

micro-level of the individual IS user. Research paper 5 focuses on the macro-perspective and contributes to new insights on the communication process of technological innovations.

As mentioned above, the individual innovation-decision process is a crucial element in the diffusion process. According to Rogers (2003) the decision to accept or reject an innovation stretches from the first knowledge of an innovation (1) to forming an attitude (2) to deciding to adopt or reject the innovation (3) to implementing the new idea (4) to finally confirming the individual decision (5). The five steps, which occur in a time-ordered sequence involve information-seeking and information-processing activities and can lead to either adoption or rejection of an innovation (Rogers, 2003).

Research paper 1 to 4 endeavor to model the first three stages of the innovation-decision process postulated by Rogers (2003), as no valid actual user data was available. To stimulate an accurate decision-making process, the research papers make use of specifically designed questionnaires, which are structured according to the first three stages: (1) Knowledge, (2) Perception and (3) Decision. Consequently, potential consumers received information regarding the financial innovation and its functionality at the beginning of each questionnaire. This stage of the process is described as “the knowledge stage” (Rogers, 2003: 171). Subsequently, respondents were supposed to form an attitude towards the innovation and its corresponding characteristics, the so-called “perception stage”, before finally evaluating the intention to use or attitude towards using, which Rogers (2003) describes as the “decision stage”. Consequently, this dissertation provides valuable information regarding the innovation-decision process from stage one to stage three as a first objective.

Figure 1 illustrates the innovation-decision process with its five elements “(1) knowledge, (2) persuasion, (3) decision, (4) implementation and (5) confirmation” (Rogers, 2003: 20). Additionally, the figure includes the factors that have been used to form the acceptance models of research paper 1 to 4. The figure indicates that prior conditions, individual characteristics, innovation characteristics and different aspects of decision-making were included into this dissertation. As all the three selected financial innovations mobile payment, social trading and fitness tracking were in the initial stages of adoption, this dissertation focused on the first three stages of the innovation-decision process, which is also demonstrated by the box around the three stages in the graphic below.

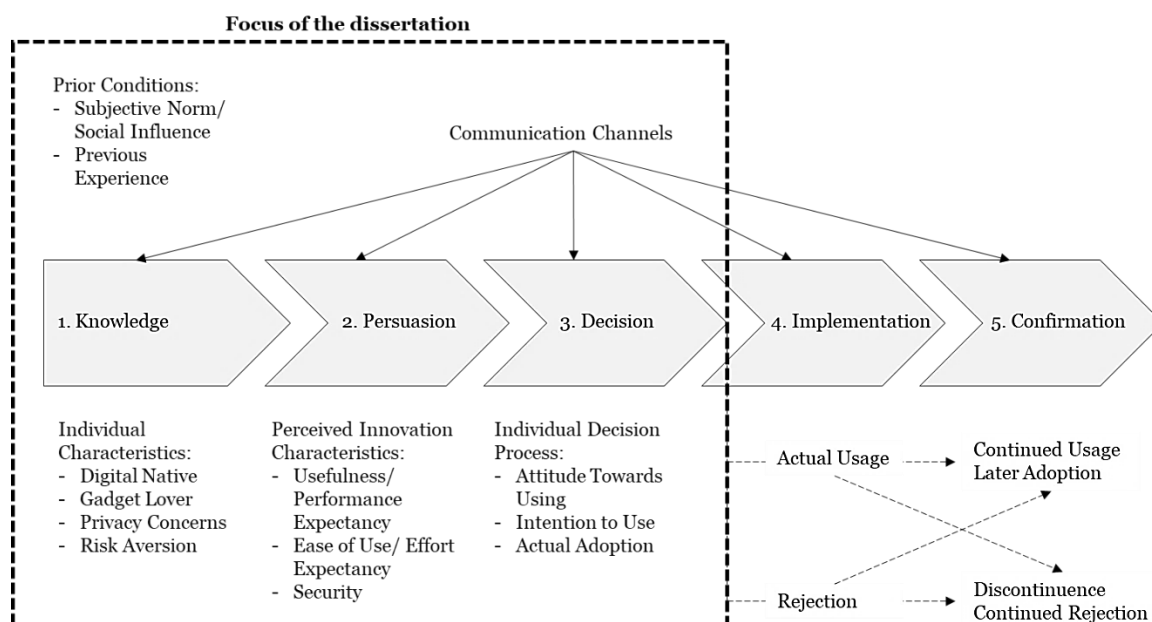


Figure 1. Classification of this dissertation, adapted from Rogers (2003)

The second objective of this dissertation focused on the communication process postulated by Rogers (2003) and its application to technological adoption. Therefore, research paper 5 classified potential technological innovators and early adopters, as these crucial consumer groups are likely to be the first target for marketers and practitioners in order to accelerate the diffusion process. Additionally, the paper compares the Internet usage behavior of the selected adopter group to the majority of the German population in order to provide recommendations for online targeting strategies, which has evolved into the most significant communication channel for novel technologies.

Figure 2 provides a comprehensive and simplified synoptic overview of the research papers and embeds them into their corresponding theoretical context. The figure illustrates a building, which should be interpreted by the reader from the bottom upwards, just like building a house. The Innovation Diffusion Theory postulated by Rogers (2003) forms the theoretical foundation of this building. The substructure is divided into two parts, the innovation-decision process as well as the communication process. The three acceptance models, namely the TAM, the UTAUT and the APCO model draw on the innovation-decision process and form the foundation for the research papers 1 to 4, which contribute to a context specific understanding of the innovation-decision process in the field the three innovations mobile payment, social trading and wearable fitness tracking. Research paper 5 is based on the communication process

postulated by Rogers (2003) and contributes to new insights regarding the communication process of technological innovations. Thus, the paper is not as context specific as research paper 1 to 4 and can be interpreted as a bigger block. Each paper contributes to a more holistic picture of the complex innovation-decision process and communication process.

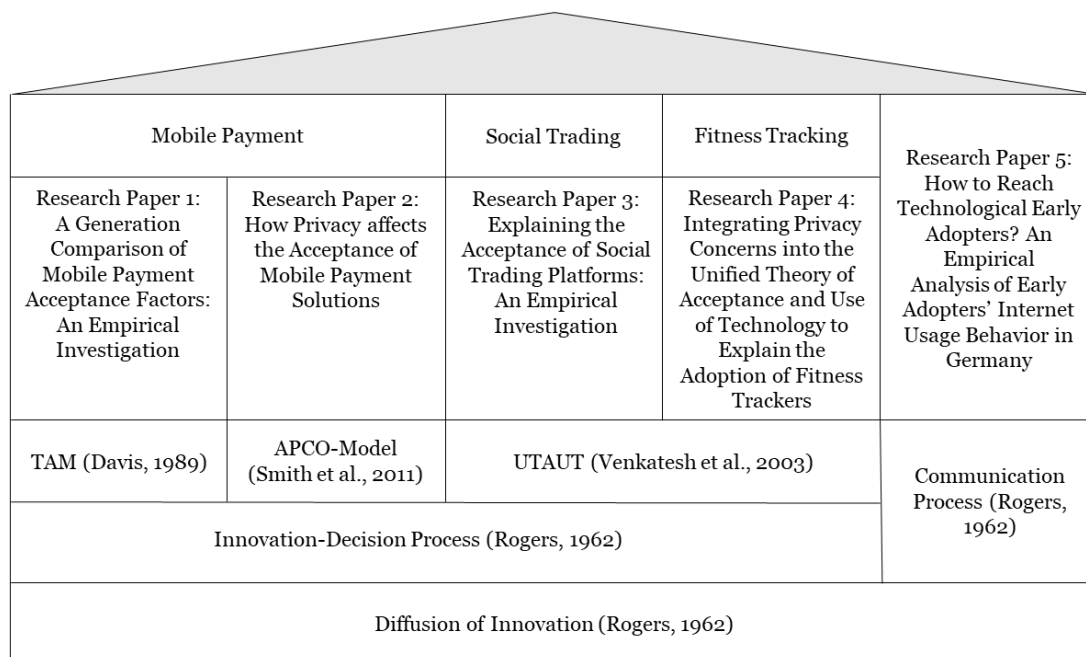


Figure 2. Overview of the included research papers

1.4 Methodology

To investigate the acceptance of financial innovations (research paper 1 to 4) as well as the Internet usage behavior of potential technological early adopters (research paper 5), a broad spectrum of statistical methods was applied in this dissertation. Due to the proposed research model in paper 1, a moderated multiple regression analysis as well as t-tests were used for the statistical analysis. Research paper 5 used a set of secondary data with some ordinal measurement scales. Therefore, nonparametric Mann-Whitney U tests and Welch tests (Welch, 1938) were applied to analyze group differences between technological early adopters and the majority of the German population. According to Fornell (1982), these statistical methods are called first-generation techniques.

To account for the more complex relationships proposed in research paper 2 to 4, structural equation modeling as a more sophisticated multivariate method, a so-called second generation technique was used (Fornell, 1982). As all the proposed hypotheses

based on existing and established theories, covariance-based structural equation modeling rather than partial least squares structural equation modeling was used as a confirmatory approach to validate the research models (Hair, Hult, Ringle, & Sarstedt, 2014).

Research paper 2 and research paper 4 propose indirect effects, in which a sequence of relationships with at least one intervening construct is involved (Hair et al., 2014). To account for the intervening process of mediators, a mediation analysis with bootstrapping was conducted, which was identified to be one of the most powerful methods to test for mediation (Hayes, 2013; Zhao, Lynch, & Chen, 2010). Additionally, research paper 2 and 4 validated the construct “privacy concerns” as a second-order latent reflective construct, which is consistent with empirical evidence of previous privacy research (Malhotra, Kim, & Agarwal, 2004; Xu, Gupta, Rosson, & Carroll, 2012). Consequently, privacy concerns were operationalized at a higher level of abstraction, which involved a sophisticated analysis of the second-order model structures.

Research paper 3 investigated the moderating effect of previous experience in trading on the strength of the relationships between antecedents and the intention to use social trading. To analyze differences between inexperienced and experienced potential users, a multi-group analysis approach was used. This advanced statistical technique considers relationships among all latent constructs, which is not commonly done by a moderated regression analysis (Homburg & Giering, 2001). Consequently, this dissertation employed a broad spectrum of first- and second-generation statistical methods, herein contributing to more precise results regarding the measurement of latent variables and constructs.

1.5 Conclusion, Limitations and Future Research

The overarching objective of this dissertation was to investigate the acceptance of the financial innovations with a particular focus on payment (mobile payment), investment management (social trading) and insurance (fitness tracking) from the perspective of the individual innovation-decision process as well as to identify potential adopters of technological innovations in the Internet as a possible target group. Consequently, the contribution of this dissertation to the field of IS and marketing is twofold: the first four research papers address recent innovations in the financial markets and propose

four acceptance models which included aspects of prior conditions, individual characteristics, innovation characteristics and different aspects of decision making. These investigations were based on individual decision-making processes and contribute to a deeper understanding of the factors that influence the consumer's intention to use innovative financial technologies from an IS perspective. Research paper 5 proposes a novel classification approach for technological innovators and early adopters and provides an overview of how this vital group of consumers uses the Internet. Hence, research paper 5 contributes to more profound results regarding the communication process of technology-affine user groups within the Internet and illustrates opportunities to accelerate the diffusion process of technological innovations.

The increasing integration of IS technology into the financial service sector has led to fundamental changes regarding the user's perception of financial IS. The ubiquitous usage of IS, combined with advanced processing capabilities in data storage and analysis, have led to an enormous rise in valuable personal data. The results of this dissertation indicate that these novel capabilities of IS technologies violate the structure of previous validated theories and underline the necessity to adapt established IS acceptance models through the integration of privacy-related aspects. The most remarkable result to emerge from this dissertation is that the influence of perceived security (research paper 1 and 3) and privacy concerns (research paper 4) was higher than the effect of effort costs on attitude (research paper 1) or intention to use (research paper 3 and 4) throughout all the financial innovations under investigation. Consequently, the results indicate that the originally used cost-benefit paradigm in the TAM should be reevaluated as it has been limited to the consideration of effort costs and did not consider other cost-related factors. The outcomes of this dissertation strengthen the privacy calculus theory and its application to enhance the TAM and the UTAUT with privacy-related antecedents of intention to use financial innovations. Furthermore, the results are consistent with the experiential computing perspective, indicating that fundamental aspects of technology acceptance research will lose relevance in the future due to the ubiquity of IS usage among Digital Natives. As illustrated in the included research papers 1, 3 and 4, effort-related costs are proposed to be less relevant than privacy-related costs when deciding to adopt financial innovations. This is an essential insight for the field of IS, as privacy-related antecedents have not been considered

appropriately by established acceptance research models. The results of this dissertation indicate a possible paradigm shift from effort-costs to privacy-related costs. This paradigm shift may lead to rendering the originally theorized relationship between ease of use and intention to use to be redundant, such as in the context of fitness tracking in research paper 4. Furthermore, the results of this dissertation are of vital importance for practitioners, such as banks, insurance companies, financial technology companies and other service providers and stakeholders in the sectors of payment, investment management and insurance. The collection, storage and usage of personal information to individualize products and services will become a major challenge for established financial institutions and an appropriate use of data will likely influence the market position in the highly competitive financial market. To change the perception of privacy concerns and the attitude of people towards self-disclosure of personal information, companies need to establish transparent and fair data protection declarations and privacy policies (Xu, Dinev, Smith, & Hart, 2008; Xu, Dinev, Smith, & Hart, 2011). Additionally, the establishment of functional cyber security systems is of vital importance, considering the high correlation between privacy risks and security aspects (Liu, Xiao, Li, Liang, & Chen, 2012). With increasing and more sophisticated cyber threats, investments in cyber security are recommended. Inadequate cybersecurity systems can lead to high damages regarding reputation and trust and should be avoided at all costs. With regard to the diffusion process, the salience of financial and privacy-related risks can be an explanation for the hesitant acceptance of the financial innovations “mobile payment”, “social trading” and “wearable fitness tracking devices” in Germany.

An additional result of this dissertation is that personality traits, such as “Digital Native”, “Digital Immigrant” and “gadget lover” can impact the consumer’s decision to adopt novel technologies and have so far lacked a comprehensive understanding within the scientific IS community. Research paper 2 has integrated the gadget loving concept into the privacy-related context of mobile payment and identified gadget lovers to show lower privacy concerns compared to other consumers. Consequently, targeting innovative consumers can be a meaningful strategy to accelerate the diffusion process. The integration of personality aspects into acceptance theory is in line with the IDT and highlights the importance of target group specific marketing strategies for the practice. To summarize, this dissertation combined the innovation-decision process and the

communication process in the context of privacy-related decision-making regarding financial innovations.

As with every research, the presented studies have limitations in terms of integrity, methodology or data validity. Each of the presented research papers provides a simplified and limited view of the reality and actual adoption behavior, which is a much more diversified and hardly measurable phenomenon. Due to the complex decision-making process of individuals, research in this area must be satisfied with a smaller selected focus on the decision-making process. Furthermore, this dissertation assumes that IS users are able to rationally weigh up the control of privacy and thus the ability to objectively evaluate the disclosure of data and its consequences in decision-making situation. This perspective was recently proposed to be inevitable in explaining actual behaviour, which is affected by the level of effort or peripheral cues and biases (Dinev et al., 2015). Another important limitation is the non-consideration of time in the innovation decision process. Actual decision-making and building of attitudes involve the dimension of time, which could not be considered in this dissertation. Future research could investigate decision-making in the context of actual real-world scenarios and try to control for time and other behavioural biases.

Regarding the methodology, all proposed relationships between the exogenous and endogenous variables and the corresponding implications draw on correlational rather than experimental results. Future research could employ a more controlled experimental approach to validate the results gained in this dissertation. The results of this dissertation could be strengthened by additional qualitative measures, the use of longitudinal research or mixed-method approaches. In addition, the quality of the data is limited as most of the included research papers used convenience sampling and students as a basis. Using actual data of payments, smartphone usage, social trading or fitness tracking could deepen the understanding and strengthen the results of this dissertation. Future research could also investigate other innovations in the financial markets, such as crowdfunding, crypto currencies, peer-to-peer lending or robo-advisory services. The proposed approaches, for instance the acceptance model of social trading (research paper 3) could provide a valuable basis for investigations of investment management innovations, such as robo-advisory or capital raising approaches, for instance crowdfunding.

The presented studies of this dissertation make a valuable contribution to the theory in

the field financial innovations and the communication process, albeit with limited generalizability for IS or other technologies. This research and the included papers should be understood as pieces of a puzzle, which contribute to an enhanced understanding of the holistic decision-making process under real conditions in a highly complex environment.

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2 Appendix

2.1 Index of Included Research Papers

This dissertation contains the following research papers:

Research Paper 1:

Fischer, M., Wömmel, A., Reith, R., & Lis, B. 2017. A Generation Comparison of Mobile Payment Acceptance Factors: An Empirical Investigation. In *Proceedings of the 25th European Conference on Information Systems (ECIS)*: 2395–2412. Guimarães, Portugal.

(VHB JOURQUAL 3: Category B)

Research Paper 2:

Reith, R., Buck, C., Walther, D., Lis, B., & Eymann, T. 2019. How Privacy Affects the Acceptance of Mobile Payment Solutions. In *Proceedings of the 27th European Conference on Information Systems (ECIS)*: ISBN 978-1-7336325-0-8. Stockholm & Uppsala, Sweden.

(VHB JOURQUAL 3: Category B)

Research Paper 3:

Reith, R., Fischer, M., & Lis, B. 2020. Explaining the Acceptance of Social Trading Platforms: An Empirical Investigation. *Journal of Business Economics*, 90: 427-460.

(VHB JOURQUAL 3: Category B)

Research Paper 4:

Reith, R., Buck, C., Lis, B., & Eymann, T. Integrating Privacy Concerns into the Unified Theory of Acceptance and Use of Technology to Explain the Adoption of Fitness Trackers. *Under submission to a peer reviewed Journal*

A previous version of this submission is published in:

Reith, R., Buck, C., Lis, B., & Eymann, T. 2020. Tracking Fitness or Sickness - Combining Technology Acceptance and Privacy Research to Investigate the Actual Adoption of Fitness Trackers. In *Proceedings of the of the 53rd Hawaii International Conference on System Sciences*: 3538–3547. Maui, Hawaii.

(VHB JOURQUAL 3: Category C)

Research Paper 5:

Reith, R., Fischer, M., Lis, B. 2020. How to Reach Technological Early Adopters? An Empirical Analysis of Early Adopters' Internet Usage Behavior in Germany. *International Journal of Innovation and Technology Management*, 17

(VHB JOURQUAL 3: Category C)

2.2 Research Paper 1: “A Generation Comparison of Mobile Payment Acceptance Factors: An Empirical Investigation”

Authors: Fischer Maximilian, Wömmel Arna, Reith Riccardo, Lis Bettina

Published in: *Proceedings of the 25th European Conference on Information Systems (ECIS)*. 2017: 2395–2412. Guimarães, Portugal. (VHB JOURQUAL 3: Category B)

Abstract: Many unsuccessful initiatives for establishing technological solutions of mobile payment (m-payment) services in stationary trade have been detected in the past few years. Therefore, following research deals with possible explanations for insufficient diffusion. A lack of research was analyzed by investigating the moderating effect of being a Digital Native (DN) or Digital Immigrant (DI) regarding technological factors influencing the attitude towards using m-payment systems. Our findings deepen the understanding of consumers’ needs and personal characteristics in the adoption of m-payment technology. The theoretical basis is built on a modified TAM and Prensky’s (2001) cultural generation concept. Hence, the technical field of m-payment is connected to a theory of identity. The study results displayed a greater degree of technological affinity concerning all factors examined in the group of DNs. By using a moderated regression analysis, we verified the negative influence of perceived security and risk having a significantly stronger effect on the attitude of DIs. Additionally, further results confirm the enormous importance of security in innovative payment processes. The results reinforce the importance of a target group-specific communication of an easy and secure payment-transaction to DIs. Furthermore, divergence of former research could be explained through the results of our cultural approach.

2.3 Research Paper 2: “How Privacy Affects the Acceptance of Mobile Payment Solutions”

Authors: Reith Riccardo, Buck Christoph, Walther Dennis, Lis Bettina, Eymann Torsten

Published in: *Proceedings of the 27th European Conference on Information Systems (ECIS)*. 2019: ISBN 978-1-7336325-0-8. Stockholm & Uppsala, Sweden. (VHB JOURQUAL 3: Category B)

Abstract: The rising need of mobility and convenience in payment processes has even forced traditional banking institutions to establish mobile payment (MP) applications in Germany. However, the breakthrough of this promising technology has not yet been realized. This raises the question about the negative effects of barriers, such as the companies’ storage and usage of personal data resulting in consumers’ privacy concerns. As research on MP calls for the integration of new models, this study aims to be the first to establish an APCO-model for the field of MP, thereby filling an essential research gap. Consequently, our model empirically validates privacy concerns and investigates its antecedents and predictive power to explain the intention to use MP systems. We additionally examined the barely studied effects of privacy concerns on risks as well as benefits. To give target-oriented recommendations, we included the theory of the diffusion of innovation and the factor “gadget loving” in our model. The results of our investigation underline the vital role of privacy concerns in the acceptance of MP and imply recommendations for the design of further research as well as an appropriate marketing communication of MP solutions.

2.4 Research Paper 3: “Explaining the Acceptance of Social Trading Platforms: An Empirical Investigation”

Authors: Reith Riccardo, Fischer Maximilian, Lis Bettina

Published in: *Journal of Business Economics*. 2020, 90: 427-460
(VHB JOURQUAL 3: Category B)

Abstract: The enormous rise of financial technology companies has greatly challenged traditional financial institutions. One emerging innovation is “social trading” (ST), which combines the advantages of social networks and delegated trading. ST platforms represent a unique context of social media platforms, on which the impact of social influence on the potential customer’s intention to use is not well understood. Moreover, researchers and practitioners lack an understanding of the moderating role of the consumer’s previous experience regarding security trading. As research in the field of ST is rather young, our study aims to be the first to address these research gaps by developing and empirically validating a model from the potential customer’s perspective. We based our framework on the Unified Theory of Acceptance and Use of Technology and theory regarding social media and financial decision-making. Our results illustrate that performance-related aspects are the dominant determinants of behavioral intention for experienced users, whereas system-related and personal barriers affect behavioral intentions of the inexperienced group. Consequently, differences regarding performance expectancy, effort expectancy, security and risk aversion were identified. Our results indicate that current platform operators’ advertising approaches of communicating the simple functionality of the platform seem inappropriate to meet the consumer’s needs.

2.5 Research Paper 4: “Integrating Privacy Concerns into the Unified Theory of Acceptance and Use of Technology to Explain the Adoption of Fitness Trackers”

Authors: Reith Riccardo, Buck Christoph, Lis Bettina, Eymann Torsten

Published in: *Proceedings of the 53rd Hawaii International Conference on System Sciences (HICSS)*. 2020: 3538–3547. Maui, Hawaii. (VHB JOURQUAL 3: Category C)

Submitted to: Under submission to a peer reviewed Journal

Abstract: Fitness tracking devices can be worn on the body, interact with multi-sensor platforms on the Internet of Things and collect data about daily activities, exercises and vital physical information. Consumers’ self-tracking of personal fitness information will enable various stakeholders to analyze and utilize highly sensitive personal data. Therefore, fitness tracking represents a unique context where the user’s everyday lives and physical activities are digitally mediated by the usage of information technology.

According to the privacy calculus theory, consumers are likely to disclose personal data by using fitness trackers if the perceived benefits of disclosure are at least balanced or greater than the concerns associated with the disclosure of individual information. Within our study, we aim to reconsider the Unified Theory of Acceptance and Use of Technology (UTAUT) from the perspective of privacy and gain new insights about the role of privacy concerns and social norms in the context of fitness tracking. Based on the privacy calculus perspective, the original construct “facilitating conditions” of UTAUT was replaced through “privacy concerns”. Consequently, we propose a direct relationship between privacy-related facilitating conditions and the intention to use fitness tracking devices. Herein, the variables of UTAUT serve as complementing beneficial components of the consumer’s perceived privacy concerns arising from the adoption of fitness tracking.

We empirically validated the proposed research model by using structural equation modeling. The results underline the vital role of privacy concerns as a predictor of the intention to use fitness tracking and support their integration into the nomological

structure of the UTAUT. However, the negative effect of privacy concerns on the intention to use fitness tracking is compensated by the strong positive effects of performance expectancy and social influence. Interestingly, social influence showed the strongest correlation with the intention to use fitness tracking, indicating that the growing social pressure of living healthy and responsible is the most important driver of the consumer's intention to use fitness tracking devices. Additionally, effort expectancy did not demonstrate a significant effect on intention.

The proposed research model enhances the privacy calculus theory and takes a new look on established acceptance research through the lens of privacy. With the perspective of the privacy calculus, the proposed research model accounts for functional and social benefits as well as effort and privacy-related costs of fitness tracking. The results reveal that Digital Natives consider effort expectancy to be a necessary but not sufficient component for the acceptance of fitness tracking. Therefore, the originally used cost-benefit paradigm to explain the integration of ease of use in Technology Acceptance Model should be reevaluated. For Digital Natives, the paradigm may have shifted from the costs of effort to the privacy-related costs, as proposed by the privacy calculus perspective and the results of our study. For practitioners, the outcomes of our study indicate that establishing a compelling marketing message to alleviate the privacy concerns among current users and potential customers is crucial. A content analysis of the websites of the five biggest providers of fitness tracking devices in Germany revealed that privacy-related or data security issues lack communication.

2.6 Research Paper 5: “How to Reach Technological Early Adopters? An Empirical Analysis of Early Adopters’ Internet Usage Behavior in Germany”

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Abstract: Early adopters (EAs) represent a crucial group of consumers in the diffusion of innovations. Therefore, reaching potential technological EAs for up and coming innovations is of vital importance. However, little is known as to how potential EAs for new technologies use the Internet. Our study examines the Internet usage of EAs in comparison to the general public and gives an overview of 15 different channels. Consequently, we classified EAs and analyzed a vast set of data containing 119,829 subjects. The results demonstrate significant differences between EAs and the remaining population and offer marketers new insights into EAs’ Internet usage behavior.