

The Use of Mobile Payment Systems in Guangdong Province, China: Basis for Enhanced Consumer Convenience

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ABSTRACT

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This descriptive quantitative study was conducted to assess the features of mobile payment systems in Guangdong Province, China, focusing on their impact on consumer convenience. The study surveyed 385 respondents who are active users of mobile payment system. Data was collected through structured questionnaires and analyzed using statistical methods to assess the features and significant difference in their assessment when demographic profile is considered. The findings indicate a good assessment on the features of mobile payment systems, with users reporting increased convenience in their daily transactions. There is no significant difference in the respondents' assessment of the features of mobile payment system when their demographic profile is considered. However, challenges such as cybersecurity concerns and the need for robust infrastructure were also identified. These insights are valuable for policymakers and businesses aiming to improve consumer convenience through mobile payment systems. Future research should address the identified challenges and explore the potential of emerging technologies to further enhance mobile payment systems.

Keywords: Consumer Convenience, Encryption Protocol, Mobile Payment Systems, Network Reliability, Usability

INTRODUCTION

With the rapid development of mobile payment and the popularity of smart phones, mobile payment has become a part of our life, which is slowly changing our living habits and providing convenience for our life. The main mobile payment tools are WeChat Pay, Alipay Pay and credit card pay. WeChat Pay and Alipay pay can be paid by scanning the two-dimensional code of the merchant, while credit card payment can be made in advance. Consumers only need to select the corresponding scene on the mobile phone to make payment, which greatly improves the convenience of payment. The development of mobile payment has brought a positive impact on consumers, which not only provides convenience to consumers, but also promotes the development of online and offline industries and drives consumption.

As a means of electronic payment, mobile payment mainly realizes business transactions through mobile communication technology, radio frequency technology and Internet technology, enabling transaction buyers to make account payment for the goods or services they consume. The types of transaction terminals are constantly enriched with the development of electronic technology. At present, most mobile payment organizations at home and abroad use mobile phones as the main transaction terminals.

At present, there are certain security problems in mobile payment, such as in the process of identity identification, when consumers choose a product is about to pay, it will automatically pop up to enter the payment password or face recognition, there may be theft, this aspect still needs the relevant regulatory authorities to intervene for unified management.

Using mobile payments for financial transactions requires confidence and trust. Due to security and privacy concerns about mobile payments, users frequently refuse to participate in transactions. Mobile devices are prone to loss or theft, which could result in identity theft or financial fraud in the event of theft. Transacting via a mobile device involves the hazards associated with using a mobile device. Hackers can take advantage of these flaws and trick people through a

variety of cyberattack forms that take advantage of technology vulnerabilities (Al-Suraihi et al., 2021).

A mobile payment system must have access control, confidentiality, integrity, non repudiation, availability, and authentication as core security features. The two distinct services that make up authentication are transaction data origin authentication and user authentication (Al-Tamimi & Al-Haija, 2024).

Mobile banking is a service that allows consumers to transact with customers while relaxing at home. Many payment applications are being developed globally because of the rise in demand for mobile payment applications. Every payment gateway needs to meet certain requirements that customers will find acceptable. One of these requirements is usability, which means that all mobile payment applications need to meet the requirement of being user-friendly and having features that are simple for customers to grasp (Pachabotla & Konka, 2022).

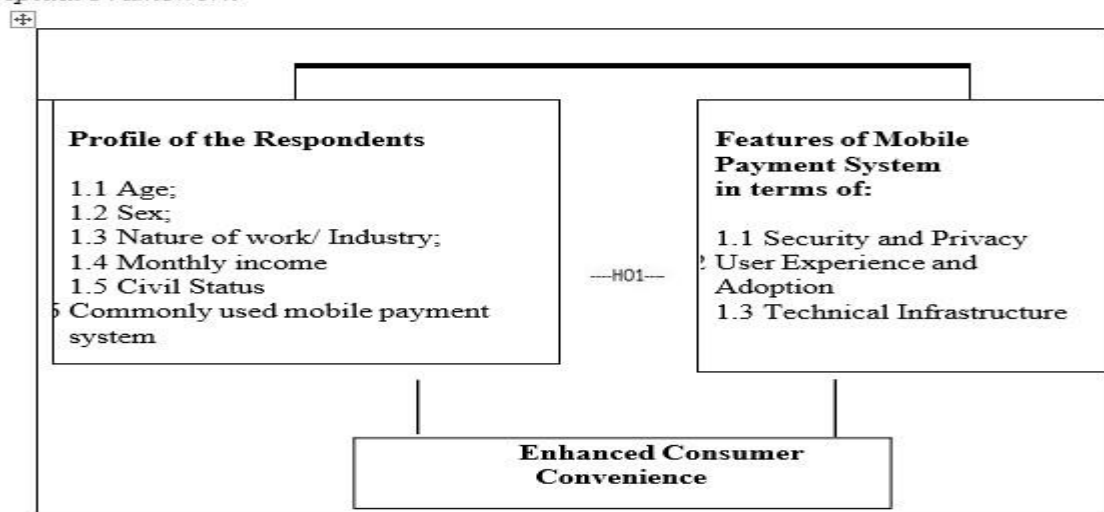
Huang et al. (2020) discovered that regulatory supervision considerably boosts user trust and acceptance of mobile payment platforms. Users are more inclined to utilize these services when they believe they are overseen by trustworthy authorities, which diminishes concerns related to security and fraud. Likewise, Sleiman et al. (2021) indicated that the perception of regulatory safeguards enhances user confidence in mobile payment solutions by ensuring the security of financial transactions. Verma et al. (2020) also observed that strict security and privacy regulations elevate user trust and encourage the adoption of mobile payment technologies.

Conceptual Framework

Below is the framework that is fundamentally a systematic arrangement of concepts, constructs, variables, and relationships that served as the foundation for the research endeavor, providing a road map for inquiry and analysis.

Figure 1

Conceptual Framework



The backbone of mobile payment systems is their technical infrastructure, which includes network connectivity, software platforms, and hardware components. Reliable infrastructure ensures smooth and uninterrupted transactions, supporting scalability and efficiency. Continuous advancements in technology contribute to the evolution and improvement of these systems.

Theoretical Framework

The TAM and the IDT served as the foundation for the theoretical frameworks of this study. This research has benefited from having a strong theoretical foundation thanks to the application of these two well-established ideas. These are two of the most important theories for explaining and forecasting how well a new system be received and used by users.

Technology Acceptance Model (TAM).

The TAM model was created by Davis (1986) to explain why users embrace new computing technology in an organizational setting. Theory of Reasoned Action (Ajzen and Fishbein, 1980) served as the inspiration for this approach. According to the paradigm, users' attitudes toward utilizing the system have an impact on their behavioral intentions, and users' behavioral intentions are used to determine actual system use. Additionally, consumers' views toward use have been influenced by perceived usefulness and perceived simplicity of use. TAM is an effective theory for predicting how users will accept new technologies. TAM is a reliable model for information technology, as shown by some empirical studies. Since then, TAM has been extensively employed to study how people embrace various facets of information technology. A method to analyze customer intentions regarding acceptance of mobile payments may be TAM. In addition, a great deal of research on e-commerce has used TAM to study how to get customers to accept e-commerce.

Two key components of the TAM model are perceived utility and perceived ease of use.

Perceived ease of use is defined as "the degree to which the prospective user expects the target system to be free of effort," while perceived usefulness is defined as "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organization context." The TAM model has been widely used and validated; additionally, other researchers have modified the model to make it suitable for various contexts.

Innovation Diffusion Theory (IDT)

It takes a lot of work to persuade potential adopters of an innovation before it can be successfully introduced into the commercial market. Depending on their expertise and the innovation's effectiveness, individual users will decide whether to adopt it. Furthermore, the information and experience of potential adopters about the innovation, as well as the knowledge and experience of their close friends and family, influence the adoption's speed. However, different adopters approach an innovation in various ways. Some early adopters will make use of newly acquired goods or services right away. Other adopters might hold off until they are comfortable with the services in case, they are not persuaded by them.

IDT is presented by Rogers (1963) for user adoption. This is a well-accepted idea that has been used by numerous researchers in their investigations. The theory helps determine the innovation adoption rate by identifying the innovative decision-making process. Two essential components of innovation decision-making processes (IDT) are users' acceptance and application of new products or technology (Zaltman & Stiff, 1973). These elements contribute to the process of innovation adoption and its likelihood. According to Rogers (1995), the acceptance of new technology may be explained by five factors: trialability, observability, complexity, compatibility, and relative advantage.

Relative Advantage, the degree to which an innovation is perceived as better than the existing product. Complexity, the degree to which an innovation is perceived as being difficult to understand and use. Compatibility, the degree to which an innovation is perceived as consistent with existing values and experience of the potential adopters. Trialability, the degree to which an innovation can be experimented with before adoption. Observability, the degree to which the results of an innovation are observable to others.

As mentioned above, these five characteristics have been found to predict the pace at which innovations are adopted. According to Rogers (1995), these five characteristics have an impact on prospective adopters' attitudes and intentions throughout the adoption process. Rogers (1995) does, however, also highlight the conceptual differences between the qualities. These five characteristics for invention diffusion are covered in more detail in the section that follows.

Adopters are more likely to accept an innovation if it offers additional or alternative products or services and requires less effort to learn how to use or modify behavior. Utilizing mobile payment systems doesn't alter users' behavior when it comes to making payments; all that is needed is a grasp of the application areas and operation procedures. Users' intents on mobile payments should therefore benefit from mobile payment compatibility.

An innovation gives customers the chance to test a good or service. An individual is more likely to adopt an invention if it satisfies their needs, including those related to price, service quality, and other factors. If not, they'll

just turn it down. Thus, the trialability of mobile payments ought to have a positive relationship with the intents of individual users regarding mobile payments.

OBJECTIVES

The primary objective of this study is to assess the features of mobile payment systems in relation to consumer convenience. Specifically, it aims to identify the demographic profiles of respondents, including their age, sex, nature of work or industry, monthly income, civil status, and their most commonly used mobile payment systems. Additionally, the study intends to assess how respondents perceive and evaluate key features of mobile payment systems, focusing on aspects such as security and privacy—covering authentication methods, encryption protocols, and data storage—user experience and adoption, including usability, merchant acceptance, and user perception, as well as the technical infrastructure, which encompasses compatibility, interoperability, and network reliability. Furthermore, the study seeks to determine whether there are significant differences in the assessments of these features when respondents are grouped according to their profiles. Finally, based on the insights gathered, the study aims to formulate practical recommendations to enhance consumer convenience in the use of mobile payment systems.

METHODS

The study employed descriptive quantitative research design to assess the features of mobile payment system and to determine the significant difference in the respondents' assessment when demographic profile is considered.

The population of the study is around 6,600,400 users of mobile payment system in Shantou City, Guangdong Province. Using the online sample calculator the sample size was computed. With a margin of error of 5%, 50% population proportion and 95% confidence level respectively which resulted to 385 as the sample size. The respondents were selected using purposive sampling method

The study utilized a researcher made survey questionnaire to assess the features of the mobile payment systems in Shantou City, Guangdong Province. Part 1, focused on the demographic profile of the respondents while Part 2 was designed to know the respondents' assessment on the features of mobile payment system in terms of security and privacy, user experience and adoption and technical infrastructure using a 4-point likert scale.

The researcher secured an ethics clearance for the school prior to data gathering. Using the WeChat application, questionnaire translated into Chinese was distributed to the respondents. The respondents were given time to answer the survey then follows the retrieval of the responses. After the data collection, the results were treated with statistical tools, analyzed, and interpreted, assisted by the data analyst.

In data analysis, percentage distribution was used to describe the demographic profile; Mean & Standard Deviation were used to assess the features of the mobile payment system while ANOVA and T-test were used to determine the significant difference in the respondents' assessment when demographic profile is considered.

RESULTS

1. What is the demographic profile of the respondents in terms of:
 - 1.1. Age;
 - 1.2. Sex;
 - 1.3. Nature of work/ Industry;
 - 1.4. Monthly Income;
 - 1.5. Civil Status; and
 - 1.6. Commonly use mobile payment system?

Table 1 shows the frequency and percentage distribution of the profile of the respondents.

Table 1. Profile of the Respondents

Age	Frequency	Percentage
18-25	68	17.7 %
26-30	104	27.0 %
31-35	144	37.4 %
36-59	69	17.9 %
Total	385	100%
Sex		
Female	202	52.5 %
Male	183	47.5 %
Total	385	100%
Nature of Work/Industry		
Academe/ School	40	10.4 %
Agriculture	21	5.5 %
E-Commerce	58	15.1 %
IT/ Technology	60	15.6 %
Investment and Financial	87	22.6 %
Manufacturing	62	16.1 %
Retail	31	8.1 %
Transport	26	6.8 %
Total	385	100%
Monthly Income		
11-15K CNY	162	42.1 %
16-20K CNY	58	15.1 %
21-25K CNY	27	7.0 %
26-30K CNY	14	3.6 %
Above 30K CNY	8	2.1 %
Below 10K CNY	116	30.1 %
Total	385	100%
Civil Status		
Married	280	72.7 %
Others	10	2.6 %
Single	95	24.7 %
Total	385	100%
Mobile Payment System Commonly Used		
Alipay Pay	199	51.7 %
Credit Card Pay	26	6.8 %
WeChat	160	41.6 %
Total	385	100%

Majority of the respondents belong to age bracket 31-35 years old, which comprised 37.4%, followed by those with ages 26-30, 27%; those in age bracket 18-25 and 36-59 are 68 and 69 with 17.7% and 17.9% respectively.

In terms of sex, female dominated the respondents with frequency of 202 with 52.5%; while male are 183 or 47.5% of the total population.

Majority belong to Investment and Financial with frequency of 87 or 22.6%; and those who belong to had a frequency of 60-26. The least in number are those who are in agriculture industry, with a frequency of 21 or 5.5%.

In terms of monthly income, majority are earning 11-15K CNY, with a frequency of 162 or 42.1% and the lowest are those with income above 30K CNY which is 8 or 2.1%.

Majority of the respondents are married with a frequency of 280 or 72.7%; followed by single with a frequency of 95 or 24.7%.

Majority are using Alipay, 199 or 51.7% ; followed by Wechat

2. What is the assessment of the respondents on the following features of mobile payment system in terms of the following:

2.1 Security and Privacy;

2.2 User Experience and Adoption;

2.3 Technical Infrastructure;

Table 2. Assessment of the Features of Mobile Payment System in terms of Security and Privacy

Variable	Mean	Standard Deviation	Verbal Interpretation
Authentication Method	3.12	0.656	Agree
Encryption Protocol	3.08	0.751	Agree
Data Storage	3.07	0.646	Agree
Overall Mean	3.09	0.684	Agree

Note. 3.26-4.00 (Strongly Agree) | 2.51-3.25 (Agree) | 1.76-2.50 (Disagree) | 1.00-1.75 (Strongly Disagree)

The respondents' assessment of the security and privacy aspects of the Mobile Payment System (MPS) indicates an overall positive perception, as reflected in the mean scores for each variable being within the "Agree" range (mean scores between 2.51 and 3.25). Specifically, the authentication method received a mean of 3.12, encryption protocol 3.08, and data storage 3.07, suggesting that respondents generally agree that these components are adequately secured within the system.

The overall mean score of 3.09 reinforces this overall perception, indicating that users believe that the current measures related to authentication, encryption, and data storage are sufficient to ensure security and privacy in mobile payments. However, since these mean scores do not reach the "Strongly Agree" level (3.26-4.00), there is still room for improvement or further strengthening each aspect to ensure higher confidence in the system's security features.

Table 3. Assessment of the Features of Mobile Payment System in terms of User Experience and Adoption

Variable	Mean	Standard Deviation	Verbal Interpretation
Usability	3.06	0.654	Agree
Merchant Acceptance	3.14	0.709	Agree
User Perception	3.09	0.786	Agree
Overall Mean	3.10	0.716	Agree

The respondents' assessment of user experience and adoption of the Mobile Payment system indicates a generally positive perception across all variables measured. The mean scores for usability (3.06), merchant acceptance (3.14), and user perception (3.09), all fall within the "Agree" category, signifying that users perceive the system as usable, widely accepted by merchants, and positively viewed by users.

The overall mean score of 3.10 further confirms this positive outlook, suggesting that respondents are generally satisfied with their experience and the level of adoption of mobile payments. Although none of the variables reached the "Strongly Agree" range (above 3.26), the scores imply a solid acceptance and recognition of the benefits associated with mobile payment usage.

Table 4. Assessment of the Features of Mobile Payment System in Terms of Technical Infrastructure

Variable	Mean	Standard Deviation	Verbal Interpretation
Compatibility	3.02	0.67	Agree
Interoperability	3.14	0.692	Agree
Network Reliability	3.14	0.717	Agree
Overall Mean	3.10	0.693	Agree

The assessment of the respondents on the technical infrastructure of the mobile payment system indicates a generally positive perception. The variables—Compatibility, Interoperability, and Network Reliability—all received means around 3.02 to 3.14, with standard deviations close to 0.67–0.717. These mean scores fall within the "Agree" range, suggesting that respondents perceive the technical infrastructure as sufficiently robust and capable of supporting mobile payment operations.

3. Is there a significant difference in the assessment of the features of mobile payment system when the respondents are grouped according to profile?

Table 5. Significant Difference in the Assessment of the Features of Mobile Payment Systems when Profile is considered.

Features	Age	Sex	Nature of Work	Monthly Income	Civil Status	Payment Method
Security and Privacy	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
User Experience and Adoption	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
Technical Infrastructure	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant

The analysis indicates that there are no significant differences in respondents' assessments of the various features of mobile payment systems—namely, Security and Privacy, User Experience and Adoption, and Technical Infrastructure—based on demographic variables such as Age, Sex, Nature of Work, Monthly Income, Civil Status, and Payment Method. All variables are marked as "Not Significant," suggesting that perceptions and evaluations of these features are relatively consistent across different respondent groups regardless of these demographic factors.

DISCUSSION

The respondent profile shows a diverse group predominantly composed of working adults aged 26–35, with a balanced gender distribution, primarily from financial, tech, and manufacturing sectors. Most earn middle incomes

(11–15K CNY and below 10K CNY) and are married, indicating potential household financial activity. Mobile payment usage is heavily centered on Alipay and WeChat Pay, highlighting a strong preference for digital wallets over traditional credit card payments. This demographic makeup provides a solid foundation for evaluating mobile payment features, emphasizing user engagement with digital financial platforms.

The assessment results indicate that respondents generally perceive the features of the mobile payment system positively across various aspects. Regarding privacy and security, the mean scores for authentication, encryption, and data storage hover around 3.07 to 3.12, reflecting an "Agree" level and suggesting users believe these security measures are adequate.

Similarly, in terms of user experience and adoption, scores for usability, merchant acceptance, and user perception range from 3.06 to 3.14, indicating that users find the system usable, widely accepted, and positively perceived. Lastly, on the technical infrastructure front, variables like compatibility, interoperability, and network reliability all received mean scores around 3.02 to 3.14, reinforcing a perception of a sufficiently robust infrastructure. Overall, while users are generally satisfied and confident in the security, usability, and technical aspects of the mobile payment system, the scores suggest room for improvement to reach higher confidence levels.

The above results concur with the discussion of Pelegrin (2021), to wit: Consumers assess new systems based on their perceived effectiveness, the amount of information provided, and the quality of the services offered. Recently, payment practices in our society have undergone significant changes. In today's fast-paced world, even basic tasks such as paying utility bills or purchasing groceries demand quicker solutions. Utilizing cashless payment methods allows us to achieve this efficiency. The current economic climate is compelling everyone to adopt digital transactions, whether they prefer it or not, prompting many businesses to develop innovative ways to operate.

The increased demand for mobile payment applications has led to the development of numerous payment applications worldwide. Every payment gateway must fulfil specific standards that consumers would find acceptable. According to Pachabotla and Konka (2022), usability is one of these needs, meaning that all mobile payment applications must be easy to use and include features that are straightforward for users to understand.

The seamless connection with different services and platforms enhances the efficiency of transactions, contributing to a smoother user experience. As mobile payment systems continue to evolve, focusing on interoperability will be key to meeting the diverse needs of consumers. Ensuring that these systems work reliably across various devices and services will drive higher adoption rates and improve consumer convenience (Sleiman et al., 2021).

Research has revealed various factors that affect user experience in digital payment systems. These factors include the design of the user interface, navigation ease, transaction speed, security measures (like two-factor authentication), and the accessibility of customer support (Gao et al., 2019). Concerns about security have a significant influence on user trust and satisfaction with digital payments. Studies have examined how security features such as encryption and biometric measures can improve users' perception of safety (Dwivedi et al., 2019). The user experience has become an integral focal point in various industries, and the realm of digital payments is no exception. As users increasingly opt for digital channels to manage their financial affairs, understanding and optimizing their experiences has become paramount. A seamless, efficient, and secure digital payment experience not only fosters customer satisfaction but also plays a pivotal role in the broader adoption and sustainability of digital payment solutions

(Dwivedi et al., 2019)

CONCLUSIONS

Based on the demographic profile and the assessment results, it can be concluded that the respondents—a diverse group of working adults primarily aged 26–35, with balanced gender representation and a preference for digital wallets like Alipay and WeChat Pay—are generally positive about the features of mobile payment systems. They perceive the security, user experience, and technical infrastructure as adequate, with mean scores indicating an "Agree" level of confidence in these elements. However, the slightly moderate scores across these areas suggest that while users are satisfied overall, there is still significant potential for enhancements to strengthen their confidence

and satisfaction. Improving aspects such as security protocols, usability, and infrastructure robustness could further elevate user trust and facilitate an even more seamless mobile payment experience.

Factors such as Age, Sex, Nature of Work, Monthly Income, Civil Status, and Payment Method do not significantly influence how users perceive these aspects. Consequently, efforts to improve and promote mobile payment systems can be broadly applied without the need for demographic-specific customization, as user perceptions are generally similar across different segments of the population.

IMPLICATIONS

The positive perception of mobile payment features among users indicates a strong acceptance and reliance on digital wallets like Alipay and WeChat Pay, which can encourage further innovation and integration within these platforms. The moderate scores in security, usability, and infrastructure suggest that service providers should focus on enhancing these areas to increase user confidence and promote broader adoption.

For stakeholders, including financial institutions, technology providers, and policymakers, the findings highlight the importance of investing in advanced security measures, improving user interface design, and ensuring robust technical infrastructure to sustain consumer trust. Additionally, the demographic insights can inform targeted marketing strategies and tailored product development that address the specific needs and preferences of different user segments.

The study underscores the necessity for continuous improvement of mobile payment systems to foster greater consumer confidence, expand user base, and support the ongoing growth of digital financial services. Such enhancements are essential for maintaining competitiveness, ensuring security, and providing a seamless payment experience that aligns with evolving consumer expectations.

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