

Just send me a **payment request**.

What factors determine the behavioral intention to use P2P payment applications?

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Abstract

A cashless society, in which cash payments would become obsolete and the only form of payment would be cashless, through smart phones or debit/credit cards. A transition towards such a society is dependent on the adoption of several payment innovations, such as P2P payment applications. This thesis therefore explores the factors relating to the behavioral intention and eventually the actual use of these applications as perceived by Dutch people, a survey was conducted consisting of 307 participants. The results of this survey were analyzed using linear regression. The results show that the perceived usefulness and perceived trust have a positive effect on the behavioral intention to use P2P payment applications and that resistance to change has a negative effect on the behavioral intention to use P2P payment applications. The perceived trust is positively affected by the perceived security and the perceived privacy. Age moderated the effects of the resistance to change and the perceived ease of use on the behavioral intention. Gender moderated the effect of the perceived usefulness on the behavioral intention. This thesis provided insights into the factors that contribute to the behavioral intention and actual use of P2P payment applications which could benefit providers of such applications as well as society as a whole.

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Chapter 1: Introduction

A cashless society, a world in which people will stop using cash to make payments and will solely use electronic forms of payments, an ideal world or just a utopia? The idea of a cash-free society has been existing for over 50 years, Reistad (1967) proposed the idea of a society in which people did not have to carry cash or checks, but instead could pay electronically using identification cards which were linked to bank accounts.

Nowadays it is hard to imagine a world without money, but there used to be a time where people would have to trade goods to get food, clothes or other things. A so-called barter or trading system, which had the huge limitation that it was not always possible to trade the right things since people had differing needs (Patel & Amin, 2012). A commodity, which is a basic item used by almost everyone (Patel & Amin, 2012), provided a solution. At first, things like, salt, tea or shells were used as a commodity but the inconvenience of this system lead to a commodity that was lightweight, low in volume and represented a form of value: the use of coins and later banknotes (Patel & Amin, 2012). The use of cash as we know it today was born.

Cash remains important in several countries but electronic payment systems, in particular, mobile payment systems, gain awareness and customer acceptance due to the high penetration rate of mobile phones (Khan & Craig-Lees, 2009). The most used forms of cashless payment options in the Netherlands are the ATM/debit card, or so-called: 'pinpas', and the credit card. Another prevalent form of payment is the use of mobile payment applications to transfer funds, between businesses and consumers or between consumers. Applications that assist the use of mobile payments are called P2P payment applications, such applications generate links which people can send to others, which enables them to transfer funds directly through a mobile payment. This use of mobile payments will be further highlighted in this thesis, in the form of mobile Peer-2-Peer payment applications.

The emergence of these cashless payment options enhances the probability of a transition towards a cashless society. The cashless society is defined as 'a society that has moved beyond cash, by storing and exchanging currency in digital form' (David & Gantori, 2018 p. 8). Cashless transactions include 'digital forms of exchanging money, including innovations like mobile payments but also credit/ debit cards, whereas cash transactions are made in physical coins and banknotes' (David & Gantori, 2018 p. 8).

The Netherlands has the potential to become a cashless society, since almost everyone in the Netherlands has a debit card, also in 2019 93% of the Dutch population had a smartphone (Deloitte, 2019), and the overall cash use has been declining, reports from April 2019 show that only 32% of the total transactions are done using cash (Central Banking, 2019). One of the fastest growing online payment methods in the Netherlands is the use of Ideal; a money transferring application. In 2019, seven out of ten iDeal payments were done from a smartphone or tablet (Turchenko, 2019). The growth of iDeal payments is mostly due to the increasing popularity of mutual mobile payments between consumers in the Netherlands (Turchenko, 2019), so called P2P payment applications. Tikkie is one of the most popular applications, in the Netherlands, to exchange money between consumers.

P2P payment applications thus have the potential to make the Netherlands move towards a cashless society. The transition towards a cashless society, depends on complementing innovations (Markard, 2012), like these P2P payment applications. That is why this particular payment method will be researched in this thesis.

This thesis aims to investigate this perceived acceptance of P2P payment applications, using the technology acceptance model (TAM) by Davis (1989) which is used in earlier research to measure the acceptance as perceived by participants towards new products or services. The TAM is a model that explains the factors that lead to the behavioral intention to use a certain product or service, the model consists of two concepts; the perceived usefulness and the perceived ease-of-use. The perceived usefulness is the added value of a product or service, to what extent using or engaging in it will lead to a positive use-performance relationship (Davis, 1989). The perceived ease-of-use refers to the effort it takes to use a new product or engage in a new service (Davis, 1989).

This model will be extended in this thesis with the concept of dispositional resistance to change and the concept of trust. The dispositional resistance to change is the avoidance of attitudes or behavior that foster change (Oreg, 2011). P2P applications alter the regular way of making payments, which gives reason to believe that the resistance to change of people could hinder the adoption of the applications. "Trust is a defining feature of most economic and social interactions in which uncertainty is present" (Pavlou, 2003 p. 106). Trust can be explained by two concepts, perceived security and perceived privacy. The perceived security can be

described as a threatening circumstance, condition or event, to data or network resources (Kalakota & Whinston, 1997). The perceived security thus refers to the perceived safety of a transaction or data. The perceived privacy can be defined as the possibility that companies collect data about individuals and use them inappropriately (Jarvenpaa & Toad, 1996). Since electronic payment systems generally are perceived as being less secure and less private as alternative forms of payment like cash, the adoption of P2P payment applications could be affected by the perceived privacy and security.

The research question that will be central in this thesis is the following: What factors determine the behavioral intention to use mobile P2P payment applications? These insights will be gathered using a quantitative research method, namely surveys. These surveys will be used to collect data that will show the most important determinants of the behavioral intention to use P2P payment applications. This form of data collection provides data that can be analyzed to indicate the weights of each indicator and provide a clear and strict answer to the research question central to this thesis.

The theoretical relevance of this thesis is the integration of theory. The TAM has never been applied, in the way that is presented in this thesis. The extension of the model with two new concepts could provide new insights into the working of these concepts, that are all tested in prior research, with their effects on the TAM, but never together in one framework.

The practical relevance is the creation of insights towards the perception of P2P payment applications and the most dominant values regarding this perception. These insights can provide guidelines to banks and providers of P2P payment applications to foster the adoption of P2P payment application. These insights can also foster a transition towards a cashless society.

This paper will continue as follows, first of all, the theories that are used in this thesis will be highlighted, including the technology acceptance model and the corresponding extensions. Following these theories and extensions a conceptual model will be presented. Secondly, the methodology will be explained. Based upon the outcome of this methodology and the corresponding survey, the results will be presented and eventually a conclusion, a discussion and the limitations of this thesis will be presented along with suggestions for future research.

Chapter 2 Theoretical Framework

In order to assess the research question proposed in the previous chapter, several theories will be discussed in this chapter. The behavioral intention and actual use of a certain innovation has been explained by the Technology Acceptance Model by Davis (1989), which consists of the perceived usefulness and- ease-of-use of an innovation. To better understand the behavioral intention to use P2P payment applications as is mentioned in the first chapter, several theories are added to this model.

Adopting new innovations can cause a certain degree of change in people's lives, people can have a certain degree of resistance to change. Oreg (2011) proposed a concept referred to as the dispositional resistance to change. To decide whether an innovation will benefit the life of a person, benefits are usually weighted against risks or other disadvantages that come along with the adoption of an innovation. Resistance to change, could thus potentially have an influence on adoption of P2P payment applications, for this reason the concept of dispositional resistance to change is added to the TAM and is discussed in this chapter. The more trust a person has in a transaction that goes along with using a product or service, the lower the perceived risks will be. Trust is influenced by the perceived security and privacy, the more secure and private a transaction is perceived to be, the higher the trust in such an innovation will be. Since the adoption of P2P payment applications depends on trust in the applications, these variables will be added to the conceptual model.

The underlying theories of all the mentioned theoretical constructs will be further discussed in this chapter, at the end of the chapter a conceptual model will be presented.

2.1 Technology acceptance model (TAM)

The acceptance or behavioral intention to use a certain product/service has been researched by Davis (1989). In order to understand the behavioral intention to use P2P payment applications, this theory is taken as a starting point.

The technology acceptance model or TAM consists of two theoretical constructs that influence the user behavior of information technology systems. The first construct is the perceived usefulness. The perceived usefulness is defined by Davis (1989 p. 320) as "the degree to which a person believes that using a particular system would enhance his or her job performance".

The perceived usefulness will be defined in this thesis as: “the degree to which a person believes that using P2P payment applications will enhance the way that person makes transactions”. A system that has a high perceived usefulness is one which leads to a positive usage-performance relationship as perceived by the user (Davis, 1989). There is evidence that the perceived usefulness has a positive effect on the behavioral intention to use innovations (Oh & Yoon, 2014; Diop, Zhao & van Duy, 2019; Stal & Paliwoda-Pękosz, 2019).

The second important determinant is the perceived ease-of-use. The perceived ease-of-use is defined by Davis (1989, p. 320) as “the degree to which a person believes that using a particular system would be free of effort”. The perceived ease-of-use will be defined in this thesis as: “the degree to which a person believes that using P2P payment applications will be free of effort”. The TAM is an extensively used model to explain technology acceptance behaviors regarding different kinds of information technology aspects (Chen & Adams, 2005). The TAM has also been used for other applications, such as mobile payment systems and numerous other e-commerce related researches (Chen & Adams, 2005). There is evidence that the perceived ease-of-use has a positive effect on the behavioral intention to use innovations (Oh & Yoon, 2014; Diop, Zhao & van Duy, 2019; Stal & Paliwoda-Pękosz, 2019)

Furthermore, Peng, Xiong and Yang (2012) found that the perceived ease-of-use and perceived usefulness of mobile payment systems in tourism positively influenced the behavioral intention to use the systems. Schierz, Schilke and Wierz (2010) also found this relationship to be existing in the context of mobile payments in general. Leive, Climent and Cabinallas (2017) also found that the perceived ease-of-use and perceived usefulness positively influenced the behavioral intention to use mobile payment applications. Ooi and Tan (2016) also showed that the perceived ease-of-use of mobile credit cards and the perceived usefulness of mobile credit cards positively influenced the behavioral intention to use the credit cards.

The perceived usefulness can thus be considered to be an important part of the behavioral intention to use P2P payment applications, since in order to use a certain innovation a person should consider the innovation as being useful. Also, in order for individuals to start using a P2P payment application, the innovation should be considered to be easy to use and operate. When an innovation is perceived to be complex and difficult to operate, the usage intention will be lower. To sum up, the perceived usefulness and ease-of-use could strongly influence the behavioral intention to use P2P payment applications.

Based on prior research the following two hypotheses will be made with regards to the technology acceptance model and the behavioral intention to use P2P payment applications:

H1: The perceived usefulness of P2P payment applications has a positive effect on the behavioral intention to use P2P payment applications.

H2: The perceived ease-of-use has a positive effect on the behavioral intention to use P2P payment applications.

The items concerning the first variable perceived usefulness were derived from the research of Mangin, Porrai, Bourgault and Mesley (2014). The items were altered for the purpose of this thesis. These items will measure to what extent an individual will perceive P2P payment applications to be a useful addition to the life of the person. The first item relates to the time that will be saved when using a P2P payment application and will be phrased as follows: *You save time when you pay using a P2P payment application.* The second item concerns the usefulness of paying with a P2P payment application and is phrased as follows: *Paying with a P2P payment application is easy.* The third item relates to the efficiency of paying with a P2P payment application and is phrased as: *P2P payment applications allow me to pay more efficiently.*

The items relating to the ease-of-use were derived from Mangin, Porrai, Bourgault and Mesley (2014) and one item was derived from the work of Weng, Yang, Ho & Su (2018). The items were altered for the purpose of this thesis. These items will measure to what extent an individual will perceive P2P payment applications to be easy to use and understandable. The first item relates to the flexibility of paying with a P2P payment application and will be phrased as follows: *Using P2P payment applications is more flexible than traditional means of payment.* The second item concerns the easiness of paying with P2P payment applications and is phrased as follows: *It is very easy to pay with P2P payment applications.* The third item relates to the complexity of understanding P2P payment applications and is phrased as: *P2P payment applications are easy to understand.*

2.2 Intention to Use and Actual Use

The TAM, which is discussed earlier, states that the behavioral intention to use and the actual use are predicted by the perceived ease-of-use and perceived usefulness. The TAM is derived from the theory of reasoned action model by Fishbein and Ajzen (1975). Intention to use stems from the behavioral intention concept introduced by Fishbein & Ajzen (1975). Behavioral intention (BI) is defined as “a person’s subjective probability that he will perform some behavior” (Fishbein & Ajzen, 1975). For the purpose of this thesis, behavioral intention will be defined as a person’s subjective probability that he/she will use P2P payment applications. The authors (Fishbein & Ajzen, 1975) argued that a certain behavior can be predicted by the intention to perform that particular behavior. The actual use of an innovation is thus caused by the behavioral intention to use a that innovation. The actual use will be defined for the purpose of this research as: the actual use of P2P payment applications. Multiple authors have validated this relationship. Mckenna, Tuunanen and Gardner (2014) showed that the behavioral intention to use location-based mobile services had a very strong and positive relationship to usage behavior. Next to that, Yun, Han and Lee also showed that the intention to use influenced the actual use of location-based services in Korea. Venkatesh, Thong and Xu (2012), indicated that the usage of mobile internet technology in Hong Kong, was strongly predicted by the intention to use that technology. Alalwan et al. (2018), showed that the intention to use mobile internet by customers from Saudi-Arabia had a positive effect on the actual use. Several other authors have found the relationship between intention to use an innovation and the actual use of that innovation to have a significantly positive relationship (Shin, 2009; Sharma & Sharma, 2019; Zhou, 2011; Mbogo, 2010; Mohd Suki & Mohd Suki, 2017).

Following prior research, the following hypothesis will be formulated:

H3: The behavioral intention to use P2P payment applications has a positive effect on actual use of P2P payment applications.

The items relating to the behavioral intention to use P2P payment applications are derived from the work of Aslam, Arif and Ham (2017). The items have been altered for the purpose of this thesis. The first item relates to the intention to use P2P payment applications whenever the opportunity arises and is phrased as: *I intend to use P2P payment applications if the opportunity arises*. The second item concerns the likeliness of usage of P2P payment applications in the near future and is phrased as: *I am likely to use P2P payment applications, in the near future*.

The item relating to the actual use of P2P payment applications will be singular and will concern the actual usage P2P payment applications and will be formulated as: *I use P2P payment applications*. Next to this item, the respondent is also asked which applications he/she uses.

2.3 Dispositional resistance to change (RTC)

The adoption of P2P payment applications will depend on changes in user's behavior, these changes are not seen as desirable by everyone. There are people that accept change and even search for change, and some people avoid and even try to resist change (Oreg *et al.*, 2008). The people that are highly resistant to change, experience negative emotional reactions like, fear or anxiety towards change (Saruhan, 2013). People with a high resistance to change are therefore less likely to incorporate change into their lives (Oreg, 2006).

Theories such as the TAM consider behavioral intention to adopt technology as a result of positive perceptions, such as the perceived usefulness and the perceived ease-of-use (Davis, 1989). The dispositional RTC has been used as a negative variable which resists consumers from adopting information technologies or other innovations (Sanford & Oh, 2010). The dispositional resistance to change refers to: "an individual's personal inclination to resist changes" (Arcieniega, 2017, p. 2). The dispositional resistance to change will be defined for the purpose of this thesis as: an individual's personal inclination to resist using P2P payment applications.

Oreg (2003) proposed a resistance to change scale, which combines institutional determinants of resistance to change (Hannan & Freeman, 1984) with psychological processes underlying resistance (George & Jones, 2001). This scale consists of 4 parts, namely, routine seeking, emotional reaction, short-term focus and cognitive rigidity. However, Nov & Ye (2008) stated that when trying to predict behavior in a certain context, it is advised to use narrow and specific traits, since they would yield stronger relationships than those found with more general traits. Apart from this, there is only marginal earlier research done which combines the more general RTC scale with the adoption of innovations. For these reasons, the general RTC scale will not be used in this thesis.

Oreg (2003) has proposed an alternative scale, the dispositional domain specific RTC scale, which consists of four items, based on the four parts of the original RTC scale. This alternative

scale thus offers a narrow and specific way of measuring an individual's resistance to change. Oreg (2003) recommended that the dispositional RTC scale can be used within the context of new product adoption behavior, since resistance to try new products is considered to be a significant obstacle for most companies who attempt to introduce new products. The domain specific dispositional RTC scale is tested and used by several authors to explain the intention to use innovations (Nov, Schecter, 2012; Nov & Ye, 2008; Nov & Ye, 2009; Oreg, 2003; Oreg, 2006; Laumer & Eckhardt, 2010; Sanford & Oh, 2010).

Nov and Ye (2008) used the RTC scale to show that the dispositional RTC influenced the perceived ease-of-use and Nov and Ye (2009) showed that the dispositional RTC also had an influence on the adoption intention of digital libraries. Their findings suggested that individuals with a high RTC perceived the use of digital libraries to be more difficult and simultaneously adopted digital libraries later than individuals with a low dispositional RTC (Oreg, Goldenberg & Frankel, 2005). Nov and Schecter (2012) found a significant effect of the resistance to change on the perceived ease-of-use. Oreg (2003, study 6) researched the willingness of university instructors to adopt a new online course management system. The higher the dispositional RTC of the participants was, the later they adopted the new online course management system. Knowing the dispositional orientation of individuals towards change can thus help predict the extent to which innovations will be resisted. Some people are disinclined towards change and innovation because they like their routines (Oreg, Goldenberg & Frankel, 2005). Furthermore, other authors have found this relationship to be positively and significant (Rizzuto, Schwarz & Schwarz, 2014; Mzoughi & M'Sallem, 2013) Based on this information the TAM model that is provided earlier will be extended with the dispositional resistance to change and the following hypotheses will be formulated:

H4a: The dispositional resistance to change towards P2P payment applications has a negative effect on the behavioral intention to use P2P payment applications will be.

H4b: The dispositional resistance to change towards using P2P payment applications has a negative effect on the perceived ease-of-use of P2P payment applications.

The items that will be used in the questionnaire to address the effect of dispositional resistance to change towards using P2P payment applications are derived from Nov & Ye (2009), which were based on the items as proposed by Oreg (2005). The items have been altered to fit with the research that is conducted in this thesis. The first item concerns the extent to which an

individual would start using other payment methods even though the person is familiar with a specific payment method and is phrased as: *I generally prefer to use a payment method with which I am familiar with over starting to use a new payment method*. The second item relates to the excitement that derives from trying a new form of payment by an individual and is phrased as follows: *I find it exciting to try out new payment methods*. The third item relates to the feeling an individual gets from trying out new payment methods: *I often feel a bit uncomfortable to try out new payment methods, even though it may be beneficial to me*. The fourth, and last, item concerns the switching behavior of individuals concerning payment methods and is phrased as: *Once I've started using a certain payment method, I'm not likely to switch*. The items thus all relate to the extent to which individuals will be resistant or open to changes of payment methods. The P2P payment application is a kind of payment method and would thus depend on the openness of consumers to change their current payment behavior and to try out a new method of paying.

2.4 Trust

The element of trust plays a role in all transactions and trust is even more important when they are conducted in an uncertain environment (pavlou, 2001). Trust is considered to be of great importance in e-services, such as P2P payment applications, because the degree of uncertainty during transactions makes the user or consumer more vulnerable in this environment (Roca, Garcia & de la Vega, 2009). Tsiakis & Sthephanidis (2005) even stated that trust of participants in electronic money transferring systems is a fundamental prerequisite. Online transactions and mobile transactions involve risks, like the possibility of thefts of data or fraud, the construction of mobile user trust is thus critical (Varnali & Toker, 2010).

Confidence is a concept that relates and is perceived to be similar to trust, to clearly define trust, the difference between trust and confidence will be explained. Trust and confidence both support cooperation, but whereas confidence is based on a specific performance criterion, trust is more freely, the party that is trusted is free to act as long as it meets the expectations of the trusting party (Earle & Siegrist, 2006). Prast, Mosch & van Raaij (2005) define confidence as having faith in the development and the future, like having faith in the economy. Trust is defined as having faith that a person, organization, system or institution will not handle out of his/its own interest and will not exploit the interest of the trusting party (Prast, Mosch & van Raaij, 2005). In the case of P2P payment applications, the expectations that people have are not specific or based on any criterion, the expectations also do not relate to a desired future. The

individual needs to trust the provider of a P2P payment application to correctly handle transactions and the individuals' data. For this reason, trust will be a variable that is used in this thesis.

Mayer, Davis and Schoorman (1995, p. 179) define trust as “the desire of one of the parties of being vulnerable to the actions of another party based on certain expectations of how the second party, to which the trust is directed, will act in a given situation” (Ramos, Ferreira, de Freitas, Rodrigues, 2018). Luhmann (1979) defined trust as the belief that one will react in a predictable manner. Pavlou (2003) described trust as “the belief that the other party will behave in a socially responsible manner, and, by so doing, will fulfill the trusting party's expectations without taking advantage of its vulnerabilities” (*Pavlou, 2003 p. 106*). Trust is thus considered to consist of predictability or meeting expectations. In this thesis, trust will be defined as, the belief of an individual that the providers of a P2P payment application will behave in a responsible manner, and by doing so, will fulfill the individuals' expectations without taking advantage of its vulnerabilities.

Trust has been extensively used as a determinant of intention to use mobile-based innovations. Bhattacharjee (2002) found trust to have a positive effect on someone's willingness to conduct transactions with an online bank. George (2002) researched trust in relationship with the attitude regarding internet purchasing and found a positive relationship. Ramos, Ferreira, Freitas and Rodrigues (2018) found that the amount of trust positively affects the intention to use mobile banking. Chiu, Bool and Chiu (2017) found that the perceived trust in mobile banking services in the Philippines had a positive effect on the adoption intention of mobile banking services. Lack of trust in online business is one of the main reasons for customers to resist engaging in commercial transaction on the web (Hoffman et al., 1999). Therefore, the feelings of trust in an e-service, such as the services provided by P2P mobile applications, are an important determinant in considering individuals intention to use an e-service like a P2P mobile payment application (Roca et al., 2009). Several other authors have found significantly positive relationships between trust and the behavioral intention to use innovations (Lu, Yang, Chau & Cao, 2011; Gu, Lee & Suh, 2009; Esmaili, Desa, Moradi & Hemmati, 2011; Faqih, 2016; Cho & Sagynov, 2015; Sung Hee, 2014).

The behavioral intention to use the researched payment method in this thesis, the P2P payment application also relies on trust. Therefore, the following hypothesis will be made with regards to trust in -and the behavioral intention to use P2P payment applications:

H5: Trust in P2P payment applications has a positive effect on the behavioral intention to use P2P payment applications.

The items relating to trust were derived from Roca, Garcia & de la Vega (2008). The items were altered for the purpose of this research thesis. These items will measure to what extent the participant is trusting the provider of a P2P payment application to manage their transactions. The first item measures to what extent providers of P2P payment applications are deemed trustworthy and is phrased as: *Providers of P2P payment application are trustworthy*. The second item concerns the perceived reputation of P2P payment applications and is phrased as follows: *P2P payment applications have a good reputation*. The third item relates to the competency of P2P payment applications and is phrased as: *P2P payment applications are competent and effective as means of payment*. The fourth option concerns the honesty of providers of P2P payment applications and is phrased as: *I do not doubt the honesty of the providers of P2P payment applications*.

2.5 Perceived privacy & security

Since, nowadays in online environments, data is often intercepted and even used for fraudulent purposes, the security concerns of consumers engaging in online transactions have been increasing (Roca et al., 2006). Unintended usage of data has also been occurring more regular, leading to concerns about the privacy whenever individuals engage in transactions online (Roca et al., 2006). Most of the mobile payment systems collect the personal information about the users to provide them with offers and other benefits based on the information given by consumers themselves (Yuvaraj & Eveline, 2018), the privacy of users could be affected by this. Many consumers believe that online payment channels are not secure and can be intercepted (Cruz, Neto, Munoz-Gallego & Laukkanen, 2010). These concerns could resist consumers from adopting P2P payment applications

Trust in a transaction and the providers of a corresponding payment application can thus be influenced by the perceived privacy and security. The perceived security and its influence on the eventual adoption of products or services, has been researched before and has proven to be

a strong factor. Perceived privacy is a frequently mentioned concern regarding mobile payment systems, the (unethical) handling of data could influence the perceived privacy of mobile payment systems, which are needed in the transition towards a cashless society. Perceived security is described as ‘the user’s perception that the service provider will meet safety requirements such as authentication, integrity, and encryption’ (Ramos *et al.*, 2018). Perceived security will be defined in this thesis as “the user’s perception that P2P payment applications will meet safety requirements such as authentication, integrity and encryption”. Perceived privacy is the possibility that online companies collect data about individuals and use them inappropriately (Jarvenpaa & Toad, 1996). The perceived privacy will be defined in this thesis as: “the possibility that providers of P2P payment applications collect data about individuals and use them inappropriately”.

Perceived security has been researched in the context of adoption of e-commerce products and has proven to be a strong factor, related to trust and eventually to the adoption of e-commerce products. Kim, Tao, Shin and Kim (2010) found that the perceived security had a significant effect on trust in electronic payment systems. Harris, Brookshire and Chin also proved this relationship between perceived security and trust, in the context of the installation of mobile applications. Furthermore, several other authors have been able to prove the positive effect of perceived security on trust relating to the adoption of (mobile) technological innovations (Zhou, 2011; Kumar, Adlakaha & Mukherjee, 2018; Chawla & Joshi, 2019; Jarvenpaa *et al.*, 1999; Gefen, 2000; Lee & Turban, 2002; Herzallah, Arshah & Al-Sharafi, 2018; Gupta & Dhami, 2015; Shin, 2010; John, 2012; Eid, 2011).

The role of the perceived privacy on trust has been extensively researched. Mukherjee and Nath (2007) showed that privacy features of website are key antecedents of trust. Ramos *et al.* (2018) also showed strong positive relationships between perceived privacy and trust in the mobile banking sector. Al-Sharafi *et al.* (2016) found that the perceived privacy of internet banking had a positive effect on the perceived trust in internet banking mechanisms. Several others have found positive effects of the perceived privacy on the perceived trust relating to the adoption of (mobile) technological innovations (Shin, 2010; Ramos *et al.*, 2018; Sung Hee, 2014; Herzallah, Arshah & Al-Sharafi, 2018; John, 2012; Eid, 2011)

Based upon prior research the following hypotheses are formulated:

H6a: The perceived security of P2P payment applications has a positive effect on trust in P2P payment applications.

H6b: Perceived privacy P2P payment applications has a positive effect on trust in P2P payment applications.

The items relating to the perceived security are derived from the research of Roca et al. (2008) and will measure to what extent the participant perceives P2P payment applications to be secure. The first item measures to what extent P2P payment applications are perceived to have the technical capacity to ensure data protection and is phrased as: *I think P2P payment applications have sufficient technical capacity to ensure that my transaction cannot be modified by a third party.* The second item concerns the perceived security measures P2P payment applications possess to ensure protection of data and is phrased as follows: *The P2P payment applications have enough security measures to protect my personal and financial information.* The third item relates to the perceived security of P2P payment applications to protect data against third parties and is phrased as: *When I make a transaction using P2P payment applications, I am sure that my transaction will not be intercepted by unauthorized third parties.*

The items concerning perceived privacy are derived from the research of Roca et al. (2008) and will measure to what extent the participant perceives P2P payment applications to be private. The items concerning perceived privacy will all be asked in a negative way as opposed to perceived security, to ensure control of the attention of the participant. The first item measures to what extent P2P payment applications are perceived to use personal data and is phrased as: *I am concerned that providers of P2P payment applications will use my personal information for other purposes without my authorization.* The second item concerns the perceived degree of collection of personal data and is phrased as follows: *I think that too much of my personal and financial information will be collected by providers of P2P payment applications.* The third item relates to the perceived privacy of personal and financial information when using a P2P payment application and is phrased as: *I am concerned about the privacy of my personal and financial information when using a P2P payment application.* The fourth and last item will determine the degree to which providers of P2P payment applications are perceived to share personal data with other entities and is phrased as: *My personal and financial information will be shared with other entities without my authorization.*

2.6 Age

The use of mobile payment systems instead of the old-fashioned use of cash as a payment system, could affect the people that might be less experienced in using technologies. While older people elderly is increasing in their smartphone use, they do have less knowledge and experience with regards to the use of mobile payment systems. A study by Kraiwanit, panpon and Thimthong (2019), found that age has an effect on the knowledge about the use of electronic payment systems, which relates to the findings of Brandyberry, Li and Lin (2010) that age has an effect on the perceived ease-of-use of social network sites. The more knowledge a person has of technologies, the less complex a technology seems to use, which will decrease the perceived ease-of-use.

Older people are expected to experience more difficulties than younger people, in giving up competencies and realizing that the knowledge they have is outdated and useless and experience more difficulties in acquiring new competencies and new knowledge (Mortimer & Borman, 1988). Stern and Barret (1992) concluded that older employees are prone to be more resistant to changes, especially technological changes. This occurs because the aging process causes several changes, such as to the sensory and motor skills of individuals which decline (Van de Watering, 2007), which makes them less likely to try new things or use new innovations. Kunze, Boehm and Bruch (2013) however, showed a negative relationship between age and resistance to change, they found that the older an individual gets, the less resistant that individual is to change. This finding was considered to be contradictory with the commonly held stereotype that older people are more resistant to change (Kunze, Boehm & Bruch, 2013).

Chadwick-Dias, McNulty and Tullis (2003) found that older people had significantly more usability issues on the internet than younger people had. The effect of perceived ease-of-use on the behavioral intention to use P2P payment applications could be moderated by age. Also, ease-of-use was deemed to be a more powerful predictor of adoption for older people than for younger people in adopting a digital personal assistant, or in other words the effect of perceived ease-of-use on the behavioral intention was stronger for older people than for younger people (Arning & Ziefle, 2007). With regards to the effect of the perceived usefulness on the behavioral intention to use certain technologies, younger people are more focused on performance-related rewards (Hall & Mansfield, 1975). The effect of the perceived usefulness on the behavioral intention to use an innovation is thus greater for younger people than for older people (Hall &

Mansfield, 1975). The effect of perceived ease-of-use on the behavioral intention to use P2P payment applications could thus be moderated by age. Chung et al. (2010), however found that age did not have a significant effect on the relationship between perceived ease-of-use and perceived usefulness on the behavioral intention to engage in online communities. However, since several studies have found age to have significant effects of the effect of the perceived ease-of-use and the perceived usefulness on the behavioral intention to use innovations (Al-Gahtani, 2008; Alsswey & Al-Samarraie, 2020; Tripathi, 2018; Tiruwa, Yadav & Kumar Suri, 2018), this thesis will also incorporate this moderating effect. Next to that, the moderating effect of age on the relationship between dispositional RTC and the behavioral intention will be included.

To address the moderating role of age on the antecedents of the behavioral intention to use P2P payment applications and the moderating effect on the relationship between RTC and the behavioral intention to use P2P payment applications, the following hypotheses are formulated:

H7a: The effect of resistance to change on the behavioral intention to use P2P payment applications will be weaker for older people.

H7b: The effect of perceived ease-of-use on the behavioral intention to use P2P payment applications will be stronger for older people.

H7c: The effect of perceived usefulness on the behavioral intention to use P2P payment applications will be stronger for younger people.

2.7 Gender

It is expected that based on the gender types of individuals, there are differences in behavior between men and women since gender types shape perceptual perspectives and actions (Venkatesh & Morris, 2000). This is why there is a growing body of research that is focused on the moderating effect of gender on the behavioral intention to use certain technologies, mainly in IT (Venkatesh & Morris, 2000). Nguyen et al. (2016) recommended that research should be conducted into the moderating role of gender on the adoption of mobile payment services. Jaradat and Fagih (2014) also stated that the moderating role of gender, needs further investigation since there has not yet been reached a consensus on its influence on the adoption of new technologies.

Met opmerkingen [RS1]: Maar écht P2P is het niet, toch? Welke implicaties heeft dat voor adoptievraagstukken?

Venkatesh and Morris (2000), found that the relationship between the perceived usefulness and the behavioral intention to use a certain innovation was stronger for men than for women. Next, to that they (Venkatesh & Morris, 2000) found that the effect of the perceived ease-of use on the behavioral intention to use a certain innovation was stronger for women than for men. Liébana-Cabanillas, Sánchez-Fernández and Muñoz-Leiva (2013) found that the relationship of perceived usefulness on behavioral intention to use mobile banking was stronger for men, than for woman. The intention to use mobile banking was thus more strongly influenced by the perceived usefulness by men than by women. Brandenberry, Li and Lin (2010) also found a moderating role of gender on the relationship between gender and perceived ease-of-use, the effect of perceived ease-of-use on the behavioral intention to use social networking sites was stronger for women than for men. Several other authors have found a significant moderating role of gender on the relationship between perceived ease-of-use and perceived usefulness and the behavioral intention to use innovations (Nysveen, Pedersen, Thorbjørnsen, 2005; Ong & Lai, 2006; Jayasingh & Eze, Wong, Teo & Russo, 2012; Yang, Hsu & Tan, 2010; Okazaki & Renda dos Santos, 2020).

However, Jaradat and Fagih (2014) found that the moderating role of gender on the effect of the perceived usefulness and perceived ease-of-use on the behavioral intention was not significant, there were thus no differences in their research between men and women relating to the impact of perceived usefulness and perceived ease-of-use on the behavioral intention to use mobile payments. Several other authors have found a non-significant moderating role of gender in the adoption of mobile payments (Hamza & Shah, 2014; Li et al., 2014; Bigne et al., 2005; Zhou et al., 2007).

Since these researches have all been conducted in different countries and the adoption of P2P payment applications is different from the adoption of general mobile payments and since there is also relevant literature that proves a significant moderating relationship, this thesis will include the moderating role of gender on the effect of perceived ease-of-use and perceived usefulness on the behavioral intention to use P2P payment applications.

To address the moderating role of gender on the antecedents of the behavioral intention to use P2P payment applications, the following hypotheses are formulated:

H8a: The effect of perceived ease-of-use on the behavioral intention to use P2P payment applications will be stronger for women.

H8b: The effect of perceived usefulness on the behavioral intention to use P2P payment applications will be stronger for men.

2.8 Conceptual model

The mentioned theoretical constructs led to the integration of three different theories into one theoretical construct that will be used in this thesis. The conceptual model (figure 1.1) shows the TAM by Davis (1989) and the two different additions to this model, the dispositional resistance to change construct as used by Nov & Ye (2009) and trust construct as used by Roca et al. (2009). Age and gender have been included as control variables. The conceptual model also shows the proposed hypotheses and the relationships. In the following chapter, the methodology of this thesis will be discussed.

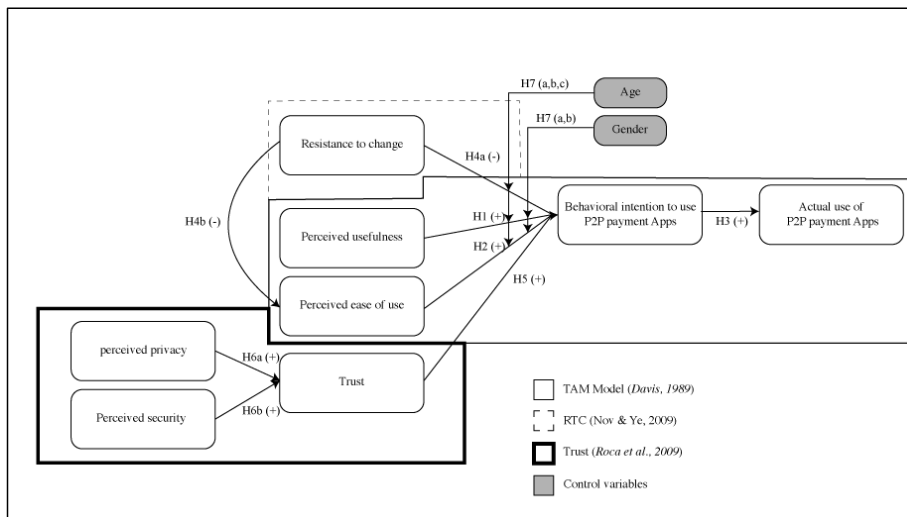


Figure 1.1: The conceptual model

Chapter 3: methodology

The previous chapter consisted of the theoretical construct with regards to the factors relating to the acceptance of or behavioral intention to use a certain product or service. The technology acceptance model and additions towards this model were highlighted. The proposed hypotheses showed the expected relationships between the constructs and the variables within these constructs. Research is needed in order to understand the proposed conceptual model and hypotheses, and to assess the influence of the variables onto the usage of P2P payment applications. This chapter will discuss the proposed methodology that is needed to research the following research question: What factors determine the behavioral intention to use mobile P2P payment applications?

3.1 Research Method

The proposed research method that will be used in this thesis will be quantitative, this choice is made based on the general assumptions that the research is proposed to generate. In order to have generalizable results regarding the Dutch population, a considerable number of participants should be taken into consideration. The qualitative research method, consisting of interviews, case studies and more shall not lead to generalizable results, since qualitative research methods are more time-consuming than quantitative research methods, the number of participants will be lower. The quantitative method that will be used in this thesis, will consist of surveys distributed among participants which will be discussed in the following paragraph.

3.2 Sample

The preceding paragraph explained the choice of research method, a quantitative method uses a sample that should be representative of the research population, this paragraph will explain the proposed sample that will be used in this thesis. The proposed research question addresses factors concerning the adoption of P2P payment applications which concerns the whole Dutch population, with a smartphone and those who are eligible to make their own transactions. There are formulas that calculate a proposed sample size but there are no explicit rules regarding these sizes. The estimated required sample size can be calculated using a formula that takes into account, the desired confidence level and the margin of error. Using a total population size of 17.000.000, a margin of error of 5% and confidence level of 95%, the estimated sample size is 400 participants (*Sample size calculator, n.d.*). To ensure this sample

size, the questionnaire will be distributed online among friends and relatives and if needed among strangers or fellow students of the Radboud University.

The restrictions on data collection will be as follows, the participants should be living in the Netherlands, have a smart phone and be eligible to conduct their own transactions. Incorrect or missing values will be deleted, and several control questions will be present in the questionnaire to ensure reliability of the used measuring instrument. These control questions will be present in the form of reversed questions, some question will be formulated positively, and some will be formulated negatively. After data collection, the data will be analyzed to avoid potential outliers that influence the data.

3.3 Research ethics

The ethical principles of this thesis will mostly address the data collection. Most of the published principles all concern two overarching principles; respect for participants and informed consent. Other principles cascade down from these two main principles. This thesis will therefore address participants as participants, as opposed to respondents, and ensure the protection of these participants, their answers will be handled confidentially. Due to the wide spreading corona or covid-19 virus, the participants will no longer be addressed personally; all data-collection will be done online through Facebook or WhatsApp. The participants will be addressed and will be kindly asked to participate by filling in the questionnaire. This questionnaire will be non-voluntary, and participants can withdraw from the survey at any time, if this is deemed necessary. The participants will be informed beforehand, the essence of the thesis will be explained, and anonymity of the participants will be guaranteed. The data that is submitted by the participants will be handled with care and only be shared with the Radboud University; this will also be communicated to the participants.

3.4 Survey

To address the participants perceived relatedness to the beforementioned constructs with regards to P2P payment applications, a survey will be distributed. Every mentioned construct will be addressed using a number of items, which can be found in appendix A. All items will be assessed using a Likert Scale with 5 possible points ranging from: 'do not agree at all' to 'totally agree'. Before participants begin with the survey, they will first be asked to agree to the

terms of the survey in which they acknowledge that they are familiar with the fact that the survey is completely voluntary, the fact that they can withdraw from the survey at any moment and that they are 18 years or older. When the participant agrees to continue, at first an introduction will be presented in which the essence of the thesis will be explained. After the introduction and, the questions relating to the different concepts will be presented and finally there will be some demographic question. To ensure that the survey is understandable and doable by participants, a pilot survey has been distributed and the survey has been corrected based on the feedback that was given by the participants. The actual survey that has been distributed can be found in appendix B under *Survey*.

Chapter 4 Results

The previous chapter consisted of the methodological choices that have been made, in order to conduct the research based upon the theoretical constructs which were explained in chapter 2. This chapter will first explain the descriptive statistics of the used sample and will then validate the data based upon the assumptions of normality, validity and reliability. The results of the survey will then be presented and answers to the earlier proposed hypotheses will be provided.

4.1 Descriptive statistics

Table 4.1: the demographic characteristics of the sample.

N = 307		
Variable	% (frequency)	Mean (SD)
Age		32.55
Young (18-30)	66.8 % (205)	
Middle aged (31-55)	20.5 % (63)	
Elderly (56+)	12.7 % (39)	
Gender		
Men	55 % (169)	
Women	45 % (138)	
Other	0 % (0)	
Education		
Elementary education	.5 % (1)	
Secondary education	13.9 % (29)	
Intermediate vocational education	12.5 % (26)	
Higher vocational education	33.7 % (70)	
Academic education	39.4 % (82)	

Table 4.1 shows the descriptive characteristics of the study sample. A total of 307 participants participated in the survey. The average age of the sample is 32 years (SD = 32.55), which is lower than the average of the population (the Netherlands) which has an average age of 42. The majority (66.8%) of people in the sample were between 18 and 30. In addition, the gender of the participants was roughly evenly distributed with a somewhat larger share of men (55% against 45%). Education was shifting more towards the higher forms of education (higher

vocational education and academic education) with a share over 73%. Furthermore, the sample was consisting of only Dutch people.

Table 4.2: Pearson's correlations

	1	2	3	4	5	6
1. Usefulness						
2. Ease of Use	.852**					
3. Resistance to Change	-.472**	-.366**				
4. Trust	.842**	.739**	-.584**			
5. Security	.705**	.667**	-.459**	.842**		
6. Privacy	.789**	.670**	.619**	.923**	.801**	

Table 4.2 shows the Pearson correlation coefficients between the different constructs that were assessed in this thesis. Generally, correlations higher than .7 are deemed high and correlations higher than .9 are deemed problematical. There are multiple analyses that research the problem of high correlations such as the factor analysis or the VIF and tolerance values, which analyze the underlying structure of the constructs. The factor analysis, which will be presented in the next paragraph, will prove that the assumptions of the convergent and discriminant validity have been met. The VIF and tolerance values which will also be presented in the next paragraph will show that there is no multicollinearity present in the dataset, the VIF and tolerance values are however deemed to be soft factors which can be met easily. The high correlations presented in this paragraph do indicate that there is in fact multicollinearity present in this thesis. The possible explanations relating to correlations exceeding .8 will be presented in the discussion and limitations sections in the next chapter.

4.2 Validation of the data

The data that is gathered needs to be assessed on normality, validity and reliability. Normality refers to the symmetrical division of the dataset. The validity of data refers to the ability of a variable to measure what it is proposed to measure (Schmidt & Hollensen, 2006). The reliability of variables refers to the consistency of results, reliable research delivers the same results whenever the research would be repeated (Blumberg et al., 2011).

The convergent validity is assessed by finding correlations between variables that are proposed to measure the same construct (Anastasi, 1990). Hopkins (2002) stated that correlation

coefficients, between variables that are supposed to measure a particular construct, 0.5 and 0.7 are considered to be large and coefficients larger than 0.7 are considered to be very large. The convergent validity thus assesses whether variables that are grouped together in fact also measure the same concept. The convergent validity will be examined by separate factor analyses on each construct. The output of each separate factor analysis can be found in appendix C under *separate factor analyses*. The results show that each variable load highly ($> .70$) on the proposed construct and in each case the variables all load on only one factor.

The discriminant validity can be described as ‘the degree to which alternative explanations for the testing results can be rejected’ (Drenth & Sijtsma, 1990, p. 205). Discriminant validity ensures that a construct is empirically unique and represents a concept that other constructs do not capture (Hair et al., 2010) The discriminant validity thus assesses whether the items of the proposed constructs do or do not contribute to measuring that construct and whether they do or do not measure another construct simultaneously. The discriminant validity can be assessed using a factor analysis. Based upon this factor analysis, concepts should not correlate too highly with concepts that it is supposed to differ from (Campbell, 1960). To assess whether a factor analysis could be conducted, the KMO and Bartlett’s test of sphericity have been applied to the data, these values which can be found in appendix C under *factor analysis*, show that the value of KMO (.962) is sufficient and that Bartlett’s test of sphericity is significant ($p = .000$), which indicates that a factor analysis can be conducted. A factor analysis using Principal Axis Factoring and the Oblimin rotation method has been applied to the data. Table 4.3 shows that all of the variables load on a separate factor, with a total of 6 factors. It can thus be assumed that all constructs measure the proposed construct and do not measure other constructs simultaneously.

Table 4.3: The pattern matrix (Principal Axis Factoring with Oblimin rotation)

	Factor					
	1	2	3	4	5	6
USE1						,960
US2						,740
USE3						,814
EAS1			-,436			
EAS2			-,796			
EAS3			-,654			
RTC1		,866				
RTC2		,909				
RTC3		,787				
RTC4		,924				
TRU1					-,454	
TRU2					-,490	
TRU3					-,318	
TRU4					-,309	
SEC1				-,738		
SEC2				-,884		
PRI1	,435					
PRI2	,804					
PRI3	,956					
PRI4	,885					

The Cronbach's Alpha has been described as one of the most important statistics to measure the reliability or internal consistency of a variable (Cortina, 1993). The Cronbach's Alpha can have a value between 0 and 1, where 1 shows perfect internal consistency between variables relating to a construct and 0 shows no internal consistency. According to Nunnally (1978), a Cronbach's Alpha higher than .7 is considered to be acceptable. A value higher than .7 thus

indicates that a construct is reliable. The values of the Cronbach's Alpha can be found in table 4.4. The results show that the Cronbach's Alpha of all the separate constructs are higher than .7, which indicates that all the constructs are reliable. Furthermore, the Cronbach's Alpha could not be improved substantially by deleting items, so there were no items omitted from this research.

Table 4.4: Cronbach's Alpha

Variables	# of items	Cronbach's Alpha	# of items deleted
Perceived Usefulness	3	0,977	0
Perceived Ease-of-Use	3	0,896	0
Resistance to change	4	0,937	0
Perceived trust	4	0,961	0
Perceived security	2	0,887	0
Perceived privacy	4	0,962	0
Behavioral intention	2	0,959	0

In order to analyze the retrieved data in this thesis, the data needs to meet certain assumptions which will assess whether the data is normally distributed. Normality can be assumed when the error terms of the data is normally distributed around zero. There are a number of assumptions that should be met in order to assess the normality assumption, which will be addressed in this paragraph.

First of all, the data should not be either skewed or kurtotic. Skewness refers to the symmetry of data, a normal distribution or bell-shaped form of data should be symmetrical, skewness thus occurs when the data is not symmetrically distributed. Kurtosis refers to the flatness of the data distribution, a normal or bell-shaped distribution should not be extremely flat or extremely steep. Based on George and Mallery (2010) the skewness and kurtosis of the data should be between -2 and 2, to assume a normal distribution of the data. The analysis of the skewness and kurtosis, which can be found in Appendix C under *Skewness and Kurtosis*, show that all values are between -2 and 2.

Secondly, probability plots assess the normality of the data, a probability plot shows the data that is analyzed along with a regression line. The data is assumed to be normally distributed when the points lie approximately linear along this regression line (Beal, 2019). The probability

plots, which can be found in Appendix C under *Probability Plots*, have lines that lie approximately along the regression line and thus show normal distributions for each variable.

Thirdly, the pattern of the data needs to be homoscedastic which refers to the spread of the residuals, which should not occur in a specific pattern, which is the case when the data is heteroscedastic. The error terms of the data should thus be random, which can be assessed using scatterplots. The scatterplot can be found in Appendix C under *Scatterplot*, shows that the residual spread does not occur in a specific pattern and it can thus be assumed that the data is homoscedastic.

Lastly, the assumption of multicollinearity has to be met. Multicollinearity refers to the extent to which items are correlating, although items always correlate to some extent, this assumption assesses whether they do not correlate to highly. Multicollinearity occurs when at least two predictors in the same regression model are highly correlated, which lead to unstable and biased standard errors (Vatcheva et al., 2016). Multicollinearity is assessed using the VIF values of variables, a value of VIF below 10 or a tolerance value above .10 are considered to be acceptable. The values, which can be found in appendix C under *VIF/tolerance values*, show that all VIF values are below 10 and all tolerance values are above .10. The variables in the regression model thus do not correlate to an extent that is deemed to be problematical. However, as earlier stated, this criterium is considered to be a soft measure which can be easily met. The Pearson correlation coefficients however show that multicollinearity is in fact a problem in this dataset, this will be further discussed in the next chapter.

4.3 Hypotheses

The research question that is proposed in chapter 1 was the following: What factors determine the behavioral intention to use P2P payment applications. In order to answer this question, theoretical constructs were proposed in chapter 2 and a survey has been distributed which is explained in chapter 3. This thesis has used the TAM framework by Davis (1989) and has extended this framework with the influence of a person's resistance to change and attitude towards trust, security and privacy relating to the adoption of P2P payment applications. The R^2 which assesses the explanatory power of the proposed model, consisting of the TAM framework and the RTC and trust, that will be assessed in this chapter is quite high ($R^2 = .720$). This variable explains the amount, in percentage, of the dependent variable that is

explained by the added independent variables, which for this model is thus 72%. A high explanatory power is not always desirable and could even indicate limitations, like redundancy, which will be addressed in the next chapter.

Table 4.5 represents the regression weights for the predictors of the behavioral intention to use and actual use of P2P payment applications, as well as the antecedents of the perceived trust. Table 4.6 represents the regression weights for the moderator variables that are taken into account in this thesis. All hypotheses have been analyzed using linear regression analyses unless stated otherwise.

Hypothesis 1, states that the perceived usefulness of P2P payment applications has a positive effect on the behavioral intention to use P2P payment applications has been proven to be positive and significant ($\beta = .311$, $t(306) = 4.273$, $p = .000$). The higher a participant would perceive a P2P payment application as being useful, the more likely it would be that the participant would be inclined to use such an application.

Hypothesis 2, which states that the perceived ease-of-use would have a positive effect on the behavioral intention to use P2P payment applications has not been proven to be significant ($\beta = -.036$, $t(306) = -.618$, $p = .537$).

Hypothesis 3, which states that the behavioral intention to use a P2P payment application would have a positive effect on the actual use of the applications. In order to address this hypothesis, a binary logistic regression analysis has been applied, which determines the chance that a person actually uses a P2P payment application and the effect behavioral intention has on this actual use. The results showed that this effect was significant and positive ($B = 1.898$, $P = .000$). The higher the participant's behavioral intention to use P2P payment applications was, the higher the chance was that the participant actually uses a P2P payment application.

Hypothesis 4 is stated in a two-fold manner. Hypothesis 4a states that a person's dispositional resistance to change would have a negative effect on the behavioral intention to use P2P payment applications, this effect has been proven to be significant and negative ($\beta = -.522$, $t(306) = -13.811$, $p = .000$). Hypothesis 4b stated that the dispositional resistance to change would negatively affect the perceived ease-of-use, this relationship was proven by the analysis ($\beta = -.366$, $t(306) = -6.867$, $p = .000$). The higher a participant's dispositional resistance to change was, the lower the behavioral intention to use and perception of the ease of use regarding P2P payment applications was.

Hypothesis 5, which states that the amount of trust a person has regarding P2P payment applications would positively affect the behavioral intention to use the application has been proven to be positive and significant ($\beta = .183$, $t(306) = 2.959$, $p = .003$). The higher a participant's trust was regarding P2P payment applications, the more inclined a participant was to use such an application.

Hypothesis 6, is stated in a two-fold manner stated that the amount of trust regarding P2P payment applications would be positively affected by the perceived security ($\beta = .288$, $t(306) = 8.685$, $p = .000$) and privacy ($\beta = .692$, $t(306) = 20.883$, $p = .000$) are both proven to be positive and significant. The higher a participant's perception of security and privacy regarding P2P payment applications was, the higher the behavioral intention to use the applications was.

Table 4.5: the regression weights of the conceptualized research model.

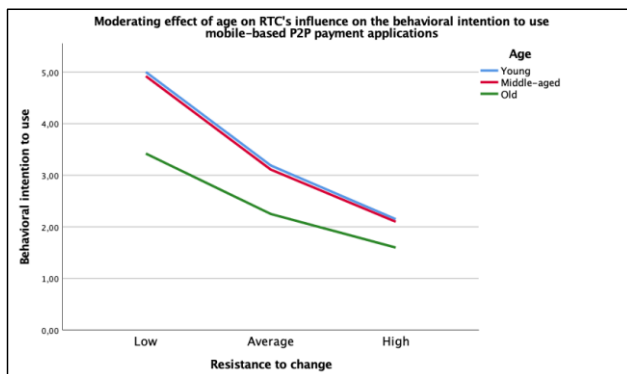
Determinants of the behavioral intention to use				
	<i>Variable</i>	<i>β</i>	<i>P value</i>	<i>Accepted?</i>
H1	Perceived usefulness	.311	.000	Yes
H2	Perceived ease-of-use	-.036	.537	No
H4a	Resistance to change	-.522	.000	Yes
H5	Trust	.183	.003	Yes
Determinants of trust				
	<i>Variable</i>	<i>β</i>	<i>P value</i>	<i>Accepted?</i>
H6a	Security	.288	.000	Yes
H6b	Privacy	.692	.000	Yes
Determinant of ease-of-use				
	<i>Variable</i>	<i>β</i>	<i>P value</i>	<i>Accepted?</i>
H4b	Resistance to change	-.366	.000	Yes
Determinant of actual use				
	<i>Variable</i>	<i>β</i>	<i>P value</i>	<i>Accepted?</i>
H3	Behavioral intention to use	2.036	.000	Yes

Hypothesis 7, which proposed that age would have a moderating effect on the relationships between several variables and the behavioral intention to use P2P payment applications has been tested using the PROCESS analysis function as proposed by Andrew F. Hayes. This analysis offers the possibility to directly measure the influence of the moderating

variable, age. This analysis also shows the Johnson-Neyman values, which show for which particular group an effect is significant. The results of this analysis can be found in table 4.5.

Hypothesis 7a stated the effect of the perceived usefulness on the behavioral intention to use P2P payment applications would get stronger as participants got older. The interaction term between age and resistance to change was added to the regression model, which accounted for a significant proportion of the variance in the behavioral intention to use P2P payment applications, ($b = .010$, $p = .000$). The conditional effects of the predictor show that the moderating effect was significant for young people ($b = -.830$, $p = .000$), for middle aged people ($b = -.810$, $p = .000$) and for elderly people ($b = -.520$, $p = .000$). The effect of RTC tends to get weaker as participants get older.

Figure 4.1: The moderating effect of age on RTC -> behavioral intention to use.



Examination of the interaction plot, which is presented in figure 4.2, showed a weakening effect of the resistance to change as age increased. The young and middle-aged group, as expected, do not differ that much, however the older aged group show a moderating effect, as RTC increases, its effect on the behavioral intention to use mobile-used P2P payment applications gets weaker.

Hypothesis 7b stated that the effect of the perceived usefulness on the behavioral intention to use P2P payment applications would get weaker as participants got older. The effect of age did however not account for a significant proportion of the variance in the behavioral intention to use P2P payment applications ($b = .002$, $p = .700$).

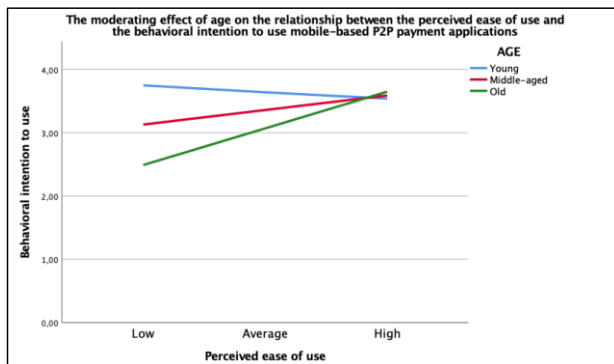
Met opmerkingen [RS2]: Isn't that remarkable?

Met opmerkingen [RS3R2]: Zit het echt in het absolute stuk (sowieso lagere willingness?) En heb je dan een aanwijzing dat het zit in ease of use (zie presentatie?)

Hypothesis 7c proposed that the effect of the perceived ease of use on the behavioral intention to use P2P payment applications would get stronger as participants got older. The interaction term between age and ease of use was added to the regression model, this interaction effect did account for a significant proportion of the variance in the behavioral intention to use P2P payment applications ($b = .0003$, $p = .000$). The conditional effects of the predictor show that for young people the effect of ease of use was not significant ($b = -.100$, $p = .545$). The effect was however significant for the middle-aged group ($b = .231$, $p = .037$) and for the group consisting of older people ($b = .575$, $p = .000$).

The Johnson-Neyman method showed that this effect was significant for people older than 25 but not significant for people younger than 25. The effect of the perceived ease of use is getting stronger as the person gets older. Thus, as people get older than 25 the effect the perceived ease-of-use has on the behavioral intention to use P2P payment applications increases.

Figure 4.2: The moderating effect of age on the relationship between the perceived ease of use and the behavioral intention to use P2P payment applications



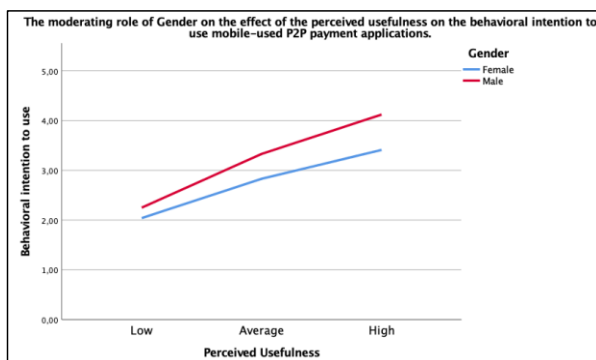
Examination of the interaction plot, which is presented in figure 4.2 showed a strengthening effect of the perceived ease of use as age increases. The young group becomes less likely to use a P2P payment application as the perceived ease of use increases, this effect has however not been proven to be significant. The middle -and older aged group show an increasing behavioral intention as the perceived ease of use increases, however the effect of the ease of use as perceived by older people on the behavioral intention is visibly stronger.

To assess the differences relating to the effect of the perceived ease of use among different age groups an additional analysis has been done. This effect was shown to be not significant when the whole dataset was taken into consideration. The effect of the perceived ease-of-use on behavioral intention to use P2P payment applications in the age group above 25 is however proven to be significant and positive (.916, $p = .000$), with an R^2 of .562, which indicates that 56% of the behavioral intention of people older than 25 can be explained by the perceived ease-of-use. people were older than 25, the higher their perceived ease of use was, the higher the behavioral intention to use P2P payment applications was.

Hypothesis 8 suggested that gender would have a moderating role on the variables present in the TAM framework. The reference group used for analysis was the male respondent group. The results of this analysis can be found in table 4.5. Hypothesis 8a states that the effect of the perceived ease-of-use on the behavioral intention to use P2P payment applications would be stronger for women. **This effect has not been proven to be significant ($B = -.142$, $P = .401$).**

Met opmerkingen [RS4]: Verbaast me niet zo. Anders gezegd: wat was/is de logica achter dit verwachte gender effect?

Figure 4.3: The moderating role of gender on the effect of the perceived usefulness on the behavioral intention to use.



Hypothesis 8b stated that the effect of the second variable of the TAM framework, the perceived usefulness would be stronger for men (H8b). This proposed effect has been proven to be significant ($B = -.840$, $P = .000$). The behavioral intention of male participants to use P2P payment applications was thus more strongly influenced by the perceived usefulness than in the case of women. Examination of the interaction plot, which is shown in figure 4.3,

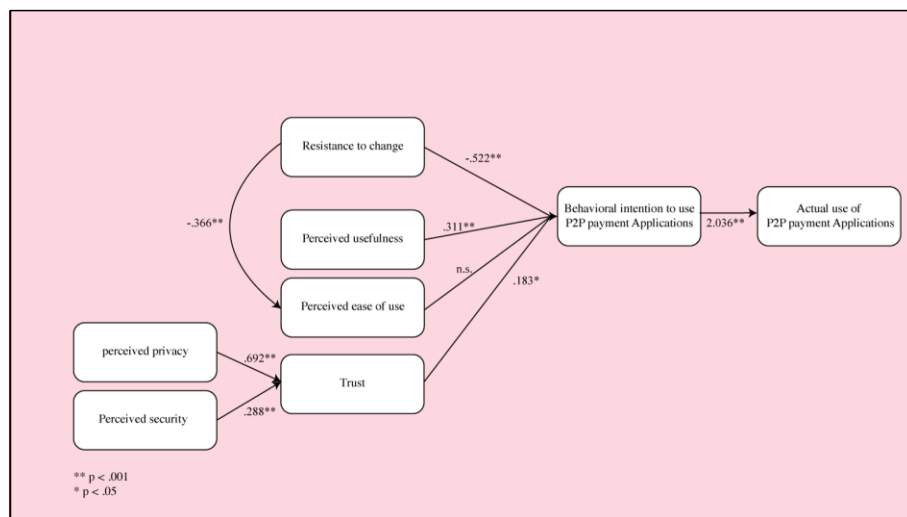
shows that as the perceived usefulness increases, its effect on the behavioral intention to use P2P payment applications gets stronger for men as compared to women.

Table 4.6: The regression weights of the moderating variables.

	Moderating effects of gender				Moderating effects of age		
	Beta	P value	Accepted?		Coefficient	P value	Accepted?
H8a	-.142	.401	No	H7a	.010	.000	No
H8b	.840	.000	Yes	H7b	.002	.700	No
				H7c	.0003	.000	Yes

This chapter thus assessed the used dataset which came from the methodology used in this thesis, which is explained in chapter 3. Furthermore, this chapter showed the assumptions and underlying structure of this dataset, this chapter also showed the significance of the effects that were proposed in chapter 2. In order to visualize the aforementioned relationships, figure 4.4 presents the conceptual model and the significant relationships.

Figure 4.4: the conceptual model and the significant relationships



Met opmerkingen [RS5]: OK, maar nu suggereer je dat RtC tot minder PEOU leidt. Is dat logisch?

Chapter 5

5.1 Conclusion

This thesis has been conducted to research the factors relating to the behavioral intention to use a certain innovation that could eventually lead to a cashless society, the P2P payment applications. To investigate the factors relating to the behavioral intention and actual use of these applications, the TAM framework by Davis (1989) has been applied along with two extending conceptual frameworks: the dispositional resistance to change originally developed by Oreg (2003) and later adjusted and applied by Nov and Ye (2009), and the concept of trust, security and privacy by Roca et al. (2009).

The research question that was central in this thesis, was the following: what factors determine the behavioral intention to use mobile P2P payment applications. The perceived usefulness and perceived trust did have a positive significant effect on the behavioral intention to use P2P payment applications, as the perceived usefulness and the perceived trust increased the behavioral intention increased as well. The resistance to change had a negative significant effect on the behavioral intention to use P2P payment applications, as the resistance to change increased, the behavioral intention to use decreased. The perceived ease of use did not have a significant effect on the behavioral intention to use P2P payment applications. Trust was positively significantly affected by the perceived security and perceived privacy, as the perceived privacy and perceived security increased, the perceived trust increased as well. The variable that had the largest effect on the behavioral intention to use P2P payment applications was the resistance to change, followed by the perceived usefulness and trust. The variable with the largest effect on trust was the perceived privacy.

Two moderating effects have been analyzed in this thesis, age and gender. The moderating effect of age was significant for the effects from RTC and perceived ease of use on the behavioral intention to use P2P payment applications. The results showed that as people got older the effect of RTC on the behavioral intention got weaker and the effect of ease of use became stronger. The second moderator, gender, was proven to have a significant effect on the relationship between the perceived usefulness and the behavioral intention proposed in the TAM framework. The effect of the perceived usefulness on the behavioral intention to use

P2P payment applications was stronger for men. The moderating effect was not significant for the relationship between the perceived ease of use and behavioral intention.

Overall, this thesis indicated important factors and underlying relationships contributing to the behavioral intention to use and eventually the actual use of P2P payment applications.

5.2 Discussion

Perceived ease of use and usefulness

The results section in chapter 4, showed which of the proposed hypotheses has been proven to be significant. First of all, the TAM framework was applied, wherein the perceived ease-of-use and the perceived usefulness and their effects on the behavioral intention to use P2P payment applications. The results of these two variables, show that the perceived usefulness had a moderate effect on the behavioral intention and the perceived ease-of-use did not have a significant effect. The positive effect of the perceived usefulness on the behavioral intention was in line with the proposed hypothesis and earlier research (Peng, Xiong & Yang, 2012; Schierz, Schilke & Wierz, 2010; Leive, Climent & Cabinallas, 2017; Ooi and Tan, 2016). The non-significant effect of the perceived ease-of-use was not in line with the proposed hypothesis and earlier research (Peng, Xiong & Yang, 2012; Schierz, Schilke & Wierz, 2010; Leive, Climent & Cabinallas, 2017; Ooi and Tan, 2016). However, earlier research (Govender & Sihlali, 2014; Alalwan et al., 2018; Basgoze, 2015; Cobanoglu, Yang, Shatskikh & Agarwal, 2015) also show that the perceived ease of use is not significant in its relationship to the behavioral intention to use mobile applications.

A possible explanation for the insignificant result of perceived ease-of-use, could be that the usage of applications does not seem to be difficult anymore, which would make the ease-of-use not much of an issue anymore.

Met opmerkingen [RS6]: Hoe zouden we dat kunnen vaststellen?

The effect of the perceived ease-of-use on the behavioral intention to use P2P payment applications was moderated by age: the older the participants were, the stronger the effect was. This also contributes to the argument made that older people are generally perceived to be less skilled at operating mobile applications, which could make it more valuable to them when the application is perceived to be easy to use.

To statistically prove this difference in effect of the perceived ease-of-use on the behavioral intention to use P2P payment applications based on age, an additional analysis has been done. The effect of the perceived ease-of-use on behavioral intention in the age group above 25 has been proven to be significant and extremely positive with a fairly high R^2 which indicates that a large share of the variance in the behavioral intention to use P2P payment applications could be explained by this one single variable.

Resistance to change

The resistance to change proved, as expected, to have a negative effect (-.151) on the behavioral intention to use P2P payment applications. Age tended to have a moderating effect on this relationship. This moderating relationship proved to be significant yet not as expected, the moderating effect was a weakening effect as the participant got older. This finding was not in line with earlier research (Mortimer & Borman, 1988; Stern and Barret, 1992; and Van de Watering, 2007) and the proposed hypothesis. The PROCESS analysis that was used, showed that as participants got older, the effect of RTC got weaker. This effect was most visible, based on the graph presented in figure 4.3, for the older aged group. This contradicting result could be explained in a two-fold manner. First of all, cellphone user numbers among elder people have been increasing over the last years, which suggest that mobile applications are already adopted by elder people. Secondly, Kunze, Boehm and Bruch (2013) provided counterarguments to the commonly held stereotype that older people are more resistant to change, the results of their thesis proved that as people got older, they would become less resistant to change. Even though that this finding did not directly implicate that age would have a moderating effect on the relationship between RTC and the behavioral intention to use an innovation, this finding could still explain the weakening effect of RTC on the behavioral intention to use P2P payment applications.

As the effect of RTC on the behavioral intention to use P2P payment applications became weaker as people got older, the effect of RTC on the perceived ease of use became stronger. This result was in line with earlier research (Nov & Ye, 2008) and the proposed hypothesis.

Trust

The concept of trust was also added to the conceptual model, which showed, as expected, that trust had a positive effect on the behavioral intention to use P2P payment applications. This finding was in line with earlier research (Bhattacharjee, 2002; George, 2002; Ramos et al.,

2018; Chiu, Bool & Chiu, 2017; Esmaili et al., 2011; Faqih, 2016; Cho & Sagynov, 2015; Sung Hee, 2014). Trust was also being affected by two variables, the perceived privacy and perceived security. Both effects were in line earlier research (Kim et al., 2010; Harris, Brookshire & Chin, 2016; Zhou, 2011; Jarvenpaa et al., 1999; Mukherjee & Nath, 2007; Al-Sharafi et al., 2016; Shin, 2010; Ramos et al., 2018; John, 2012), the results of this thesis show that the variables have a positive effect on the perceived trust. From these two variables, the perceived privacy was the variable that affected trust the most. A possible explanation for this difference could be the occurrence of certain events last year, where so-called IBAN numbers were becoming visible in P2P payment applications such as Tikkie or Bunq, in these cases the privacy of the users was compromised. Even though such events did occur a year ago and were fixed by the mentioned platforms, the image of payment applications could still be harmed in the long term.

The moderating role of gender

The moderating role of gender has also been researched. The interaction graph that has been presented in the preceding chapter showed that the behavioral intention to use P2P payment applications of male respondents was stronger influenced by the perceived usefulness as the behavioral intention of women was. This finding is in line with the findings from (Vanketesh & Morris, 2000; Liébana-Cabanillas, Sánchez-Fernández & Muñoz-Leiva, 2013).

The effect of the perceived ease-of-use could however not be significantly proven to be stronger for female participants. This is not in line with the proposed hypothesis and earlier research (Nysveen, Pedersen, Thorbjørnsen, 2005; Ong & Lai, 2006; Jayasingh & Eze, 2009; Wong, Teo & Russo, 2012). The non-significant result has however also been found by several earlier research (Jaradat & Fagih, 2014; Hamza & Shah, 2014; Li et al., 2014; Bigne et al., 2005; Zhou et al., 2007). This could be explained by the decreasing gender gap, as Jaradat & Fagih (2014) also to refer. The gender gap refers to the difference between mobile adoption for different genders (GSMA, 2018). A report by GSMA (2018) however shows that the gender gap, which is still present in multiple countries, is very small in Europe. This shrunken gender gap could thus explain the non-significant effect, women are apparently less affected by the ease-of-use then they were several years ago or as they still are in developing countries. Since women have adopted mobile phones, they are probably more skilled at using a mobile phone and its applications, which thus decreases the effect of the perceived ease of use.

Intercorrelations

Met opmerkingen [RS7]: Is dat gap in deze context sowieso niet erg achterhaald? Wat is eigenlijk de theoretische basis voor dat gap?

There were several high intercorrelations present in this thesis, this section will provide possible explanations for these intercorrelations, more methodological explanations and consequences of these intercorrelations will be further discussed in the limitations section. The high correlations between the perceived ease of use and the perceived usefulness, which are often used as two separate determinants of the behavioral intention to use can be explained by the innovation that was central in this thesis. An innovation such as a P2P payment application, would need to work easy and fast in order to be useful to a potential customer, since these applications merely present an opportunity, or link, to pay. The overlapping need for an app that is easy to operate and thus useful could explain this high correlation. There were also high intercorrelations present between the concepts of trust, security and privacy. The high correlations between these constructs could be because of the fact that security or privacy measures simply are indeed correlated, since they address somewhat the same problems, especially as perceived by people with no or less technological expertise regarding mobile applications.

Actual use

To research the extent of the behavioral intention to use P2P payment applications, its influence on the actual use of these applications has been taken into consideration. As expected, the behavioral intention did have a very strong influence ($B = 2.063$) on the actual usage. This result is in line with earlier research (Mckenna, Tuunanen & Gardner, 2013; Yun, Han & Lee, 2013; Venkatesh, Thong & Xu, 2012; Alalwan et al., 2018). This would thus indicate that the proposed factors that contribute to the behavioral intention to use P2P payment applications would eventually lead to the actual usage of these applications. Which shows that the determinants of the behavioral intention to use P2P payment applications which are presented in this thesis, provide information related to the actual use of these applications.

Met opmerkingen [RS8]: Durhur, open deur. Wat had dit evt. in de weg gestaan? M.a.w. zou een andere modelstructuur ook nog kunnen?

5.2 Practical Recommendations

This thesis showed certain relationships that could also benefit actual P2P payment application providers, banks and society. First of all, several determinants of the behavioral intention to use P2P payment applications were found to be significant. The highest positive effect has been found for the effect of the perceived usefulness and the biggest negative effect has been found for the effect of RTC. These significant relationships are beneficial to providers of P2P payment applications to attract new users. Providers of P2P payment applications could attract new users

by advertising based upon the usefulness of their applications. The ease of use however could not have been proven to be a significant determinant of the behavioral intention, providers of P2P payment applications should thus reconsider advertising based upon the ease of using the applications. This effect could however be proven to be significant for older people, it could thus be indicated that older people would be more inclined to use P2P payment applications when the applications are perceived to be easier to operate, videos explaining this applications could thus attract the older users, which are showing an increasing smart phone adoption.

Older people were perceived to be a less attractive target group since they are believed to be less inclined to try new innovations, especially technological innovations. The findings however indicate that the negative effect of resistance to change becomes weaker as people got older, which suggests that they could be an attractive target group. This target group of people over 50 is referred to as the 'silver economy' which according to a report of the European Commission (2018) would be as big as the third largest economy worldwide. This 'silver economy' is expected to exceed 5.7 trillion euros to Europe's economy by 2025 (European Commission, 2018). This age group could thus potentially be a profitable and attractive target group for providers of P2P payment applications. The findings of these thesis suggest that the adoption of P2P payment applications of this age group is less affected by RTC and could be enhanced by an increased perceived ease of use which offers opportunities to address this increasing target group. Furthermore, it was shown that males were more affected in their intention to use P2P payment applications by the perceived usefulness, it should thus be taken into consideration to focus more or less on usefulness depending on the target group. Men are more inclined, than women, to use P2P payment applications whenever they perceive these applications as being useful, advertisements showing their functions and benefits to using them could improve the perceived usefulness and thus the behavioral intention to use.

Results that could also be beneficial to P2P payment application providers are the importance of trust and the effect of perceived privacy and security. It has been shown that the perceived privacy is more important to the participants than the perceived security is. Providers of these applications should thus put their emphasis on creating a feeling of privacy with regards to the services they are offering.

The recommendations that are presented here are also applicable to society, since these insights could help providers of P2P payment applications, banks or governments to attract people to

use these applications. A cashless society is, as mentioned before, dependent on complementing innovations such as P2P payment applications. Insights regarding the factors contributing to the behavioral intention of these applications could foster this transition. The transition towards a cashless society is beneficial to society because cash is costly, consisting of the costs of printing and handling physical money and maintaining cash in circulation (Achord, Chan, Collier, Nardani & Rochermont, 2018). Companies, and banks, also need to store and transport the money, which costs a sufficient amount of money and is also prone to theft (Achord et al., 2018). Apart from this, cash offers a possibility to (criminal) shadow economies, since cash is very private and mobile transactions can be monitored (Achord et al., 2018). A cashless society thus offers less possibilities for people to embezzle, hide or launder dirty money. The adoption of P2P payment applications could foster the transition towards this cashless society and thus has the potential to benefit society.

5.3 Limitations

As every conducted research does have a certain number of things that went wrong or things that could have done or gone better, this thesis is no exception. First of all, the sample group consisted of relatively young participants since over 57 percent of the participants were between the age of 18 and 25, which could have had implications for the data. The most recent data of Statista (2019) shows that the share of people between 15 and 25 in the Netherlands is only 12,3 %. This comparison thus shows that the division of age in the sample that is used in this thesis is not representative to the Dutch population. Also, due to the fact that most of the people in the researcher's network are students, most (75%) of the participants were either HBO (higher vocational education) or University students. A sample group with a more even distribution of education levels could lead to different results.

The squared variance of the basic model (the TAM extended with RTC and trust) was relatively high ($.72 = 72\%$). The declared variance indicates the amount of variation in the dependent variable caused by the independent variables and would thus be assumed to be preferably as high as possible, however a high squared variance does not always indicate a good model. The squared variance can be affected by a number of problems, such as overfitting of the model or multicollinearity. Overfitting of the data does not seem to be an issue in this thesis, however intercorrelation seems to be an issue. There are multiple high correlations, as is discussed in

chapter 4, these correlations could cause overlapping variables which can cause a high squared variance.

Met opmerkingen [RS9]: Ja, maar dat zou dan vooral wijzen op een probleem met overlap tussen onafhankelijke en afhankelijke variabelen. Jij bespreekt het eerder vooral in de context van alleen de onafhankelijke variabelen.

The survey of this thesis has been divided into separate sections, which grouped certain variables together such as the perceived ease of use and the perceived usefulness, and the items of trust, security and privacy. The grouping of these variables could have had an influence on the correlations between variables as they were seeming to belong together in the survey. Participants could thus have perceived these items to belong to the same construct, which could have complicated the discriminant validity of these items. Also, the items relating to the perceived ease of use, the perceived usefulness, the resistance to change, actual use and the behavioral intention to use all were relating to P2P payment applications. The items of trust, security and privacy were however relating to the providers of P2P payment applications. It is possible that participants did not make or did not understand this distinction, since all other questions do relate to P2P payment applications, which could have caused differences in interpretation of the constructs. Furthermore, possible theoretical reasons for these high correlations are further explained in the preceding paragraph.

Met opmerkingen [RS10]: Heb je hier niet sowieso ook een beetje een meer diepgaand methodologisch probleem te pakken? Hoe voorzag je survey bv. in onderscheid tussen diverse providers?

Some of the items used in this thesis did have very high values ($>.95$) for the Cronbach's Alpha, which could mean that there are redundant items, and which means that the number of items could have been shorter. However, since the deletion of items relating to constructs with high Cronbach's Alpha values did not provide considerably large reductions of Cronbach's Alpha and due to the fact that these constructs were only consisting of four or even two items it was decided to not delete any items. These high values for Cronbach's Alpha are considered to be a limitation to this research.

5.4 Future research

This paragraph will highlight recommendations for other research that could be conducted, which are made based upon the results of this thesis. First of all, the squared variance or R^2 of the proposed model showed that there are possibly more determinants of the behavioral intention to use P2P payment applications. More research could be conducted into the effects of other determinants which are more specific than the determinants proposed in this thesis. Examples of other determinants could be compatibility as Ooi & Tan (2016) found to be positively affecting the behavioral intention to use smartphone credit cards, or innovativeness

Met opmerkingen [RS11]: Die was toch juist heel hoog? Spreek je jezelf dan hier niet een beetje tegen?

which was found to significantly affect the behavioral intention to use mobile shopping applications by Saprikis, Markos, Zampou and Vlachopoulou (2018). The determinants of the perceived trust could be further researched as well, since the two proposed variables declared 88% of the variance in the perceived trust, there is reason to believe that there will be more variables that could be of influence. The resistance to change was the strongest determinant of the behavioral intention to use P2P payment applications, this variable is however not researched extensively as a determinant of behavioral intention. The high effect of this variable indicates that further research is needed, as it could substantially affect the adoption of mobile applications or other innovations.

Furthermore, age proved to be a moderator with significant effects on the relationships between respectively, the perceived ease of use and resistance to change and the behavioral intention to use. However, since the majority of the participants was relatively young, these moderating effects could be biased because of these age differences. Therefore, future research is needed to assess these moderating effects in a sample in which age is more evenly distributed.

Furthermore, the preceding paragraph which relates to the limitations of this thesis indicated that future research is needed in order to assess the usability and validity of the scales that were used in this thesis. This thesis integrates different theories which have not been used together in this setting before, to further assess the added value of integrating these theories, further research is needed. As the Cronbach's Alpha of the variables were high, there is reason to believe that the used items can be improved with regards to validity or redundancy. The items of the resistance to change have also not been used extensively, which raises questions regarding its validity, testing these items in different settings and with different samples is thus desirable.

The research could be conducted using samples from differing countries since, Mckoy, Galetta & King (2017) showed that the effects of determinants in the TAM model differ across cultures. The research by Mckoy, Galetta & King (2017) showed that the effects of the perceived ease of use and/or perceived usefulness seemed to be non-existent in cultures with a high-power distance, high collectivism, low uncertainty avoidance and high masculinity. Their results thus show that the effects, presented in this thesis, could be different in countries in which people are more collectivistic, like Japan or Sweden, where people are less uncertainty avoidance (Anbari, Khilkhanova, Romanova & Umpleby, 2003). Also, Zaltman and Duncan (1977)

Met opmerkingen [RS12]: Hoezo? Je hebt daarvoor toch gecontroleerd?

Met opmerkingen [RS13]: Ja hallo... waarom er dan aan begonnen??

proposed that the resistance to change of people is dependent on four cultural barriers, such as the values and belief of different cultures. Their proposed cultural barriers could affect the influence of resistance to change as proposed in this thesis. Regarding trust, McClary (2015) showed that the culture people live in, affects their way of making decision to trust or distrust another. The findings by McClary (2015) indicate that the effect of trust in this thesis, could thus be different, when researched using samples from another culture.

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Appendix

Appendix A: Item list

Item	Item no.	Item	Original	Source
Perceived usefulness	Q1 (USE1)	You save time when you pay using a P2P payment application.	You save time when doing financial operations by on-line banking.	Mangin, Porrai, Bourgault & Mesley 2014
	Q2 (USE2)	Paying with a P2P payment application is useful.	Financial services offered on-line are useful	
	Q3 (USE3)	P2P payment applications allow me to pay more efficiently.	The on-line banking allows me to manage my finance accounts and operations more efficiently.	
Perceived ease-of-use	Q4 (EAS1)	Using P2P payment applications is less flexible than traditional means of payment.	Using multimedia materials is more flexible to teach than traditional one	Weng, Yang, Ho & Su (2018)
	Q5 (EAS2)	It is very easy to pay with P2P payment applications	It is very easy to work with on-line banking services	Mangin, Porrai, Bourgault & Mesley 2014
	Q6 (EAS3)	P2P payment applications are easy to understand.	On-line banking services are clear and easy to understand.	
Behavioral intention to use P2P payment applications	Q7 (INT1)	I intend to use P2P payment applications if the opportunity arises.	I intend to use mobile payment services if the opportunity arises.	Aslam, Arif & Ham (2017)
	Q8 (INT2)	I am likely to use P2P payment applications, in the near future	I am likely to use mobile payment services in the near future	
Actual use of P2P payment applications	Q9 (AUS1)	I use P2P payment applications	n/a	n/a
	Q10 (AUS1.2)	If yes → Which P2P payment	n/a	n/a

		application do you use.		
Dispositional resistance to change	Q11 (RTC1)	I generally prefer to use a payment method with which I am familiar with over starting to use a new payment method.	I generally prefer to use computer software with which I am familiar over starting to use a new program.	Nov & Ye (2009)
	Q12 (RTC2)	I find it exciting to try out new payment methods.	I find it exciting to try out new computer software.	
	Q13 (RTC3)	I feel a bit uncomfortable to try out new payment methods, even though it may be beneficial to me.	I often feel a bit uncomfortable to try out new computer software, even though it may be beneficial to me.	
	Q14 (RTC4)	Once I've started using a certain payment method, I'm not likely to switch.	Once I've started using certain computer software, I'm not likely to switch.	
Trust	Q15 (TRU1)	Providers of P2P payment applications are trustworthy	The online trading systems are trustworthy	Roca, García & de la Vega (2008)
	Q16 (TRU2)	P2P payment applications have a good reputation	The online trading systems have a good reputation as financial dealer and stockbroker	
	Q17 (TRU3)	P2P payment applications are competent and effective a means of paying.	The online trading systems are competent and effective as financial dealer and stockbroker	
	Q18 (TRU4)	I do not doubt the honesty of providers of P2P payment applications.	I do not doubt the honesty of the online trading systems	
Perceived Security	Q19 (SEC1)	I think P2P payment applications are	I think the online trading systems have sufficient	

		have sufficient technical capacity to ensure that my transaction cannot be modified by a third party	technical capacity to ensure that the data I send cannot be modified by a third party.	
	Q20 (SEC2)	The P2P payment applications have enough security measures to protect my personal and financial information	The online trading systems have enough security measures to protect my personal and financial information	
	Q21 (SEC3)	When I make a transaction using P2P payment applications, I am sure that my transaction will not be intercepted by unauthorized third parties	When I make a transaction using an online trading system, I am sure that my transaction will not be intercepted by unauthorized third parties	
Perceived Privacy	Q22 (PRI1)	I am concerned that using P2P payment applications will lead to abuse of my personal information.	I am concerned that the online trading systems will use my personal information for other purposes without my authorization	
	Q23 (PRI2)	I think that too much of my personal and financial information will be collected by providers of P2P payment applications.	I think that too much of my personal and financial information will be collected by the online trading systems	
	Q24 (PRI3)	I am concerned about the privacy of my personal and financial information when paying with a P2P payment application.	I am concerned about the privacy of my personal and financial information during a transaction	

	Q25 (PRI4)	My personal and financial information will be shared with other entities without my authorization.	My personal and financial information will be shared with other entities without my authorization	
Gender	Q26 (GEN)	What is your gender?	n/a	n/a
Age	Q27 (AGE1)	How old are you?	n/a	n/a
Education	Q28 (EDU1)	What is your highest achieved level of education?	n/a	n/a

Appendix B: Questionnaire

Informed consent page:

Deze enquête is bedoeld om het gebruik van betaal (verzoek) applicaties te onderzoeken. Deze enquête zal daarom vragen bevatten die relevant zijn voor het onderzoeken hiervan. U zal worden verzocht om een antwoord te geven op deze vragen, door middel van een 5-punts-Likertschaal; een schaal die loopt van helemaal niet mee eens tot helemaal mee eens. Uw antwoorden zullen geheel anoniem en vertrouwelijk worden behandeld en enkel gedeeld worden met de Radboud Universiteit.

Deze enquête zal ongeveer 5 minuten van uw tijd in beslag nemen. Uw deelname is geheel vrijwillig en vrijblijvend. U kunt op elk gewenst moment stoppen met de enquête. U kunt contact met mij opnemen voor vragen en/of resultaten van het onderzoek via: I.heijting@student.ru.nl

Wanneer u op 'Ja, ik ga akkoord' klikt, geeft u aan:

- Dat uw deelname aan deze enquête volkomen vrijwillig is.
- Dat u minstens 18 jaar oud bent.
- Dat u ervan op de hoogte bent, dat u op elk gewenst moment kan stoppen met het invullen van de enquête.

Ja ik ga akkoord, start de survey.

Nee ik ga niet akkoord, ik wil graag stoppen met de survey

Beste,

Bedankt voor het akkoord gaan met uw deelname aan deze enquête.

Aangaande het afstuderen van de master Marketing aan de Radboud Universiteit te Nijmegen, dien ik een onderzoek te verrichten.

Kent u het volgende?

“Ik heb nog 10 euro van je tegoed voor dat verjaardagscadeau... weet je nog, van die verjaardag laatst?”

Door middel van het sturen van een betaalverzoek en het betalen met een betaalapplicatie, wordt het terugbetalen van vrienden, kennissen of andere mensen een stuk toegankelijker en gemakkelijker. Een betaal (verzoek) applicatie maakt voor jou een betaallink aan die je met anderen kunt delen. Iedereen die de link opent, kan vervolgens het vooraf opgegeven bedrag via iDeal overmaken.

Dit onderzoek zal betrekking hebben op de factoren die ten grondslag liggen aan het gebruiken van een betaal (verzoek) applicatie waarmee u geld overmaakt naar anderen (kennissen, familie, vrienden, vreemden etc.). **Deze vragenlijst betreft dus enkel de betaalapplicaties waarmee geld kan worden overgemaakt tussen individuen door middel van het sturen en betalen van een betaalverzoek.** U kunt denken aan applicaties zoals Tikkie, Rabobank/ING-betaalverzoek.

De meeste vragen van dit onderzoek zullen vragen bevatten waarbij u gevraagd wordt aan te geven in hoeverre u het eens of oneens bent met de stelling.

Mocht u vragen hebben ofwel interesse hebben in de resultaten van het onderzoek, vraag ik u contact met mij op te nemen via: l.heijting@student.ru.nl.

Met vriendelijke groet,
Lucas Heijting

De volgende vragen hebben betrekking op het gebruiksgemak van betaalapplicaties. Kunt u aangeven in hoeverre u het eens bent met de volgende stellingen?

Je bespaart tijd door met betaalapplicaties te betalen.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Betalen met betaalapplicaties is handig.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Betaalapplicaties stellen mij in staat efficiënter te betalen.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Betalen via een betaalapplicatie is flexibeler dan betalen met contant geld.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Het is makkelijk om via een betaalapplicatie te betalen.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Betaalapplicaties zijn makkelijk te begrijpen.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

De volgende vragen gaan over uw **houding** tegenover veranderingen in de manier van betalen. Kunt u aangeven in hoeverre u het eens bent met de volgende stellingen?

Ik betaal liever met een betaalmethode waar ik bekend mee ben dan met een methode die ik niet ken.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Ik word enthousiast van het gebruiken van een nieuwe betaalmethode.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Ik vind het niet prettig om een nieuwe betaalmethode te proberen, ook al zou deze mij voordelen opleveren.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Wanneer ik aan een bepaalde betaalmethode ben gewend, zal ik niet snel wisselen van betaalmethode.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

De volgende vragen hebben betrekking op uw houding tegenover **betaal (verzoek) applicaties** met betrekking tot **vertrouwen**, **privacy** en **veiligheid**. Kunt u aangeven in hoeverre u het eens bent met de volgende stellingen?

Aanbieders van betaalapplicaties zijn te vertrouwen.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Betaalapplicaties hebben een goede reputatie.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Betaalapplicaties zijn een goede en effectieve manier van betalen.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Ik twijfel niet aan de eerlijkheid van aanbieders van betaalapplicaties.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Ik denk dat betaalapplicaties met voldoende technische kennis zijn ontwikkeld om te voorkomen dat mijn transactie niet kan worden onderschept door kwaadwillende partijen.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Ik denk dat bij het gebruik van betaalapplicaties mijn persoonlijke en financiële informatie voldoende beschermd zijn.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Wanneer ik betaal met een betaalapplicaties, kan deze transactie volgens mij onderschept worden door een andere partij.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Ik ben vrees dat het gebruik van betaalapplicaties leidt tot misbruik van mijn persoonlijke informatie.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Ik denk dat er te veel van mijn persoonlijke en financiële informatie verzameld wordt door aanbieders van betaalapplicaties.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Ik heb zorgen over de privacy van mijn gegevens tijdens het gebruiken van een betaalapplicatie.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Mijn persoonlijke en financiële informatie zal door aanbieders van betaalapplicaties worden gedeeld met andere partijen zonder mijn toestemming.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

De volgende vragen hebben betrekking op de mate waarin u denkt een betaalapplicatie te gaan gebruiken.

Ik ben van plan een betaal (verzoek) applicaties te gaan gebruiken wanneer de mogelijkheid zich voordoet.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Ik ben van plan binnenkort een betaal (verzoek) applicatie te gaan gebruiken.

Helemaal niet mee eens / niet mee eens / neutraal / mee eens / helemaal mee eens

Gebruikt u een betaal (verzoek) applicatie?

- Ja
- Nee

Zo ja, welke?

- Tikkie
- Bunq
- Rabobank betaalverzoek
- ING-betaalverzoek
- Anders, namelijk: _____

We zijn bijna op het eind!

Tot slot, zullen deze vragen gaan over u persoonlijk (uw antwoorden worden **anoniem** verwerkt en uw gegevens worden slechts gebruikt binnen dit onderzoek en niet met andere partijen gedeeld).

Wat is uw geslacht?

Man
Vrouw
Anders
Zeg ik liever niet

Hoe oud bent u?

Zeg ik liever niet

Wat is uw hoogst genoten opleiding?

Basisonderwijs
Middelbaar onderwijs
MBO
HBO
WO

Bedankt voor het invullen!

Appendix C: analysis

Separate Factor Analyses

Factor Matrix^a

	Factor 1
USE1	,976
US2	,969
USE3	,956

Factor Matrix^a

	Factor 1
EAS1	,715
EAS2	,953
EAS3	,938

Factor Matrix^a

	Factor 1
TRU1	,972
TRU2	,955
TRU3	,918

Factor Matrix ^a	
	Factor 1
RTC1	,852
RTC2	,915
RTC3	,849
RTC4	,948

TRU4	,872
------	------

Factor Matrix ^a	
	Factor 1
SEC1	,895
SEC2	,895

Factor Matrix ^a	
	Factor 1
PRI1	,897
PRI2	,963
PRI3	,935
PRI4	,921

Factor analysis

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,962
Bartlett's Test of Sphericity	Approx. Chi-Square	8653,983
	df	190
	Sig.	,000

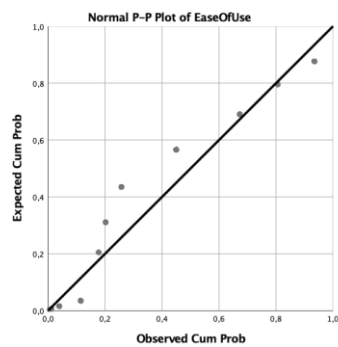
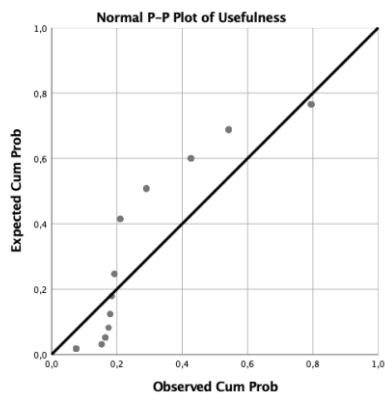
Skewness and Kurtosis

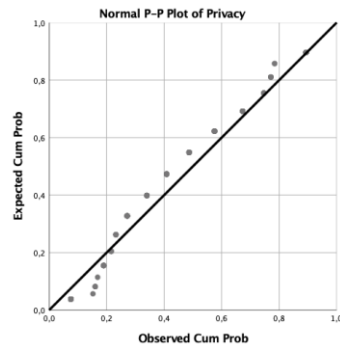
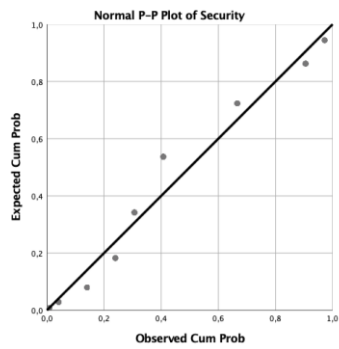
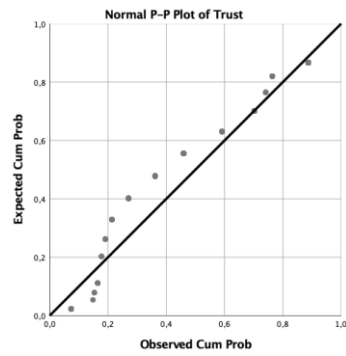
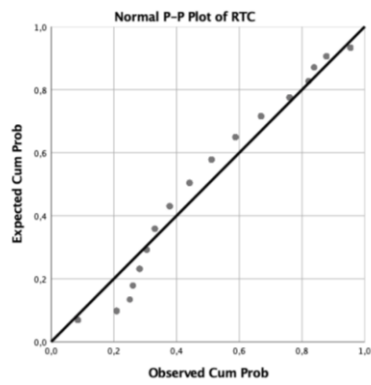
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
	ic	ic	c	tic	Statistic	ness	Skewness	Kurtosis	Kurtosis
Usefulness	307	1,00	5,00	3,9718	1,41752	-1,362	,139	,280	,277
EaseOfUse	307	1,00	5,00	3,8317	1,00881	-1,100	,139	,204	,277

RTC	307	1,00	5,00	2,984 5	1,34233	-,200	,139	- 1,197	,277
Trust	307	1,00	5,00	3,570 8	1,28865	-,901	,139	-,182	,277
Security	307	1,00	5,00	3,407 2	1,00099	-,621	,139	-,651	,277
Privacy	306	1,00	5,00	3,339 1	1,31963	-,484	,139	-,797	,277

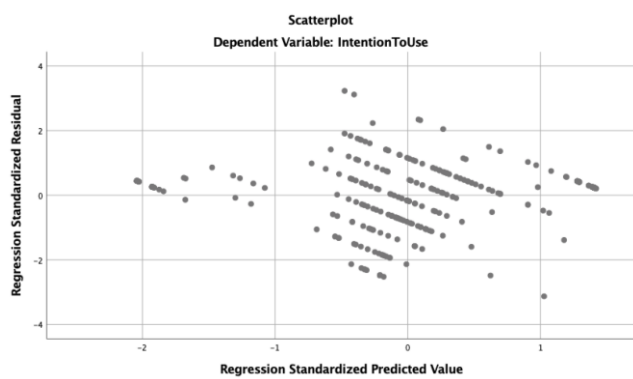
Descriptive Statistics									
	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Skewness Statistic	Std. Error	Kurtosis Statistic	Std. Error
Usefulness	307	1,00	5,00	3,9718	1,41752	-1,362	,139	,280	,277
EaseOfUse	307	1,00	5,00	3,8317	1,00881	-1,100	,139	,204	,277
RTC	307	1,00	5,00	2,9845	1,34233	-,200	,139	-1,197	,277
Trust	307	1,00	5,00	3,5708	1,28865	-,901	,139	-,182	,277
Security	307	1,00	5,00	3,4072	1,00099	-,621	,139	-,651	,277
Privacy	306	1,00	5,00	3,3391	1,31963	-,484	,139	-,797	,278
Valid N (listwise)	306								

Probability Plots





Scatterplot



VIF/tolerance values

		Coefficients ^a						
		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	3,019	,259		11,651	,000		
	Usefulness	,312	,073	,311	4,273	,000	,175	5,711
	EaseOf Use	-,051	,083	-,036	-,618	,537	,269	3,722
	RTC	-,553	,040	-,522	-13,811	,000	,649	1,541
	Trust	,201	,068	,183	2,959	,003	,243	4,108

a. Dependent Variable: IntentionToUse

		Coefficients ^a						
		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	,048	,091		,527	,599		
	Security	,370	,043	,288	8,685	,000	,358	2,796
	Privacy	,677	,032	,692	20,883	,000	,358	2,796

a. Dependent Variable: Trust