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**Abstract**

Recently, the data become an attractive topic in the business field. According to a report, the amount of data created during 2015 and 2016 occupied 90% of the total data and the data created each year is predicted to rise to 44 zettabytes by 2025. Meanwhile, the third-party mobile payment become more and more popular in different countries. It rises concerns about the regulation and other issues regarding payment. This paper is to analyse the users of third-party payment in China and the Netherlands and studies the factors that effect the intention to use of the payment services.

Key words	Third-party Payment, Regualtions in China and the Netherlands, Intention to use
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**UNIVERSITY  
OF TURKU**  
Turku School of  
Economics

**IAE  
AIX**

Aix-Marseille Graduate  
School of Management  
Aix-Marseille Université



# **INTENSION TO USE OF CUSTOMERS FOR PAYMENT SERVICES BY THIRD-PARTY PAYMENT SERVICE PROVIDERS**

**Comparing the situations in China and the Netherlands**

Master's Thesis  
in International Master in Management of  
IT

Author:  
Yonghui Guo

Supervisor:  
Prof. Anne Rutkowski

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# 1 INTRODUCTION

Recently, the data become an attractive topic in the business field. According to a report, the amount of data created during 2015 and 2016 occupied 90% of the total data and the data created each year is predicted to rise to 44 zettabytes by 2025. (Zerlang, 2017) Managers and analysts believe that if they can have good use of the data, they can analyse and anticipate customer behaviors and preference in an easier way. There are also other people realize how valuable the data is.

More and more companies are in the face of a threat of hackers. In July 2019, Capital One, an American bank, announced a data breach and the information of more than 106 million customers was accessed by a hacker. (Capital One, 2019) The concern arises regarding the security of data because of such a situation. To have better protection of people's privacy and personal data, a new policy called General Data Protection Regulation (GDPR) which is based on privacy laws in Europe was conducted and enforced from 25 May 2018. This regulation requires companies operating or offering goods or services or monitoring individual behaviors in Europe Union to draw attention to data privacy and cyber security of personal data. No matter which the position of the company within the process, from producing devices to collect and utilize, or getting data, to processing data in anywhere, the protection of data is always an important issue. (IEEE Innovation at Work, 2018)

Meanwhile, E-payment and mobile payment become more and more popular in daily life of people in many countries. Up to now, traditional payment methods such as cash and checks still play an important role, but there are a reduction in use with an increase trend of using electronic payment. Banks cards including credit and debit ones are frequently used in everyday life, which the third payment service institutions like Ali and Apple are seizing market share. To be specific, checks is seldom used and obsolete by many countries. Besides, users look forward to having a payment experience which is the same as or higher than cash and that is what E-payment can provide (EPC Ad-hoc Task Force on Instant Payments, 2016).

Many people consider GDPR as a global standard for data privacy and cyber security because the approach increases the compliance of companies and improves individual's awareness of protecting personal data. (Kalman, 2019; Grove, Clouse & Schaffner, 2019) However, protecting the data privacy and boosting cyber security would have some kind of negative impact on the development of Europe economy based on data. (Kalman, 2019)

At the same time, not many countries have conducted the same level regulations regarding privacy, which could be an obstacle during the transaction among European companies and companies from other regions or multinationals. (Bennett, 2018) The GDPR is still in its infancy and required to be improved in the following days.

Regarding the development of technologies, providing a reliable, effective and safe mechanism to protect sensitive data during payment process is incredibly important. To ensure the trust of users, payment services should be pretty secure and have no delay. In the Netherlands, Apple pay just take actions to extend its market share. Meanwhile, there are many successful implications in China about protecting sensitive data including Alipay, Wechat pay and Unipay. From this perspective, there could be some experience learnt from these implications in China.

The topic of this study is to improve intension to use of customers for payment services by non-financial institutions comparing the situations in China and the Netherlands. This research problem is investigated into three research questions:

1. What are the data protection regulations in the EU and in China?
2. What are the possible factors that would affect the intention to use of customers for payment service provided by the third-party?
3. What the influences of these factors are for payment services from the perspective of users in the Netherlands and in China?

In this study, the market, regulatory environment, current regulations regarding cybersecurity and payment services in China and the Netherlands are discussed and analyzed. By introducing the case of Alipay, some positive solutions can provide useful suggestions for the Dutch case. Through an empirical study of usage intention influence factors from the perspective of users in the Netherlands and China, the end goal of this study is to provide viable advice of improvement regarding the third party payment services in these two countries.

The questionnaires would be sent to people who live in the Netherlands and in China. Comparing the solutions in China and the factors users concerned in the Netherlands, some conclusion and advices can be made. Further research ideas about improving non-financial institutions payment service can be suggested.

This study is divided into five chapters. First is the induction chapter, where the research topic is set, the research problem and purpose are introduced, general aims and outlines of the research progress are stated. The second chapter presents the regulations

and two different environments in China and the Netherlands. At the same time, the factors that are possible to affect the intention to use of customers are introduced. The third chapter focuses on the methodological decisions such as the conduction of quantitative research and the analysis of research. A model is established and corresponding hypotheses are proposed. A questionnaire based on the research model is designed and distributes. The fourth chapter is the empirical research part. A descriptive score test is performed on the collected data. Afterwards, the empirical results are analyzed on the basis of this test. The fifth chapter is the conclusion part. In this chapter, the empirical results are summarized and discussed. Based on the findings, recommendations are made for future research directions.

## **2 LITERATURE REVIEW AND THEORETICAL BACKGROUND**

### **2.1 The Definition of the Third-party Mobile Payment**

According to Krueger (2001), mobile payment is a process that a payer makes a commercial payment to a recipient over the internet using a mobile phone or other mobile device to complete a transaction. It is also an innovative way to transfer between individuals, between organizations, and among individuals and organizations via the internet on mobile device (Heijden, 2002). In this study, mobile payment refers to the exchange of financial data through mobiles using internet for the purpose of transferring funds (Hui Ding, 2014; Heijden, 2002).

Combining the opinion of The State Information Center of China, the third-party mobile payment is a mean of payment that a consumer completes the transfer of funds from a payer to a recipient through a third-party intermediary that is independent of banks. In this context, third-party intermediaries only serve as intermediaries for the transfer of funds to address issues of credit and security involved in the transaction process. The third-party intermediaries only play a role in the transfer of funds to address the credit and security issues involved in the transaction process.

### **2.2 The Third-party Mobile Payment Service Regulations in China and the Netherlands**

#### **2.2.1 Overview of the Market**

Generally speaking, the growth of non-financial payment service is due to the popularity of e-commerce. In the past ten years, the importance and influence of e-commerce expand exponentially not only in China but also in other parts of world. To simplify the payment process, the third-party platform and payment systems become more and more important and challenge traditional payment methods like cards.

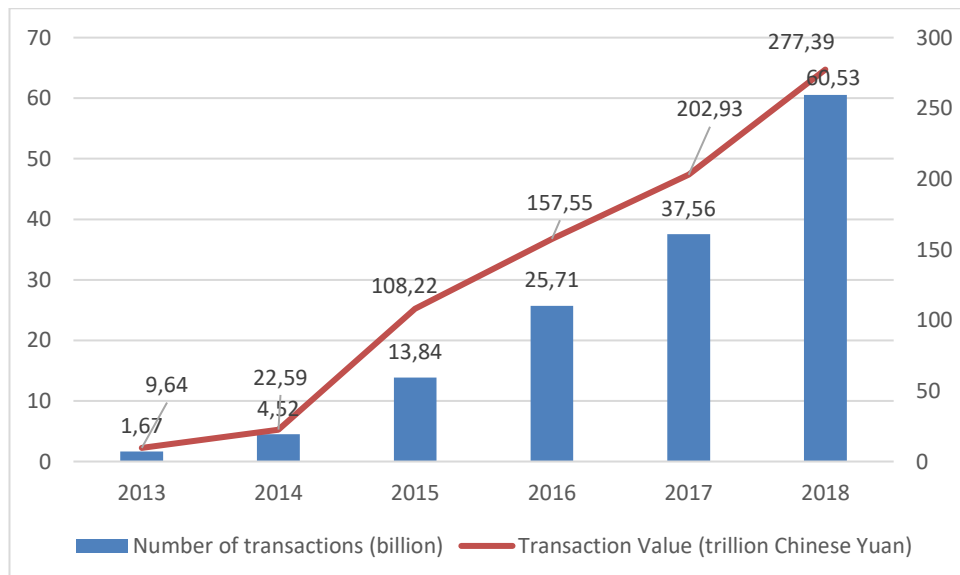
Comparing with e-payment, traditional methods like cash and cards have many drawbacks. Although cash is commonly accepted and has no transaction fee, in many situations, it is easy to lose or stolen. Because of the anonymity and intractability of cash, people cannot get refunded if they lost their cash. More importantly, cash is easy to forge so consumers are likely to be cheated during transaction. When using e-payment service, people can trace their money in an easier way and protect their property. Because of the e-payment process, interrupting the transaction becomes possible and common in daily life.

Adopting e-payment services can enjoy more advantages including higher speed of money transactions, shorter transaction process, less effort, more safety in a general way and easy to carry. In last decades, Credit cards debit cards are widely used for decades and gradually non-financial payment service become more and more popular because of its convenience.

### 2.2.1.1 Non-financial payment institutions in China

In recent years, the e-payment industry achieved significant growth. China has become the world's largest mobile payment market. Meanwhile, it plays an important role in the mobile payment market and have a large user scale, transaction scale, and not to mention the penetration rate. According to the State Information Center, in the first half of 2018, the number of mobile payment users in China is about 890 million, and the proportion of people using mobile payment service among all the phone users in the past three months, which can represent the penetration rate of mobile payment, is as high as 92.4%.

In terms of transaction scale, based on the overall situation of the payment system issued by the Payment and Settlement Department of the People's Bank of China, in 2018, banking financial institutions handled a total of 60.53 billion mobile payment transactions, with a transaction amount of 277.39 trillion yuan, an increase of 61.19% and 36.69% year-on-year respectively(Figure 1).



**Figure 1 Banking mobile payments transaction value and number of transactions from 2013 to 2018(The State Information Center, 2016)**

According to the statistics of the Payment and Clearing Association, non-financial institution payment data is with higher relevance to third-party payments. In 2017, non-financial institutions handled a total of 239.262 billion mobile payment transactions with an amount of 105.11 trillion yuan, an increase of 146.53% and 106.06%, with an average of 656 million transactions per day, amounting to 0.29 trillion.

From 2000 to 2010, the main payment methods were cash and card payments. Non-financial payment institutions have an advantage of integrating cards from different banks, which makes the payment easier and more effective. It also arises some concerns about the protection of data, especially in information Age.

Many Chinese internet operators, commercial banks and third-party payment institutions have made many efforts to explore e-payment, but the e-payment business and the scope of application have not achieved a quantum leap, and the market scale is difficult to expand significantly. In 2010, the People's Bank of China issued the "Measures for the Management of Payment Services of Non-financial Institutions", which stipulates that non-financial institutions should obtain payment business licenses and accept the supervision and management of the People's Bank of China under the law. The central bank's regulatory intervention has clarified the operating guideline of e-payment companies. Since then, e-payment has gradually entered the scope of financial supervision from industries with blurred border attributes.

#### *2.2.1.2 Electronic Payment Regulatory Environment in the Netherlands*

In the past years, e-payment services have similar increasing trend in Europe comparing with China, which promotes the European Union to develop regulations to monitor the payment behaviors with the aim to support the significant growth. The Single Euro Payment Area launched by European Commission is a milestone which makes electronic and card payment in every euro country possible in an easy way (European Commission, 2020).

The legal framework of SEPA is established with the adoption of The SEPA regulation (EU) No 260/2012 in 2012. It stipulates that all credit transfer and direct debits in Euro should be conducted in one of the two formats, which are SEPA Credit Transfers and SEPA Direct Debits respectively since 2014. This regulation focuses more on credit transfers and direct debits and supports payment service institutions at the same time. It also allows customers transfer funds to providers effectively for further use.



### 2.2.2 The development on cybersecurity and data protection in China

In December 2015, the People's Bank of China issued the "Administrative Measures on the Network Payment Business of Non-bank Payment Institutions". The purpose is to regulate the payment business of non-bank payment institutions, reduce payment risks, and protect the legitimate rights and interests of payment institutions and users. The regulation, implemented on July 1<sup>st</sup> of 2016, is about the following points: positioning of the three-party payment institution in the market, the real-name registration of payment accounts, the protection of the legitimate rights and interests of consumers, and the implementation of account classification management.

In 2016, a new Cybersecurity Law was passed and went into effect on June 1<sup>st</sup>, 2017. This law focus on improving the security of the internet in the case of an increase in the number of hackers.

The People's Bank of China, as the main regulatory body of the third-party payment institutions, is in charge of the third-party payment institutions. In addition to the regulation by the People's Bank of China, there are industry self-regulatory associations, such as the China Payment Clearing Association, which routinely manages the business of the institutions. The China Payment and Settlement Association has formulated a number of internal regulations for the standardized and healthy development of the industry, including the Convention on Self-Discipline in the Network Payment Industry and Convention on Self-Regulation in the Mobile Payments Industry.

At the same time, the third-party payment is a comprehensive business, which means it involves many aspects, including financial services business, the operation of the internet business and so on. If the regulation is only based on the third-party payment as a single business function, it is one-sided and there is potential crisis. Therefore, The Ministry of Industry and Information Technology, the Ministry of Public Security, the Banking Regulatory Commission, the Ministry of Commerce and the General Administration for Industry and Commerce will also be involved in supervision (Table 1).

**Table 1 Subject and Scope of Regulations**

Regulator	Regulatory content	Regulations
People's Bank of China (PBoC)	Internet payment qualification, Payment system stability and security, Payment clearing risk prevention	Anti-money-laundering and Anti-terrorist Financing Management Measures for Payment institutions

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		Measures for the Management of Internet Business by Payment Institutions
		Management of Payment Services by Non-financial Institutions
China Banking Regulatory Commission (CBRC)	Online payment norms for third-party payment institutions and commercial banks	Interim Measures for the Management of Internet Banking Management of Electronic Banking Security Assessment Guidelines for Electronic Banking Commercial Banking Act
Ministry of Commerce	Online transactions, E-commerce	Electronic Signature Act Third-party E-commerce Trading Platform Service Specifications
Ministry of Industry and Information Technology	Internet information security	Security Management Approach to the International Networking of Computer Information Networks Internet Information Services Management Network Services Regulations on the Protection of Personal Information of Telecommunications and Internet Users
Ministry of Public Security	Cybersecurity, Information crime	Regulations of the People's Republic of China on Public Security Administration Penalties
General Administration for Industry and Commerce	Internet trading, Network service provider behavior management	Contract Law Interim Administrative Measures for Internet Commodity Trading and Related Services

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### 2.2.3 Payment Service Directive

The adoption of the Payment Service Directive in 2007 brought significant change to the payment market in Europe and set the legal framework for establishing a single Euro payment market in the European Union area. The aim of the directive is to establish a set of regulations that is applicable to all payment services.

The main point is that service providers should have greater transparency on requirements of payment services and information. It also clarifies the rules and obligations of the users and providers of payment services. In some case, it can achieve the goal that simplify the cross-border payments and improve efficiency and makes them as safe as domestic payments.

The two main sections of Payment Service Directive are as follow:

1. Create a list of authorized payment service providers
2. Set rules for the operation of services providers

The Payment Service Directive plays an important role in establishing a framework for electronic payments, but because of the new trends of payment and the rise of e-commerce platforms, European Commission realized that the regulations did not match the needs of occurred technological innovations and protection of users and providers should be enhanced.

#### 2.2.4 Payment Service Directive 2

With the aim to reduce fraud and improve customer choice, the second Payment Service Directive is driving changes and innovations in banking and finance (Gaynor,2020). Four main roles are involved in this process: the customer, the merchant, the bank and the third-party service provider.

PSD2 have impact on these roles in an effective way (De Nederlandsche Bank, 2020). For the customers, they can use the latest online payment and accounts services with the help of PSD2. The third-party service providers can access the bank accounts of customers after obtaining consent. For the merchants, with PSD2, they can enjoy the innovative electronic payment services of third-party providers. They can choose from various payment methods and providers. The decision of service might also be influence by the preference of customers. The new payment and account information services providers are the third party of customers and banks which can be other banks and fintech companies. The only point for attention is that any provider must have a license of a supervisory authority.

This directive also contains two important elements for participants: Strong Customer Authentication (SCA) and two types of new regulated payment providers (Gaynor,2020). Strong Customer Authentication is to reduce payment fraud while have minimized impact on customer experience. The key factor is double identification authentication. When customers try to finish a payment, they need to provide two kind of information to verify their identity. It could be the thing they own like their phone, the information they know like PIN code, or their biometric information. Some kind of transactions can be free of authentication, such as transaction with lower value and the repetitive transactions.

The two new type of third-party service providers are payment initiation service providers and account information service providers. Payment initiation service providers refers to the providers that with the allowance to initiate payment on behalf of the customers without accessing the online bank accounts, which is flexible for customers to pay. Account information service providers allows third party institutions to access the bank accounts of customers and show the relevant information. For example, the customers can read details of all his or her account from a single application, which help the customers have an overall understanding of their financial situation.

### **2.3 Theory of Reasoned Action**

The Theory of Reasoned Action was developed by Fishbein and Ajzen in the 1970s to explore the correlation between internal attitudes of individuals toward a behavior and the actual performance of that behavior. This model has its roots in psychology and covers three basic assumptions (Wu and Zhou, 2016):

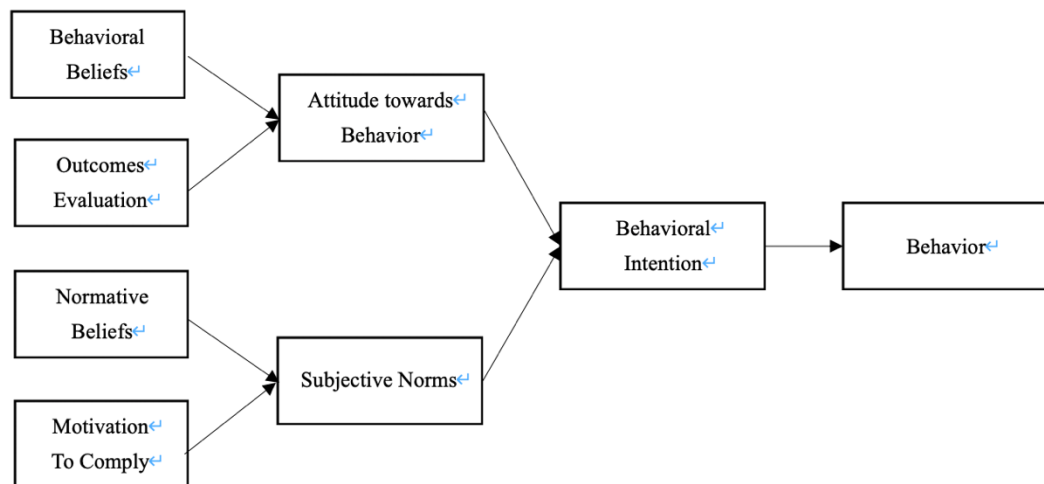
First, social groups are rational. They are able to accept and use the knowledge and experience they acquire based on a systemic and holistic view.

Second, unconscious latent variables do not affect the actual behaviors of social groups.

Thirdly, individuals themselves can fully determine their own conscious behaviors.

According to Lu and Xu (2005), the model, as shown in Figure 2, shows that the behavioral intentions in the TRA model can be used to infer the actual use of behavior, while the attitudes and subjective norms displayed in the mind of individuals when performing a behavior can be used to infer the behavioral intentions. A normative awareness of beliefs of individuals and their motivation to conform with others can have a direct effect on their subjective norms. Factors that influence the attitude of individuals to behavior include his or her commitment to performance and the evaluation he or she places on its effectiveness.

Behavioral intentions are used to weigh the strength of the intention of individuals to perform a behavior. Subjective norms refer to the social influences that an individual receives when he or she engages in a behavior. This is a subjective judgement of whether the people around him, such as colleagues and leaders, who influence his decision making, expect him to perform a certain behavior. Behavioral attitudes represent the positive or negative emotions that an individual feel when performing a certain behavior.



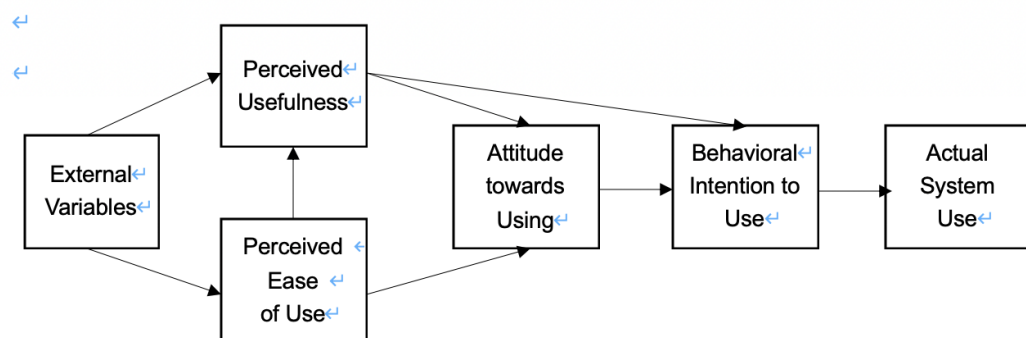
**Figure 2 Theory of Reasoned Action Model**

As the three assumptions covered by this model are difficult to meet, further improvements are needed.

## 2.4 Technology Acceptance Model

The Technology Acceptance Model is developed based on the Theory of Reasoned Action by Davis in 1989. It is usually used to study the determinants that influence the use of Internet technologies and products and it is showed in Figure 3. The theory suggests that the attitudes of users are more influential than subjective norms when accepting a new technology, and that attitudes are mainly influenced by perceived usefulness and perceived ease of use.

Perceived usefulness refers to the extent to which the application of a technology or system effectively enhances the performance of the user. Perceived ease of use refers to the degree of ease of use perceived by the user when applying a technology or system.



**Figure 3 Technology Acceptance Model**

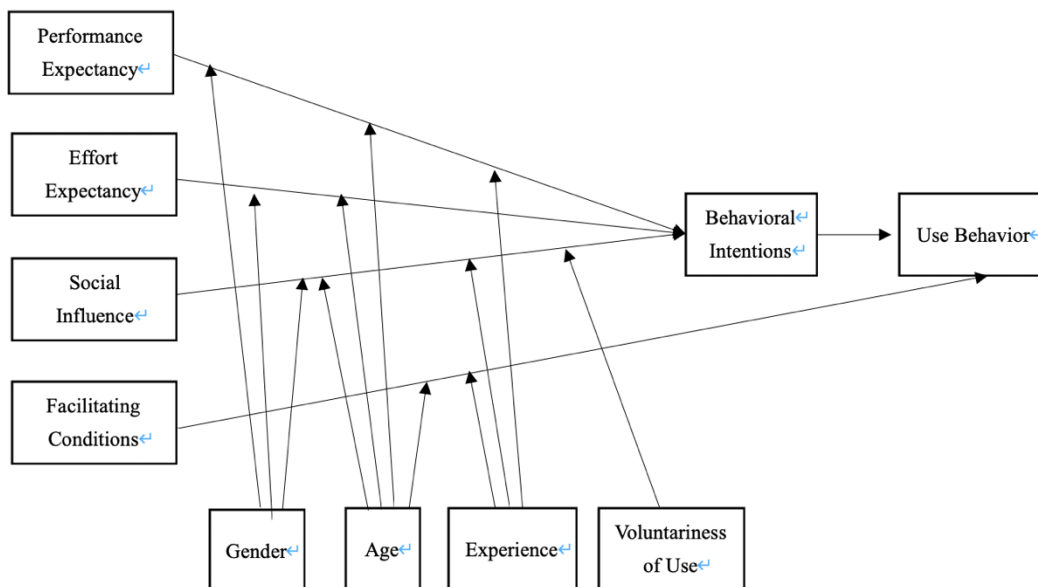
The actual usage behavior of individuals in the TAM model architecture is directly influenced by their behavioral intentions, and the behavioral attitude and perceived usefulness jointly determine behavioral intention to use. In turn attitude towards using is jointly determined by perceived usefulness and perceived ease of use.

In addition, perceived ease of use has a positive differential effect on perceived usefulness. The greater perceived ease of use of an innovative technology of individuals is, the more effective it is in improving their performance and the more positive their behavioral attitudes. Both of them are influenced by external factors. Common externalities include technology characteristics, usage process characteristics, user interventions, etc., which also indirectly influence the actual behavior of technology users.

However, when extending the application of the TAM model, its limitations become apparent. The model is usually only applicable to behaviors dictated by the wills of individuals and is lack of the constraints of external conditions such as resources and time (Bagozzi, 1992).

## 2.5 Unified Theory of Acceptance and Use of Technology

In 2003, Venkatesh et al. integrated the latent variables involved in previous theoretical models into four dimensions and developed an integrated theory of technology acceptance and use which is Unified Theory of Acceptance and Use of Technology. The model of theory is showed as Figure 4.



**Figure 4 Unified Theory of Acceptance and Use of Technology Model**

The Unified Theory of Acceptance and Use of Technology model includes not only the outcome variables of intention to use and use behavior, but also four core variables of effort expectancy (EE), performance expectancy (PE), social influence (SI), and facilitating conditions (FC), and four moderating variables of voluntariness of use, age, gender, and experience. Its four core variables are conceptually defined as follows (Yu, 2012):

1. Performance expectancy is the degree to which users believe that the application of a technology will enable them to have a better level of performance;
2. Effort expectancy is the degree to which a technology is perceived by the user as being easy to apply;
3. Social influence is the perceived influence of the surrounding population on the perception the user of their adoption or rejection of a technology;
4. Facilitating conditions refers to the extent to which users perceive that existing structures or conditions support their application of a technology.

The model argues that willingness of users to use an innovative technology is directly influenced by social influence, effort expectancy and performance expectancy, while individual usage behavior is directly influenced by facilitating conditions and intention to use, with the four moderating variables mediating the relevant variables of the UTAUT model.

The theoretical model contains three main values. First, it builds on existing theoretical models, being developed and elaborated on the kernel of four elements, which also influence individual technology acceptance: performance expectancy, effort expectancy, facilitating conditions.

Secondly, it introduced moderating variables, which not only made the model more explanatory and more widely applicable, but also contributed to a better theoretical model of technology.

Third, the UTAUT model has a unique advantage in user technology acceptance studies because of its strong degree of interpretation.

However, the UTAUT model, as a general user technology use model, is not immune to some shortcomings. Venkatesh et al. (2003) discuss the limitations of the UTAUT model by emphasizing that the model's measurements are still preliminary, its content validity needs to be further improved. The relevant variables included in other theoretical models may not be fully represented in the UTAUT theoretical model.

## **2.6 Factors That Affect the Intention of Use in Third-party Payment**

### **2.6.1 Intention to use**

In the study of Blackwell (2011), the researcher argues that intention to use is considered as the inclination of a user to take a certain action, which can be either a consuming action or some action taken by the consumer towards a specific goal. Chen (2015) believe that intention to use refers to the thoughts of a consumer about whether to buy or use the service or product offered by the merchant.

In short, intention to use is defined as the mental activity of a consumer on whether he or she wants to buy a product or service offered by a merchant, which also known as the willingness to use the product or service in this paper.

### **2.6.2 Transaction Procedures**

Because of the development of internet and technology, the procedure of transaction in mobile payment is different from the traditional payment. Such kind of difference can lead to a series of security issues, for example the unauthorized use (Grigg et al., 2015). That is because the basic difference of tools of transaction. Although the third-party mobile payment can provide a more convenient experience, more guarantees should be made.

According to Gao and Waechter (2017), the protection of the payment traction procedures is become a factor to increase the use of the payment service because it can increase the trust of the system. Zhou (2011) suggests that improving the transparency and scandalization is possible to boost the adaptation of mobile payment. At the same time, in mobile payment system, Niu (2017) argues that a sophisticated procedures and process should be established to reduce concerns about security.

### **2.6.3 Technical Protections**

Because the internet is an open space, the transaction process of mobile payment, especially the third-party service is explored to every participant. That is the reason why the technical structure of the payment system should be strong enough to defend against attacks. Pietro et al. (2016) argue that the service providers should consider careful about the technology to protect the security of information of users, as the reliability of protection method would have influence on intention to use. Meanwhile, the security of mobile



payment is influenced by various factors, such as systems factors which refers to the infrastructures, etc., transaction factors and regulation factors (Linck et al., 2016, Hwang et al., 2007). Transaction factors can be recognized as following well-designed instructions based on latest technology to complete the payments, and regulation factors means the legal framework for mobile payment. According to the study of Liu (2015), there are three main factors affecting the security of data, which are information misuse, illegal collection and violation of personal wishes. Taylor (2016) suggests that security solutions with various technologies play an integral role in payment service. Sum up, related technologies should be developed to ensure the quality of service.

#### 2.6.4 Security Statements

Security statements refers to the information provided to users for understanding the operations and solutions of mobile payment service. It can reduce the information asymmetry during the payment process and increase the willing to use the service (Kim et al., 2010). Friedman et al. (2002) suggest that the statements of regulations, typical security marks, clear descriptions, statements that easy to understand, and logical designs provide a good way for users to figure and understand how the security system of the payment service works and reduce their concerns.

#### 2.6.5 Perceived Risk

According to Bauer (1860), During the purchasing process, consumers do not accurately expect the results of the use of the products. Some of the products may be unpleasant to consumer, so the purchase can be regarded as an act of risk-taking. When consumers buy a product or service, they assume the potential negative consequences of that purchase activity, and the subjective perception of such negative consequences is perceived risk. Cunningham (1967) develop the theory and categorized perceived risk into following two factors: uncertainty and consequence. Uncertainty refers to the subjective probability of the consumer of whether something will happen. Consequence refers to the risk of the outcome if the thing goes wrong. In this study, perceived risk is recognized as the sum of perceived uncertainty and adverse consequences of an individual (Kamarulzaman and Azmi, 2010).

Previous studies also definite the perceived risk dimensions, and different research subjects may be divided into different dimensions of perceived risk due to their characteristics (Chaudhuri, 2003, Shang and Lü, 2009). Featherman and Pavlou (2003) suggest that there are six dimensions for e-commerce, which are privacy risk, time risk, financial risk, performance risk, social risk, and psychological risk representatively.

## **2.7 Summary**

In this chapter, concepts regarding mobile payment and the third-party mobile payments are introduced. The overview of Dutch and Chinese market is explained and the regulation frameworks of the Netherlands and China are analyzed. Four factors that are possible to affect the intention to use of the third-party mobile payment are chosen to be presented.

Pervious searches usually focus on the analysis of single application, but the comparison of two typical application in two regions is relatively infrequent, while it is possible to provide some new ideas to improve the performance of the application. In this paper, transaction procedure, technical protections, security statements and perceived risks are introduced into a model with the aim to investigate the intention to use of customers regarding the third-party payment.

### **3 METHODOLOGY AND RESEARCH MODEL**

In this section, the details of model and hypotheses are also introduced. The methodology by which this study will be conducted is also described, including research approach, research design, data collection method, sample selection, and research limitations.

#### **3.1 Research Model and Hypotheses**

With the rise of the mobile internet, third-party mobile payments are poised for rapid growth. The choice of third-party mobile payments of customers is influenced by personal factors, security concerns, technological changes, and other various factors, which makes the choice of third-party mobile payments more complicated. Therefore, this paper explores the factors influencing the willingness of customers to use third-party mobile payments, based on existing research on third-party payments and third-party mobile payments, combined with the regulatory conditions and current market situations in the Netherlands and China.

##### **3.1.1 Transaction Procedure**

Transaction Procedure refers to a set of processes that users are required to go through to achieve their goals in a convenient way (Lawrence et al, 2002). According to Wei and Ye (2020), there are three main stages in the process. The first one is the authorization of the identity of payers before payment. Secondly, it is the encrypted separate steps for payers to finish payment. The final one is confirmation message after payment to make sure the transaction is completed. Going through these procedures successfully do help to increase intention to use of customers (Singh and Srivastava, 2018). Therefore, the following hypotheses are made:

H1: Transaction procedures are negatively correlated with consumers' perceived risk

H2: Transaction procedures are positively correlated with consumers' intention to use of the third-party payment service.

##### **3.1.2 Technical Protections**

Technical protections refer to a set of technical mechanism that are applied to protect the function of a system (Kim et al. 2010). According to Seetharaman et al. (2017), the guarantee of latest and powerful technologies to protect security of payment have influence

on the intention to use of customers. When customers get the information of the technical protections, there is also an influence on perceived risks. Therefore, the following hypotheses are made:

H3: Technical protections are negatively correlated with consumers' perceived risk.

H4: Technical protections are positively correlated with consumers' intention to use of the third-party payment service.

### 3.1.3 Security Statements

Security Statements refer to the explanation and description of the usage of the payment system with the aim to reduce the concerns of users. Miyazaki and Fernandez (2000) suggest that customers would be affected by the security statement of the payment service. When the quality of statements is high, they are more likely to trust the service and be willing to use the payment system. Therefore, the following hypotheses are made:

H5: Security statements are negatively correlated with consumers' perceived risk.

H6: Security statements are positively correlated with consumers' intention to use of the third-party payment service.

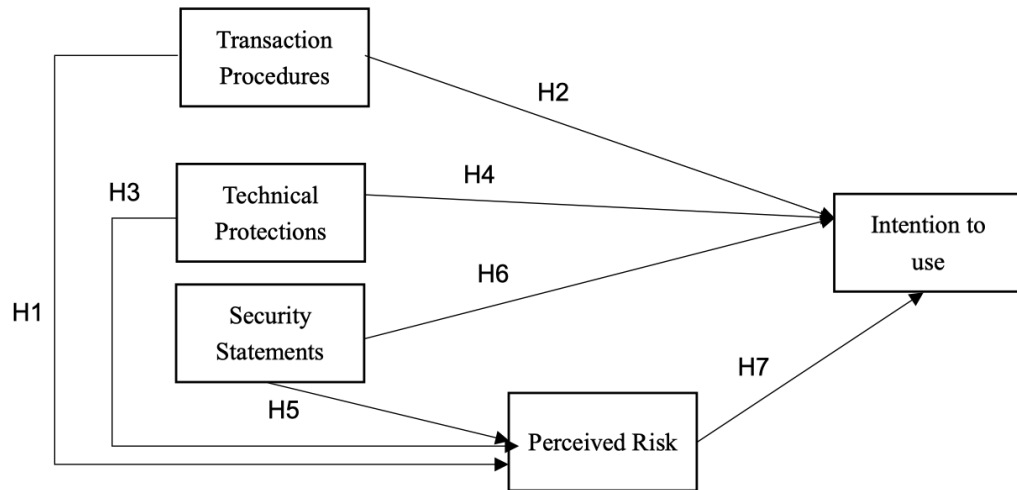
### 3.1.4 Perceived risks

Perceived risk refers to the uncertainty of risk and the psychological expectation of adverse consequences that consumers have during a transaction. Forsythe and Shi Bo (2003) found that consumers' attitude towards online shopping is negatively affected by perceived risk. Therefore, the following hypothesis is made:

H7: Perceived risk is negatively correlated with consumers' intention to use of the third-party payment service.

### 3.1.5 Research Model

Based on the summary of existing researches and taking into account markets backgrounds and differences, this study takes four variables - transaction procedure, technical protections, security statements and perceived risks - as factors influencing the intention to use of third-party mobile payments. The specific research model is showed in Figure 5:



**Figure 5 Research model**

### 3.2 Research proposes

The research purpose is to analyze intension to use of customers for the third-party payment services comparing the situations in China and the Netherlands. This study is conducted by using quantitative research methods. Based on existing literature, theories hypotheses are formed. Collecting appropriate data and analyzing the data to test these hypothesis or proposition is the next process. If the analysis is consistent, the hypotheses are valid.

The core of quantitative research is the collection and analysis of quantitative data. The results from the analysis of data often have the advantage of reliability and validity and can establish a cause and effect relationship between the research question and the data. In addition, quantitative research method makes the collection and analysis of data fairly quickly and the results are more reliable and objective.

### 3.3 Research design

In this study, survey is adopted. The design of the questionnaire is based on several previous studies on electronic payments and the protection of sensitive information. The questions were set on what information protection measures and security guarantees make users more likely to continue using the software. According to the purpose of study, the questionnaire in this paper was modified from the questionnaires used in previous studies with good reliability and validity, to obtain a proper the measurement scale in this paper. The questionnaire has multiple question items for each variable to ensure the reliability

of the scale. The items that measure the same variable are grouped together to make it easier for respondents to understand the items when completing the questionnaire.

A total of 22 items is set based on five variables: transaction procedure, technical protections, security statements, perceived risks, and intention to use. A seven-point Likert scale is adapted to examine, that is, the respondents need to score each question according to their own knowledge of the third-party mobile payment application. Each option represents the different attitudes of the respondents to the question, where strongly agree represents 7 points, agree represents 6 points, somewhat agree is for 5 points, neither agree nor disagree is for 4 points, somewhat disagree is for 3 points, disagree means 2 points and strongly disagree means 1 point.

### 3.3.1 Variables Measurement Scale

Variable Transaction Procedure refers to a set of processes that users are required to go through to achieve their goals in a convenient way (Lawrence et al, 2002). This study extracts the relevant measurement scales which are suitable for third-party mobile payment on the basis of summarizing the existing research on the measurement scales of transaction procedure through reading the relevant research literature. Transaction procedure measurement question items mainly refer to the measurement scales of kim et al. (2000), and the relevant items are modified to make them better fit actual situations of Alipay and Apple Pay. Using the Likert 7-level scale, the final measurement question items are shown in Table 2.

**Table 2 Transaction Procedure Variable Measurement Scale**

Variable	Number	Item
Transaction procedure	Q1.1	The application provides enough ways to authenticate your identity.
	Q1.2	The verification method before completing the payment can guarantee that the payer is yourself.
	Q1.3	The summary of payment details (fees, payer, etc.) and the final payment amount is clearly displayed in the application.
	Q1.4	The confirmation provided by the application after the payment is completed and precise.

Technical protections refer to a set of technical mechanism that are applied to protect the function of a system (Kim et al. 2010). This study extracts the relevant measurement scales which are suitable for third-party mobile payment on the basis of summarizing the existing research on the measurement scales of technical protections through the relevant

research literature. Technical protections measurement question items mainly refer to the measurement scales of kim et al. (2000) and Huang (2019). The relevant items are modified to make them better fit actual situations of Alipay and Apple Pay. Using the Likert 7-level scale, the final measurement question items are shown in Table 3.

**Table 3 Technical Protections Variable Measurement Scale**

Variable	Number	Item
Technical protections	Q2.1	You believe that your personal information has not been stolen as a result of using the application.
	Q2.2	You believe that your personal information has not been leaked to other companies or individuals by the application for any reason.
	Q2.3	You trust that the payment amount and transaction information displayed in the application has been accurate
	Q2.4	You believe that the transaction information transmitted through the application is strictly protected.
	Q2.5	Few errors occur when using the application.
	Q2.6	The application's payment services are available anytime, anywhere.

Security statements refers to the information provided to users for understanding the operations and solutions of mobile payment service. This study extracts the relevant measurement scales which are suitable for third-party mobile payment on the basis of summarizing the existing research on the measurement scales of security statements through the relevant research literature. Security statements measurement question items mainly refer to the measurement scales of kim et al. (2000) and Zhou et al. (2019). The relevant items are modified to make them better fit actual situations of Alipay and Apple Pay. Using the Likert 7-level scale, the final measurement question items are shown in Table 4.

**Table 4 Security Statement Variable Measurement Scale**

Variable	Number	Item
Security statements	Q3.1	The application provides detailed explanations allows you to understand how to view, cancel, modify and record a payment.
	Q3.2	The application provides statements that can allay your doubts about security policies, emergency contacts, and feature settings.
	Q3.3	You can find the relevant security statements in a prominent place in the application, and have no trouble reading them.
	Q3.4	Your concerns about security issues can be easily found in the FAQ or in the help.

Perceived risk refers to the uncertainty of risk and the psychological expectation of adverse consequences that consumers have during a transaction. This study extracts the relevant measurement scales which are suitable for third-party mobile payment on the basis

of summarizing the existing research on the measurement scales of perceived risks through the relevant research literature. Perceived risks measurement question items mainly refer to the measurement scales of Rouibah et al. (2016). The relevant items are modified to make them better fit actual situations of Alipay and Apple Pay. Using the Likert 7-level scale, the final measurement question items are shown in Table 5.

**Table 5 Perceived Risks Variable Measurement Scale**

Variable	Number	Item
Perceived risks	Q4.1	You are worried that a vulnerability in the application's system could cause personal information to be compromised.
	Q4.2	You are worried about account theft.
	Q4.3	You are worried about losing money using the application.
	Q4.4	You are worried about trading information being compromised.

Intention to use is defined as the mental activity of a consumer on whether he or she wants to buy a product or service offered by a merchant, which also known as the willingness to use the product or service. This study extracts the relevant measurement scales which are suitable for third-party mobile payment on the basis of summarizing the existing research on the measurement scales of intention to use through the relevant research literature. Intention to use measurement question items mainly refer to the measurement scales of Rouibah et al. (2016) and Seetharaman et al.(2017). The relevant items are modified to make them better fit actual situations of Alipay and Apple Pay. Using the Likert 7-level scale, the final measurement question items are shown in Table 6.

**Table 6 Intention to Use Variable Measurement Scale**

Variable	Number	Item
Intention to use	Q5.1	Your attitude towards using the application is positive.
	Q5.2	You will continue to transact through the application.
	Q5.3	You will recommend the application to others.

### 3.4 Data Collection

The research topic of this study is the analyze and comparison of factors influencing the intention to use of third-party mobile payments in the Netherlands and China. With the rise of the mobile internet in recent years, third-party mobile payments are gradually integrated into people's daily lives. At present, the penetration rate of third-party mobile payment is not widespread enough all the age group. For many people, third-party mobile payment is still a new technology and new tool. Therefore, the respondents of this study need to know more about the third-party mobile payment, so those groups who are more



willing to contact or early contact with new technology than others. Undergraduate students and working professionals within three years of university graduation are main participants. They are usually can utilize internet conveniently, and master the skills to purchase online, manage their account online and other basic abilities to use mobile internet. Laukkanen et al. (2007) argue that the users of the third-party payment services have a certain level of education and a younger age generally. That is because the younger users are more willing to trust the technology of the payment services and do not think the third-party payment services in a high risk. Choosing this group as a survey sample can be better to get the scientific and reasonable survey results. In addition, in order to maintain the coverage of the survey sample, this study selects those who have used Alipay in China and those who have used Apple Pay in the Netherlands as the survey sample.

In summary, the university students and career persons who have used Alipay in China and those who have used Apple Pay in the Netherlands are chosen as the main survey groups in this study.

### **3.5 Questionnaires and recovery**

The questionnaire was designed and completed with the help of Qualtrics XM, and was distributed through social tools such as Wechat, Email, Messenger and Whatsapp. A total of 400 questionnaires were distributed and 358 were returned, with 330 valid questionnaires.

### **3.6 Summary**

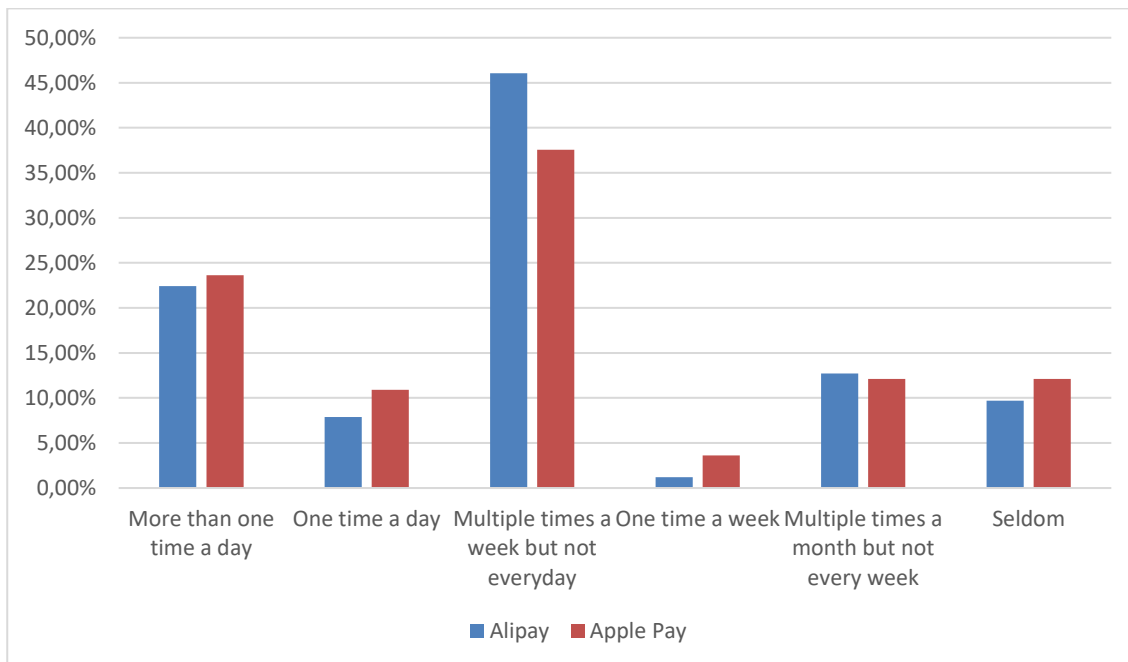
Regards on the theoretical research model, this chapter examines the proposed hypotheses through a questionnaire. During the design the questionnaire, the mature existing studies are mainly referred and appropriate modifications to relevant questions regarding the actual situation of third-party mobile payment in the Netherlands and China are customized. Besides, this chapter further analyzes the sample selection, distribution and recovery of the survey questionnaire.

## 4 EMPIRICAL RESEARCH

### 4.1 Descriptive Statistical Analysis

Of all the survey respondents, 165 consumers use Alipay and 165 consumers use Apple Pay. The results can be referred in Figure 6. Of the consumers who use Alipay, 37 use it multiple times a day, 13 use it once a day, 76 use it multiple times a week but not daily, and two use it once a week. Those who use it multiple times a month but not weekly are 21, and those who seldom use it are 16.

Of the consumers who use Apple Pay, 39 use it multiple times a day, 18 use it once a day, 62 use it multiple times a week but not daily, and 6 use it once a week. Those who use it multiple times a month but not weekly are 20, and those who seldom use it are 20.



**Figure 6 Third party mobile payment service using frequency distribution map**

According to the survey results, consumers who use both third-party payment applications more than once a week are greater than 75 percent. This indicates that the respondents of this survey use third-party payment applications frequently and to some extent meets the requirements of this paper.

### 4.2 Reliability and Validity Analysis

Reliability analysis and validity analysis are analyses of the validity and reliability of data. Only after passing the reliability and validity tests can subsequent studies be con-

ducted. Therefore, it is very important to perform reliability and validity tests on the sample data. In this paper, SPSS software is used to perform reliability and validity tests on the data.

#### 4.2.1 Reliability

Reliability refers to the consistency and stability of a scale in measuring an indicator, and reliability analysis measures the reliability of a survey questionnaire. In this paper, Cronbach's alpha is used, which is the most commonly used reliability test method in statistical analysis. The rules of Cronbach's alpha are explained in Table 7.

**Table 7 Cronbach's alpha evaluation standard**

Cronbach's alpha	Internal consistency
Cronbach's Alpha $\leq$ 0.3	Unacceptable
0.3<Cronbach's Alpha $\leq$ 0.4	Poor
0.4<Cronbach's Alpha $\leq$ 0.5	Questionable
0.5<Cronbach's Alpha $\leq$ 0.7	Acceptable
0.7<Cronbach's Alpha $\leq$ 0.9	Good
0.9<Cronbach's Alpha	Excellent

From the table, it can be found that the corrected item total correlation values of each item in the questionnaire are greater than 0.5. Generally, it means that asked items in the questionnaire have a strong correlation with the research questions, which suggests that the questionnaire design can separate participants with different opinions and feelings. The alpha values are 0.817, 0.882, 0.813, 0.817 and 0.767 respectively, which are all greater than 0.7. These numbers show that the internal consistency of the questionnaire is good. Besides, it refers that the stability and reliability are good, and the questionnaire design is reasonable.

**Table 8 The results of reliability analysis**

	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
TranP1	.688	.746	.817
TranP2	.639	.770	
TranP3	.607	.784	
TranP4	.620	.778	
TechP1	.793	.844	
TechP2	.656	.868	.882
TechP3	.689	.863	
TechP4	.692	.862	
TechP5	.661	.867	

TechP6	.666	.866	
SS1	.708	.728	
SS2	.663	.750	.813
SS3	.575	.790	
SS4	.592	.783	
PR1	.704	.737	
PR2	.608	.783	.817
PR3	.633	.772	
PR4	.608	.783	
ITU1	.664	.613	
ITU2	.601	.685	.767
ITU3	.547	.743	

At the same time, the Cronbach's alpha values of the deleted items of each item are greater than 0.7. It means when the items had been deleted, the alpha value is lower than the overall Cronbach' alpha reliability coefficient. Therefore, all the questions are on the same measurement level and asking within certain scale, so there is no need to delete any item. This questionnaire has high reliability.

#### 4.2.2 Validity

Before the factor analysis, the KMO test and the Bartlett's spherical test are first performed and to determine whether it is suitable for factor analysis. In factor analysis, if the original hypothesis is rejected, it means that factor analysis can be done. Otherwise, it means that these variables may imply information independently and the factor analysis cannot be conducted. The value of KMO is between 0 and 1. The closer the KMO value is to 1, the stronger the correlation between variables, the weaker the partial correlation, and the better the effect of factor analysis. When the value is above 0.9, it is very suitable for factors analysis. When the KMO value is below 0.5, it is not suitable to apply factor analysis, and redesigning the variable structure or using other statistical analysis methods should be considered. The results of tests are showed in Table 9.

**Table 9 KMO and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.939
	Approx. Chi-Square	3389.312
Bartlett's Test of Sphericity	df	210
	Sig.	.000

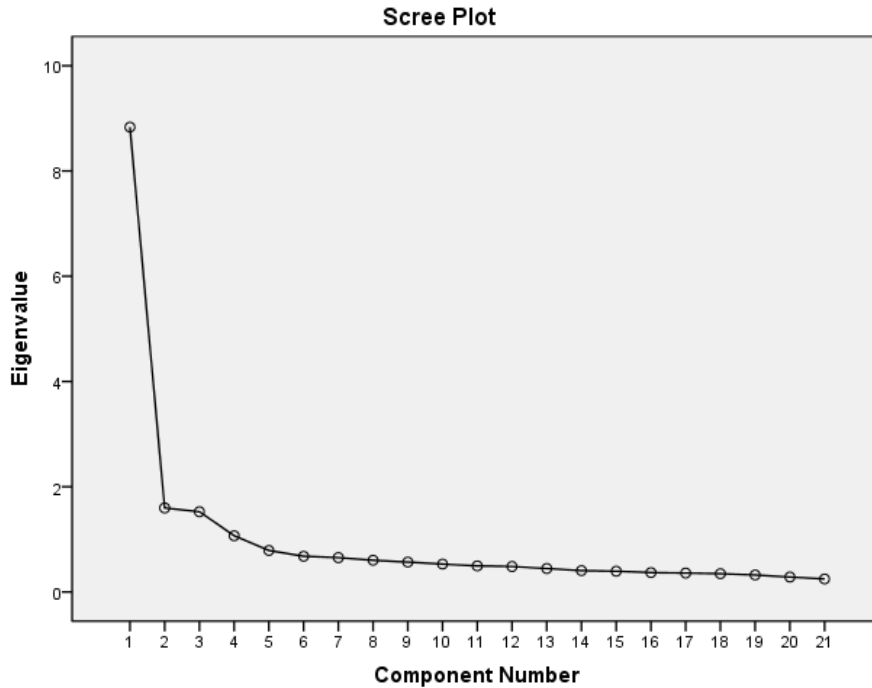
It can be seen from the table that the KMO value of this sample is 0.939, which is greater than 0.9. The approximate chi square value of Bartlett's sphericity test in the table is 3389.312, and the value of significance is 0, less than 0.05. According to Kaiser's KMO measurement standard, it meets the conditions for non-performing factor analysis.

**Table 10 Total Variance Explained**

Extraction Method: Principal Component Analysis.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Of Vari- ance %	Cumulative %	Total	of Vari- ance%	Cumulative %	Total	of Vari- ance%	Cumulative %
1	8.832	42.058	42.058	8.832	42.058	42.058	3.887	18.508	18.508
2	1.597	7.603	49.662	1.597	7.603	49.662	2.924	13.922	32.430
3	1.525	7.262	56.924	1.525	7.262	56.924	2.726	12.980	45.410
4	1.069	5.090	62.014	1.069	5.090	62.014	2.379	11.329	56.739
5	0.789	3.758	65.772	.789	3.758	65.772	1.897	9.033	65.772
6	.679	3.232	69.004						
7	.653	3.107	72.111						
8	.603	2.871	74.982						
9	.568	2.704	77.686						
10	.530	2.522	80.208						
11	.495	2.357	82.565						
12	.484	2.306	84.871						
13	.445	2.121	86.992						
14	.407	1.939	88.931						
15	.394	1.878	90.809						
16	.369	1.758	92.566						
17	.360	1.712	94.279						
18	.347	1.651	95.930						
19	.323	1.540	97.470						
20	.284	1.351	98.821						
21	.248	1.179	100.000						

Principal component analysis is used to extract five factors in the scale. The five factors explain 65.772% of the total variance of the original variables. Overall, the information loss of the original variables is less, the effect of factor analysis is better. By observing the gravel map (Figure 7), it shows that it is suitable to remain one principal component. It can be found that the fifth factor is the inflection point, which shows that the extraction of five common factors is reasonable.



**Figure 7 Gravel map**

In order to facilitate the interpretation of the factors, the factor rotation is often conducted. The most commonly used method is the varimax rotation method. As can be seen from the Table 12, the 21 items in the questionnaire are divided into five dimensions. The numbers of dimensions is referred to the assumption of the research, which means they are expected to represent the five variables. Each dimension contains 4, 6, 4, 4 and 3 items respectively, and they refer to the amount of questions.

Among them, as showed in Table 11, Tranp1, Tranp2, Tranp3 and Tranp4 have loads on the third factor, which can be interpreted as "TranP". Techp1, Techp2, Techp3, Techp4, Techp5 and Techp6 have loads on the first factor, which can be interpreted as "TechP". SS1, SS2, SS3 and SS4 have loads on the second factor, which can be interpreted as "SS". PR1, PR2, PR3, PR4 have loads on the fourth factor, which can be interpreted as "PR"; ITU 1, ITU 2, ITU 3 have loads on the fifth factor, and the fifth factor mainly explains the three items, which can be interpreted as "ITU".

If the load value is greater than 0.5, it can be recognized as an important item. From the table, it says that the load value of each item in the questionnaire is greater than 0.5. At the same time, the result obtained by rotating the component matrix is fit with the research design. In sum, the validity is in good condition and the following analysis can be adopted.

**Table 11 Rotated Component Matrix**

Extraction Method: Principal Component Analysis.  
 Rotation Method: Varimax with Kaiser Normalization.  
 a. Rotation converged in 6 iterations.

	Component				
	1	2	3	4	5
TranP1			.799		
TranP2			.715		
TranP3			.749		
TranP4			.668		
TechP1	.864				
TechP2	.700				
TechP3	.679				
TechP4	.680				
TechP5	.698				
TechP6	.700				
SS1		.822			
SS2		.750			
SS3		.635			
SS4		.688			
PR1				-.743	
PR2				-.587	
PR3				-.658	
PR4				-.740	
ITU1					.673
ITU2					.511
ITU3					.640

### 4.3 Correlation Analysis

In order to investigate the degree of correlation between the variables, this paper performs a correlation analysis between the variables. The smaller the correlation coefficient, the lower the degree of correlation between the two variables, and the larger the correlation coefficient, the higher the degree of correlation between the two variables. In this paper, the two-sided test of Pearson's coefficient is mainly used to analyze the correlation between the variables.

**Table 12 Correlations**

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

		Transaction Procedures	Technical protections	Security statements	Perceived Risk	Intention to use
Transaction Procedures	Pearson Cor- relation	1	.503**	.414**	-.542**	.569**
	Sig. (2- tailed)		.000	.000	.000	.000
	N	330	330	330	330	330
Technical pro- tections	Pearson Cor- relation	.503**	1	.528**	-.594**	.615**
	Sig. (2- tailed)	.000		.000	.000	.000
	N	330	330	330	330	330
Security state- ments	Pearson Cor- relation	.414**	.528**	1	-.542**	.634**
	Sig. (2- tailed)	.000	.000		.000	.000
	N	330	330	330	330	330
Perceived Risk	Pearson Cor- relation	-.542**	-.594**	-.542**	1	-.623**
	Sig. (2- tailed)	.000	.000	.000		.000
	N	330	330	330	330	330
Intention to use	Pearson Cor- relation	.569**	.615**	.634**	-.623**	1
	Sig. (2- tailed)	.000	.000	.000	.000	
	N	330	330	330	330	330

#### 4.3.1 Transaction Procedures and Perceived Risk

From Table 12, it shows that the significance level of Transaction procedures and perceived risk is 0,  $p < 0.01$ . At the 0.01 level, their correlation coefficient  $r = -0.542$ . There is a significant negative correlation between Transaction Procedures and Perceived Risks. When transaction procedures become more standardized, the perceived risks of consumers would reduce because of the formalized process. H1 is valid.



#### 4.3.2 Transaction Procedures and Intention to Use

From Table 12, it shows that the Significance level of Transaction procedures and Intention to Use is 0,  $p < 0.01$ . At the 0.01 level, their correlation coefficient  $r = 0.569$ . There is a significant positive correlation between Transaction Procedures and Intention to Use. When transaction procedures become more standardized, users are more willing to the payment application. H2 is valid.

#### 4.3.3 Technical Protections and Perceived Risks

From Table 12, it shows that the significance level of Technical Protections and Perceived Risks is 0,  $p < 0.01$ . At the 0.01 level, their correlation coefficient  $r = -0.594$ . There is a significant negative correlation between Technical Protections and Perceived Risks. When there are more powerful technical protections of the payment application, the perceived risks of consumers would reduce because users can get a stronger protection regarding their account and property. H3 is valid.

#### 4.3.4 Technical Protections and Intention to Use

From Table 12, it shows that the significance level of Technical Protections and Intention to Use is 0,  $p < 0.01$ . At the 0.01 level, their correlation coefficient  $r = 0.615$ . There is a significant positive correlation between Technical Protections and Intention to Use. When there are more powerful technical protections of the payment application, users are more willing to the payment application. H4 is valid.

#### 4.3.5 Security Statements and Perceived Risks

From Table 12, it shows that the significance level of Security Statements and Perceived Risks is 0,  $p < 0.01$ . At the 0.01 level, their correlation coefficient  $r = -0.542$ . There is a significant negative correlation between Security Statements and Perceived Risks. When there are more clear and detailed explanations of security regulations of the payment application, the perceived risks of consumers would reduce. H5 is valid.

#### 4.3.6 Security Statements and Intention to Use

From Table 12, it shows that the significance level of Security Statements and Intention to Use is 0,  $p < 0.01$ . At the 0.01 level, their correlation coefficient  $r = 0.615$ . There is a

significant positive correlation between Security Statements and Intention to Use. When there are more clear and detailed explanations of security regulations of the payment application, users are more willing to the payment application. H6 is valid.

#### 4.3.7 Perceived Risks and Intention to use

From Table 12, it shows that the significance level of Perceived Risks and Intention to Use is 0,  $p < 0.01$ . At the 0.01 level, their correlation coefficient  $r = -0.623$ . There is a significant negative correlation between Perceived Risks and Intention to Use. When the perceived risks of users reduce, users are more willing to the payment application. H7 is valid.

#### 4.3.8 Hypotheses Correlation Validation Results Summary

Based on the validation of pervious hypotheses, results summary is as followed Table 13.

**Table 13 Hypotheses Correlation Validation Results**

Hypothesis	Validation
H1: Transaction procedures are negatively correlated with consumers' perceived risk	Valid
H2: Transaction procedures are positively correlated with consumers' intention to use of the third-party payment service.	Valid
H3: Technical protections are negatively correlated with consumers' perceived risk.	Valid
H4: Technical protections are positively correlated with consumers' intention to use of the third-party payment service.	Valid
H5: Security statements are negatively correlated with consumers' perceived risk.	Valid
H6: Security statements are positively correlated with consumers' intention to use of the third-party payment service.	Valid
H7: Perceived risk is negatively correlated with consumers' intention to use of the third-party payment service.	Valid

## 4.4 Structural Equation Modeling Analysis

Through the correlation analysis of the model, this study has reached preliminary conclusions. In order to further analyze the model, the internal mechanisms among the influencing factors of third-party mobile payment intention will be verified through structural equation modeling, and the internal rules among the variables influencing third-party mobile payment intention can also be discussed. Based on the analysis above, this study

continues to conduct structural equation model analysis on 330 valid sample data in order to verify the path of interaction between the variables and the degree of fit of the model.

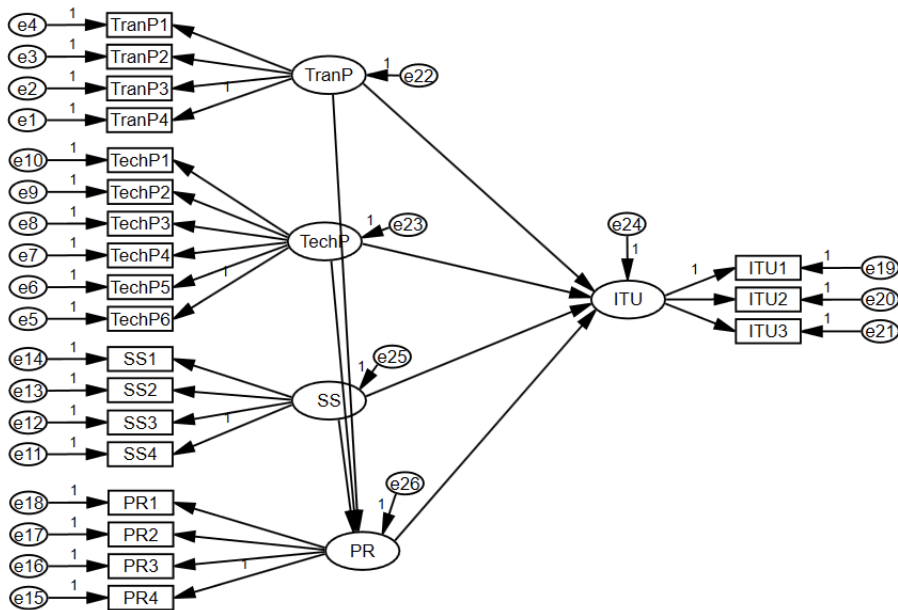
#### 4.4.1 Structural Equation Modeling

Structural equation modeling is to analyze relationships between variables based on their covariance matrices and it is often used to explain the relationship between one or more independent variables and one or more dependent variables (Hoyle, 1995).

The structural equation model consists of two parts: the measurement model and the structural model (Ullman and Bentler, 2003). The measurement model consists of observable variables and latent variables, which is used to measure the relationship between the observable variables and the latent variables. The structural model consists of latent variables, which is used to measure the relationship between the latent variables. Structural equation modeling can relate multiple observed and latent variables and estimate both measurement and structural equations simultaneously, and produce more accurate results than traditional regression analysis.

#### 4.4.2 Model

According to the model of the influencing factors on the intention to use of third-party mobile payments in the Netherlands and China constructed in Chapter 3, the preliminary model framework is shown in Figure 8 by Amos software. The model integrates five potential variables which are transaction procedures, technical protections, security statements, perceived risks, and intention to use and their corresponding 20 observable variables.



**Figure 8 AMOS Model Diagram**

TranP: Transaction procedures; TechP: Technical protections; SS: Security statements; PR: Perceived risks; ITU: Intention to use

#### 4.4.3 Analysis of Model

After constructing the research model, the appropriate evaluation metrics need to be selected to test the fitting degree of the model to determine its feasibility. The fitting degree of the model refers to the fitting degree between the hypothetical model and the actual collected data, that is, the difference between the covariance of the hypothesis model and the sample covariance. Generally, the model fitting index is divided into absolute fitting index and relative fitting index. Absolute fitting index and relative fitting index contain many indexes, which can be selected according to specific research problems.

According to the study of Kline (2015) and Byrne (2010), seven indexes are selected, which are CMIN/DF, NFI, IFI, TLI, CFI, GFI, RMSEA. In this paper, Amos software is used to calculate the parameters of the model and test the significance of each index.

In Amos, CMIN is used to indicate chi-square value. It indicates the fit of the correlation matrix of the variables in the overall model and the correlation matrix of the actual data. The smaller the CMIN, the less significant the difference between the two. A chi-square value equal to zero indicates that the hypothetical model is a perfect fit to the actual data. The size of CMIN is strongly influenced by the number of variables and the amount

of data. The larger the number of variables, the larger the value; the larger the amount of data, the larger the cube. Both of them is possible to make the value exceed the significance limit. Because chi-square value is sensitive to the number of variables and sample size, they are prone to have a poor fit of the hypothetical model to the actual data. The chi square/degree of freedom ratio is chosen to consider the fit of the model so that the effect of the number of variables would be eliminated. The smaller the ratio, the better the mode fit (Jöreskog, 1970).

There are also other different indexes to evaluate the model. NFI refers to normed-fit index. IFI refers to incremental fit index. TLI means Tucker-Lewis Index. CFI means Comparative fit index. These four indicators are usually used to discriminate the fit of a model by the comparison of the hypothetical theoretical model to be tested with an independent model. GFI is goodness of fit index. The closer the GFI value is to 1, the higher the mode fit is; otherwise, the lower the mode fit is (Bentler, 1983). RMSEA is root mean square error of approximation. RMSEA is also an indicator of poor fit, with larger values indicating a poorer fit between the hypothetical model and the data. It is a model fit indicator that has received considerable attention in recent years. According to Browne and Arminger (1995), it performs better than many other indicators.

Based on the research of the Ullman (2001), Schumacker and Lomax (2004) and Kline (2005), the evaluation criteria can be found on Table 14.

**Table 14 Structural Equation Modelling Evaluation Criteria**

Index	Criteria		
	Acceptable	Good	Excellent
CMIN/df	<5	<3	<2
NFI	(0.7, 0.9)	>0.9	>0.95
IFL	(0.7, 0.9)	>0.9	>0.95
TLI	(0.7, 0.9)	>0.9	>0.95
CFI	(0.7, 0.9)	>0.9	>0.95
GFI	(0.7, 0.9)	>0.9	>0.95
RMSEA	<0.1	<0.08	<0.05

Based on the constructed research model of influencing factors on the intention to use of third-party mobile payment in China and the Netherland, and through empirical testing of 330 survey samples, the structural equation model fit indexes are calculated as shown in the Table 15.

**Table 15 Fit Indexes Table**

CMIN	df	CMIN/DF	NFI	IFI	TLI	CFI	GFI	RMSEA
488.056	182	2.682	0.859	0.907	0.892	0.906	0.877	0.071

It can be seen from the Table 15 that the CMIN / DF value of the structural equation modeling in this paper is 2.682, the value of NFI is 0.859, the value of IFI is 0.907, the value of TLI is 0.892, the value of CFI is 0.906, the value of GFI is 0.877, and the value of RMSEA is 0.071. All the fitness indexes meet the requirements, indicating that the model matches the scale well. The structural equation modeling in this paper has a high fitting degree, and the model is established.

#### 4.4.4 Path Test Significance Analysis

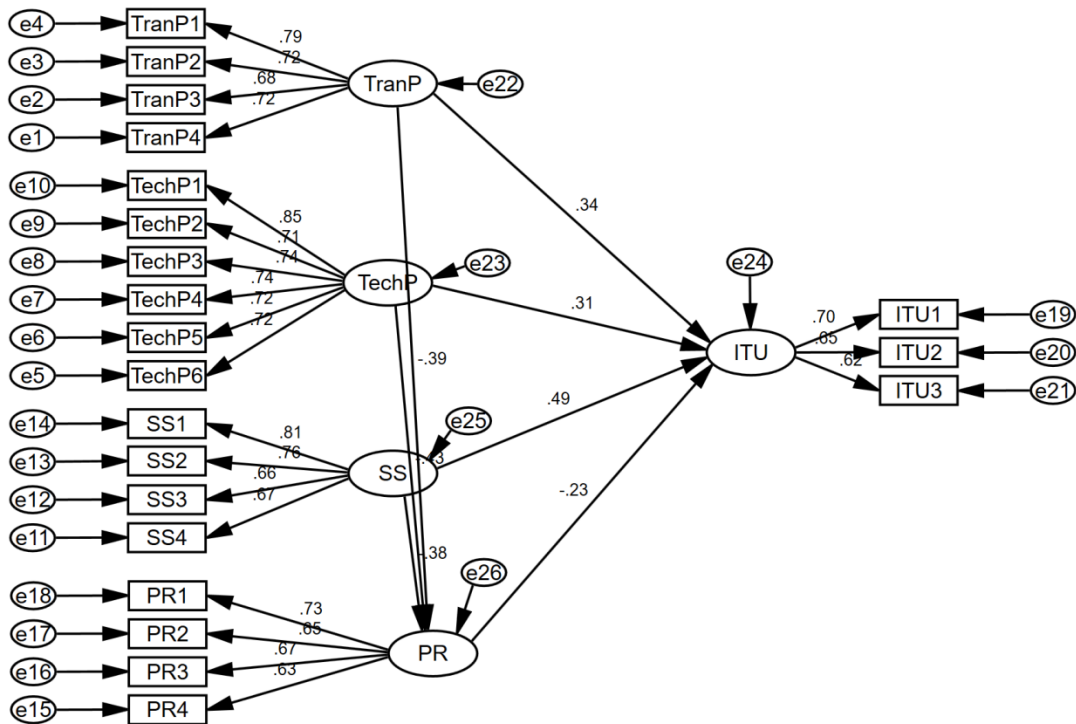
According to the empirical analysis of 330 survey samples, this study quantifies the significance relationship between variables. Learned from the experience of previous studies, it is generally believed that the effect of path between two variables is significant when the P-value of the path coefficient test is less than 0.05. Based on the above criteria for determining the path coefficients, the next step is to empirically test the seven action paths in this study.

**Table 16 Path Test Significance Analysis Results**

			Standardized Estimate	Unstandardized Estimate	S.E.	C.R.	P
PR	<---	SS	-0.378	-0.318	0.057	-5.578	***
PR	<---	TechP	-0.432	-0.321	0.05	-6.415	***
PR	<---	TranP	-0.395	-0.29	0.05	-5.828	***
ITU	<---	PR	-0.229	-0.294	0.122	-2.411	0.016
ITU	<---	TranP	0.342	0.323	0.069	4.657	***
ITU	<---	TechP	0.309	0.296	0.069	4.312	***
ITU	<---	SS	0.491	0.531	0.085	6.231	***
TranP4	<---	TranP	0.719	1			
TranP3	<---	TranP	0.678	0.93	0.086	10.852	***
TranP2	<---	TranP	0.721	0.986	0.086	11.445	***
TranP1	<---	TranP	0.789	1.215	0.1	12.207	***
TechP6	<---	TechP	0.718	1			
TechP5	<---	TechP	0.715	0.987	0.081	12.259	***
TechP4	<---	TechP	0.742	1.123	0.088	12.707	***
TechP3	<---	TechP	0.743	1.102	0.087	12.721	***
TechP2	<---	TechP	0.707	1.01	0.083	12.114	***

TechP1	<---	TechP	0.852	1.39	0.096	14.461	***
SS4	<---	SS	0.669	1			
SS3	<---	SS	0.658	0.977	0.097	10.104	***
SS2	<---	SS	0.759	1.198	0.106	11.29	***
SS1	<---	SS	0.810	1.469	0.125	11.728	***
PR4	<---	PR	0.626	1			
PR3	<---	PR	0.672	1.091	0.117	9.345	***
PR2	<---	PR	0.654	1.088	0.119	9.167	***
PR1	<---	PR	0.732	1.298	0.132	9.849	***
ITU1	<---	ITU	0.695	1			
ITU2	<---	ITU	0.648	0.819	0.085	9.677	***
ITU3	<---	ITU	0.617	0.76	0.082	9.303	***

According to the path coefficient table (Table 16), because  $\beta$  is -0.378 and  $P < 0.05$ , security statements have a significant negative effect on perceived risks. Because  $\beta$  is equal to -0.432 and  $P < 0.05$ , technical protections have a significant negative impact on perceived risks. Because of  $\beta$  is equal to -0.395 and  $P < 0.05$ , transaction procedures have a significant negative impact on perceived risks. Because  $\beta$  is equal to -0.229 and  $P < 0.05$ , perceived risks have a significant negative impact on intention to use. Because  $\beta$  is equal to 0.342 and  $P < 0.05$ , transaction procedures have a significant positive impact on intention to use. Because  $\beta$  is equal to 0.309 and  $P < 0.05$ , technical protections have a significant negative impact on intention to use. Because  $\beta$  is equal to 0.491 and  $P < 0.05$ , security statements have a significant positive effect on intention to use. All hypotheses are valid.



**Figure 9 Path Coefficient Analysis Result**

The factor load of 21 measurement indexes in the model range from 0.617 to 0.852 as showed in Table 16 and Figure 9. All of them are greater than 0.50, and the corresponding significant P values are less than 0.05. These number indicates that there is a significant impact between the latent variables and the observable variables, and the subjects corresponding to each potential variable are highly representative.

#### 4.4.5 Multiple-Group Analysis for Structural Equation Modelling

Multiple-group analysis for structural equation modeling is used to investigate whether different samples have a good fit to the same model. That is, whether a particular model has stability or parameter invariance across different samples (Wu, 2010).

When investigating whether moderating variables have an effect on a model, there are generally two steps. First, it is necessary to compare the unconstrained model and the constrained model. The differences between the two models are determined by analyzing the chi-square value, degrees of freedom, p value, and other parameters. Then, the level of the effect is valued by comparing the estimated value of the standardized path parameter of different groups and the t-values of that.



**Table 17 Multiple-Group Analysis Model Fit**

Model	CMIN	DF	P	CMIN/DF F	NFI	IFI	TLI	CFI	GFI	RMSEA A
Unconstrained	705.819	36 4	0	1.939	0.808	0.897	0.879	0.895	0.837	0.054
Measurement weights	725.904	38 0	0	1.91	0.802	0.895	0.883	0.894	0.830	0.053

It can be seen from the Table 17 that the CMIN/DF value of unconstrained structural equation model is 1.939, the value of NFI, IFI, TLI, CFI, GFI and RMSEA are 1.939, 0.808, 0.897, 0.879, 0.895, 0.837 and 0.054, respectively. These numbers indicate that the scale matching of unconstrained structural equation model is good and the model fitting degree is high, which mean the unconstrained model is tenable. At the same time, the CMIN/DF value of measurement weights model is 1.910, the value of other fitness indicators are as follows: NFI value is equal to 0.802, IFI value is equal to 0.895, TLI value is equal to 0.883, CFI value is equal to 0.894, GFI value is equal to 0.830, RMSEA value is equal to 0.053. All of these values show that the adaptation index of measurement weights model meets the requirements, and indicates that the scale matching of measurement weights model is good and the model fitting degree is high. The model is established as well.

**Table 18 Multiple-Group Analysis Model Comparisons**

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measure- ment weights	16	20.085	.216	.005	.006	-.003	-.004

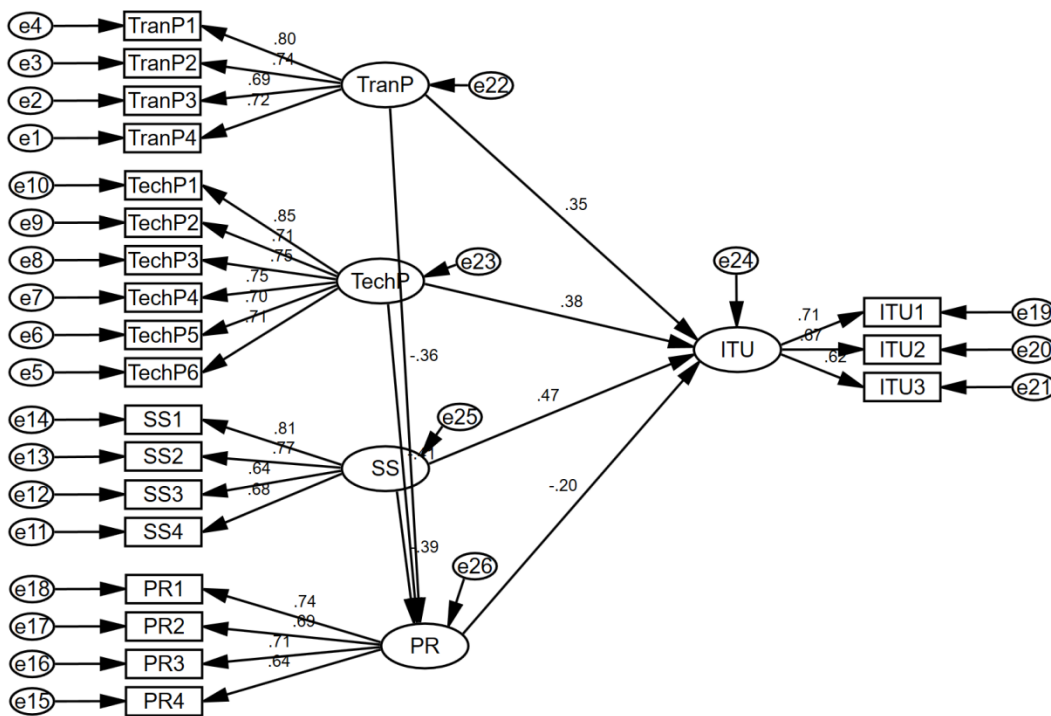
Table 18 is to show whether the unconstrained model and measurement weights model have significant difference between each other. According to the model comparisons table, when the P value of measurement weights model minus that value of unconstrained model, the result is equal to 0.216, which is greater than 0.05, indicating that there is no significant difference between the two models. In addition, the absolute values of NFI is equal to 0.005, the absolute values of IFI is equal to 0.006, the absolute values of RFI is equal to 0.005, the absolute values of TLI is equal to 0.004. They are all less than 0.05, indicating that the model parameters change in these two models is not great.

On the whole, there is little difference in the fitness index between the two groups of structural equation models. The comparison table of standardized path parameter estimates and t value of corresponding multiple sets of structural equation models is as showed in Table 19 and Figure 10 and 11:

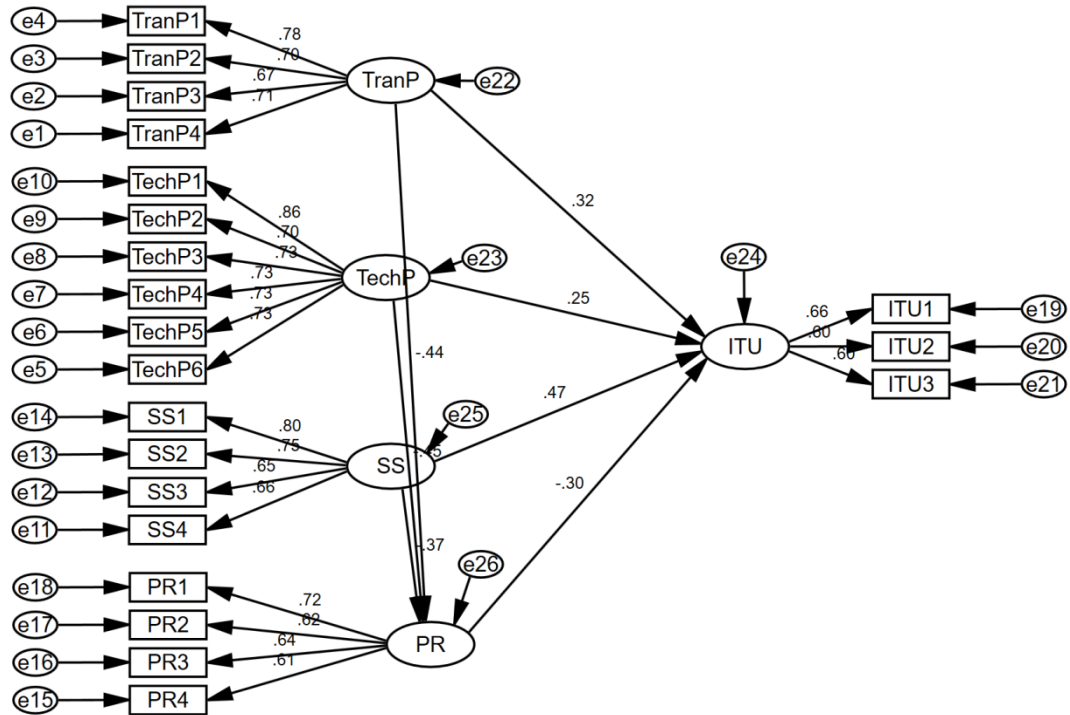
**Table 19 The Comparison Table of Standardized Path Parameter Estimates and T Value**

\*Correlation is significant at the 0.1 level (2-tailed), \*\*at the 0.05 level (2-tailed), \*\*\*at the 0.01 level(2-tailed)

Path	Applepay (n=165)		支付宝 (n=165)	
	Standardized Path Parameter Estimates	T Value	Standardized Path Parameter Estimates	T Value
PR <--- SS	-0.391***	-4.059	-0.372***	-3.874
PR <--- TechP	-0.412***	-4.41	-0.448***	-4.625
PR <--- TranP	-0.354***	-3.835	-0.441***	-4.391
ITU <--- PR	-0.204***	-1.696	-0.274***	-1.772
ITU <--- TranP	0.350***	3.671	0.301***	2.609
ITU <--- TechP	0.364***	3.776	0.239***	2.196
ITU <--- SS	0.465***	4.439	0.486***	4.080



**Figure 10 Standardized Path Parameter Estimates of Apple Pay Model**



**Figure 11 Standardized Path Parameter Estimates of Alipay Model**

When analyzing the impact of different paths, T value is an important indicator. If the absolute value of T value is greater than 2.57, it means the significant level is 1%. That is  $P < 0.01$ , which shows the path is very significant. If the absolute value of T value is greater than 1.96, it means the significant level is 5%, that is,  $P < 0.05$ , which represents the path is significant and it is a common standard. When the absolute value of T value is greater than 1.65, it means the significance level is 10%, which is  $P < 0.1$ .

It can be seen from the table that in the SS-to-PR path, the estimated value of the standardized path parameter of the Apple Pay group is -0.391 and the T value is -4.059. The estimated value of the standardized path parameter of the Alipay group is -0.372, and the T value is -3.8874. From such perspective, security statements of Apple Pay group have a greater impact on perceived risks than the security statements of Alipay group. For the users of Apple Pay, when there are have some kind of improvement on security statements, they would have a greater change on perceived risks than the users of Alipay.

Among TechP-to-PR path, the estimated value of the standardized path parameter of the Apple Pay group is -0.412 and the T value is -4.41. The estimated value of the standardized path parameter of the Alipay group is -0.448 and the T value is -4.625. It shows that the impact of technical protections in the Apple Pay group on perceived risks is less than the impact of technical protections in the Alipay group on perceived risks. For the

user of Alipay, when they notice there are upgrades on technical protections, they would have a greater change on perceived risks comparing with the user of Apple Pay.

In the path of TranP-to-PR, the estimated value of the standardized path parameter of the Apple Pay group is -0.354, and the T value is -3.835. The estimated value of the standardized path parameters of the Alipay group is -0.441, and the T value is -4.391. The impact of transaction procedures in the Apple Pay group on perceived risks is less than the impact of transaction procedures in the Alipay group on perceived risks. For the users of Alipay, the well-developed transaction procedures is more likely to reduce their perceived risks when compared with the users of Apple pay.

As for the PR-to-ITU path, the estimated standardized path parameter of the Apple Pay group is -0.204 and the T value is -1.696, while the estimated standardized path parameter estimated value of the Alipay group is -0.274, and the T value is -1.772. The impact of the perceived risks of the Apple Pay group on the intention to use is less than the impact of the perceived risks of the Alipay group on the intention. Meanwhile, the absolute value of T value of these two models in this path is in a range of 1.65 to 1.96, which means comparing with other paths, perceived risks have a less important impact on intention to use in both models.

For the TranP-to-ITU path, the estimated standardized path parameter of the Apple Pay group is 0.350, and the T value is 3.671. The estimated standardized path parameter of the Alipay group is 0.301 and the T value is 2.609. It shows that the degree of influence on transaction procedures to intention to use in Apple Pay group is higher than that influence on transaction procedures to intention to use in Alipay group. For the users of Apple Pay, the development and convenience of transaction procedures have a greater effort on their intention to use level comparing with the users of Alipay.

In the TechP-to-ITU path, the estimated value of the standardized path parameter of the Apple Pay group is 0.364 and the T value is 3.776. Besides, the estimated value of the standardized path parameter of the Alipay group is 0.239 and the T value is 2.196. Therefore, the influence of technical protections of the Apple Pay group on intention to use has a higher degree than the influence of technical protections of Alipay group on intention to use. When considering whether to use the third-party payment application, the user of Apple Pay would pay more attention on the technical protections than the users of Alipay.

In the SS-to-ITU path, the estimated value of standardized path parameter of Apple Pay group is 0.465, and the T value is 4.439. The estimated value of standardized path parameter of Alipay group is 0.486, and the T value is 4.080. These numbers show that

the impact of security statements on intention to use of Apple Pay group is less than that of security statements on intention to use of Alipay group. For the users of Alipay, when they choose the tool for mobile payment, they care more about the security statements than the users of Apple Pay.

#### **4.5 Summary**

In this chapter, the sample data are first tested for reliability and validity, and after passing the tests, correlation tests and structural equation modeling are performed on the sample data. The result show that transaction procedures, technical protections and security statements have negative impact on perceived risks. It also points out that transaction procedures, technical protections and security statements have positive impact on intention to use and perceived risks have negative impact on intention to use.

The analysis of users of Apple Pay and Alipay is also conducted. No matter they use Apple Pay or Alipay, the hypotheses mentioned above are valid for all of them. But in these two different groups of users, the degree of influence is various among different paths. For the users of Apple Pay, the security statements have a greater negative impact on perceived, while the technical protections and transaction procedures would have greater influence on their perceived risks for users of Alipay. Regarding the intention to use, transaction procedures, technical protections and security statements have greater effort for users of Apple Pay. At the same time, the impact of perceived risks to intention to use is more significant for users of Alipay.

## 5 CONCLUSION AND SUGGESTIONS

### 5.1 Research Conclusion

This paper first introduces and analyzes the current situation and laws and regulations of the third-party payment market in China and the Netherlands. A research model is built by combining the Technology Acceptance Model, Unified Theory of Acceptance and Use of Technology and previous studies about factors that have impact on intention to use of third-party payment services. After that, whether there is a correlation between individual variables is analyzed through correlation analysis. Then this study compares and analyzes the user usage of Apple Pay and Alipay by constructing structural equation modeling and draws conclusions.

The Chinese government and associations take effort to develop the regulations of the third-party payment and achieve some goals. In 2015, People's Bank of China issued the "Administrative Measures on the Network Payment Business of Non-bank Payment Institutions". In 2016, a new Cybersecurity Law was passed. This law focus on improving the security of the internet in the case of an increase in the number of hackers. Besides, the third-party payment is a comprehensive business. The Ministry of Industry and Information Technology, the Ministry of Public Security and the Banking Regulatory Commission also play a role of regulator to establish a better developed regulation framework.

In the Netherlands, Payment Service Directive 2 creates a better environment for the development of third-party payment. For customers, merchants and third-party payment services providers, the Strong Customer Authentication (SCA) and new types of regulated payment providers increase the opportunity to adopt the third-party payment services.

In this paper, four factors that affect the intention to use in third-party payment are analyzed. That is transaction procedures, technical protections, security statements and perceived risks. For the users of Apple Pay, perceived risks are the least important factors for them to consider whether they are going to use the application. Meanwhile, they pay attention on the performance of transaction procedures, technical protections, security statements. The level of satisfaction of these three factors is directly affecting their intention to use. At the same time, though users of Alipay concern about the performance of transaction procedures, technical protections, security statements, the impact of perceived risks is also important for them.

To increase the intention to use of third-party payment in the Netherlands, the service providers should improve their transaction procedures, technical protections and security statements firstly, and then they also take actions to reduce the perceived risks to make the service framework more perfect.

## **5.2 Research Prospects**

Based on an extensive summary of existing research on third-party mobile payment, this study integrates the Technology Acceptance Model, Unified Theory of Acceptance and other papers, choosing transaction procedures, technical protections, security statements and perceived risks as factors influencing third-party mobile payment intention to use. This study initially explores the factors influencing the intention to use third-party mobile payments in China and the Netherlands from the perspectives of theoretical analysis and empirical research, and some conclusions have been obtained. However, there are still many issues to be further explored and researched, mainly in the following aspects.

Firstly, the research perspectives need further innovation. There are still many other variables that are possible to influence intention to use of the third-party payment. Due to time constraints, it is not possible to continue the study with more extensive research. The subsequent research process should continue to broaden the research horizon, include more relevant potential influential factors into the research model, such as factors like gender, relationships that do not discussed in this study, and conduct more in-depth empirical analysis.

Secondly, the survey sample needs to be further expanded. The university students and career persons who have used Alipay in China and those who have used Apple Pay in the Netherlands are chosen as the main survey groups in this study. The samples have certain limitations because it does not cover all types of people, such as people from various age groups, so the survey sample should be expanded to cover a wider range of users in the process of subsequent research, so that the survey sample has a broader representation.

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