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**The growth, risks and benefits, and problems of payment apps**

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|   |           |
|---|-----------|
| <b>ABSTRACT</b> .....   | <b>1</b>  |
| <b>1. INTRODUCTION</b> .....  | <b>2</b>  |
| <b>2. LITERATURE REVIEW</b> .....   | <b>4</b>  |
| 2.1 Growth, Difference and Dominant Market.....   | 4         |
| 2.1.1 Growth of Alipay, Apple Pay and Samsung Pay .....   | 4         |
| 2.1.2 Difference between Alipay, Apple Pay and Samsung Pay .....                                | 5         |
| 2.1.3 Dominant Market of Alipay, Apple Pay and Samsung Pay .....                                | 5         |
| 2.2 Benefit, Security Concerns and Possible Reinforcement .....                                 | 6         |
| 2.2.1 Benefit Payment Apps Like Alipay and Wechat Pay Bring To China .....                      | 6         |
| 2.2.2 Security Concern of Payment App like Alipay .....   | 6         |
| 2.2.3 Possible Reinforcement .....  | 7         |
| 2.3 Traditional Banks and Payment Systems Affected .....  | 8         |
| 2.3.1 Traditional Banks and Payment Systems Affected by Payment Apps Like Alipay In China ..... | 8         |
| 2.3.2 Traditional Banks and Payment Systems Affected by Payment Apps Apple Pay in U.S.....      | 9         |
| 2.4 Global Investment Strategy and Plan.....  | 9         |
| 2.4.1 Global Investment Strategy and Plan of Alipay .....                                       | 9         |
| 2.4.2 Global Investment Strategy and Plan of Apple Pay .....                                    | 9         |
| <b>3. METHODOLOGY &amp; DATA</b> .....  | <b>10</b> |
| 3.1 Discussion of Data and Sample .....   | 10        |
| 3.1.1 Discussion and Explanation of Dataset .....   | 10        |
| 3.1.2 Discussion of Sample .....  | 11        |
| 3.2 Discussion of Methodology & Model .....   | 11        |
| 3.2.1 Discussion and Explanation of Methodology .....   | 11        |
| 3.2.2 Discussion and Explanation of Model and Hypotheses .....                                  | 11        |
| <b>4. ANALYSIS &amp; FINDINGS</b> .....   | <b>13</b> |
| 4.1 Data collection .....   | 13        |
| 4.2 Analysis .....  | 14        |
| 4.1 Finding .....   | 17        |
| <b>5. CONCLUSION</b> .....  | <b>20</b> |
| <b>6. REFERENCES</b> .....  | <b>22</b> |
| <b>7. TABLES AND FIGURES</b> .....  | <b>24</b> |
| Table 1 Respondents' demographic characteristics .....  | <b>24</b> |

|  |           |
|--|-----------|
| Figure 1 Cronbach's alpha.....   | 25        |
| Table 2 Validity Test .....  | 25        |
| Table3: Regression: relationship between benefit and willingness of using apps .....           | 26        |
| Table4: Regression: relationship between perceived risk and willingness of using apps.....     | 26        |
| <b>8. Appendix .....</b>   | <b>27</b> |
| Appendix A Regression: relationship between benefit and willingness of using apps .....        | 27        |
| Appendix B Regression: relationship between perceived risk and willingness of using apps ..... | 27        |
| Appendix C: Questionnaire data .....   | 27        |

## **Abstract**

Payment apps plays an increasingly important part in people's daily life and change the market largely in recent years. Analyzing the development of some payment apps help market investigators to understand the trend better. The main purpose of this study is to explore the growth of payment apps like Alipay, Apple Pay and Samsung Pay, the risks and the benefits, and the problems these apps create. In this study, questionnaire is used to collect data and SPSS is used to analyze the relationship between benefit of payment apps and willingness of use, and perceived risk of payment apps and willingness of use. The result shows that benefit has positive impact in willingness of use, but there is no relationship between perceived risk and willingness of use. These results shows that companies should put more efforts to enhance ease of use and usefulness to make customer satisfied. Meanwhile, one of the main differences between the three apps is technology, which is that Apple Pay and Samsung Pay uses NFC but Alipay use QR code. These apps develop fast and their dominant market is in their own countries. Besides, traditional industries are exploring new service on mobile phone to avoid greater losses. For expanding service area, Apple Pay is promoting in China while Alipay is promoting Europe.

## 1. INTRODUCTION

Carrying cash and credit cards to pay for things are not popular anymore. As fast as payment apps grow, they bring convenience to people since they can use smartphone to pay in stores anywhere in the world. Today, people are holding their mobile phone in their hand everywhere and anytime. As a result, companies think up ideas that they can use apps which is downloaded in their phones to pay for products and service.

In recent years, the finance industry has been boosted by high-technology especially fintech. Due to the development of technology, more new forms of financial service and products rose and change the traditional finance industry. Alipay, Apple Pay and Samsung Pay, payment apps produced lately are good examples of the ongoing of fintech revolution and how they bring changes to the traditional finance industry.

On the one hand, those payments apps promote economy condition of countries and make citizens' life easier; on the other hand, they also bring damage to traditional finance industry and force them to produce high-tech products. Besides, the personal data uploaded to apps and agreements people have to agree to continue to use apps also bring problems and concerns, and as a result, payments apps have to take measures. While the new payment apps offers users a variety of benefits, it also come with some perceived risk. This study will analyzes growth and trend of some payment apps, the benefit and risk of Alipay, Apple Pay and Samsung Pay, and discusses some ways to improve its reliability. The relationship between benefit and willingness of use, perceived risk and willingness of use will be focused in the study. In addition, once we find its safety problems and risks, we will think up and provide solutions to deal with these problems. Also, the plans of payment apps will be discussed and analyzed. The purpose of

this study is to explore the growth of payment apps like Alipay, Apple Pay and Samsung Pay, the risks and the benefits, and the problems these create.

## 2. LITERATURE REVIEW

### 2.1 Growth, Difference and Dominant Market

#### *2.1.1 Growth of Alipay, Apple Pay and Samsung Pay*

Alipay uses QR codes because of its low infrastructure threshold, making them cheaper in a short time and easier to promote across the country. Thanks to Alipay's high-tech, marketing strategy and innovation, Taobao accounted for 80 percent of China's e-commerce market in 2010, with 170 million registered shoppers. It beat eBay to become the country's market leader. According to Lu (2018), the market size of China's mobile payment industry reached 38 trillion yuan, equivalent to 5.7 trillion us dollars in 2016, 50 times that of the us market (112 billion us dollars).

As for Apple Pay, the company has expanded Apple Pay to 17 new countries and across the European Union. In addition, in-store mobile payments in the U.S. are expected to reach \$128 billion by 2021 (2019). Apple Pay is now adding more new users and quadrupling monthly transactions. According to Simon Kucher&Partners, nearly 90% of American consumers prefer to pay with cash, credit or debit cards rather than their mobile phones. In 2017, China's mobile payment market was \$1.7 trillion, about 35 times the \$49 billion.

Globally, Samsung has a major market share (24.6% in Q12015), nearly 10 percentage points higher than apple. By turning all these phones into mobile wallets, Samsung can record, track and measure fixed new value elements in the transaction, rather than just the first sale of an actual phone (Alex Samuely, 2017). Samsung is also expanding its market.

#### *2.1.2 Difference between Alipay, Apple Pay and Samsung Pay*

Compared with mobile payment systems using Near Field Communication (NFC) technologies such as Apple Pay and Samsung Pay, Alipay and most Chinese fintech companies have chosen Quick Response Codes (QR codes) to implement mobile payment functions. Because of its lower infrastructure threshold, it is cheaper and easier to promote in the short term (Constantinecu, 2019). Because retailers and stores must have NFC-enabled terminals to accept payments via NFC, Apple Pay is not as widely accepted as Samsung Pay (Mishra, 2018).

### *2.1.3 Dominant Market of Alipay, Apple Pay and Samsung Pay*

Taking into account Alipay's dominance in the Chinese market and its preference for local enterprises, they believe that apple and Samsung may not become a strong competitor for Alibaba in the near future (Team, 2015).

Ayoub Aouad (2017) pointed out that Apple Pay is generally considered to be the leading mobile wallet in the United States and accepted in 4.5 million locations. However, in the United States in 2018, the most popular mobile payment platform is the Starbucks application (2019). Starbucks has 23.4 million users, defeating the second-ranked Apple payment (22 million), and it is compatible with all mobile devices anywhere, on any device (online and offline). According to the British "Financial Times" quoted iResearch data, the 2017 China mobile payment market value of 17 trillion US dollars, about 35 times the US market of 49 billion US dollars.

Samsung Pay currently has 2.59 million users in South Korea. In March, Korea's mobile payment system used 41 times per user, making it the most used mobile payment application in Korea (Mu-Hyun, 2016).

## **2.2 Benefit, Security Concerns and Possible Reinforcement**

### *2.2.1 Benefit payment apps like Alipay and Wechat pay bring to China*

As Thomas Guillemaud (2017) said, the Chinese can pay for most of the activities in their daily lives with only one smartphone. Mobile payments can be used to pay for most utility expenses, as well as their meals, and other entertainment. In general, any Chinese can live a life without cash. The payment app also bring benefits to tourists when they go outside. Among overseas Chinese tourists, mobile payment is gaining momentum.

### *2.2.2 Security Concern of Payment App like Alipay*

Lu Lelong (2018) pointed out that as more and more depositors transfer funds from bank accounts to Fintech electronic wallets, they will no longer be entitled to official protection of their funds. Terms and agreements have been changed without the user's notice and consent; key information is not fully disclosed to consumers. Mobile network operators can be exposed to behavioral tracking and subscription data, transaction process data and other data. In addition, it may reveal consumers' shopping habits, financial status, and even their health or family status. In addition, Alipay does not have a legal entity to pay for virtual accounts (Li-jun & Wei, 2009).

As of Apple Payment, although biometrics is still an emerging technology, authentication processes such as fake fingerprints can be bypassed with extra effort (Liu, 2015). Other unsafe reason is that the touch id is still optional for unlocking the phone; if the user cannot activate the touch id or choose not to use it, the phone will always return to pin authentication. Users may trust Apple's devices more because they have biometric authentication, but thieves know that they only need one password.

### *2.2.3 Possible Reinforcement*

Future legislation should regulate capital requirements, investment limits, and redemption of electronic money (Li-jun & Wei, 2009). Specific provisions of the guidelines on the principles of deletion, minimum principles and necessity should be included in the law. The consumer should be given the consent or change of their agreement, withdrawal of consent or a meaningful choice of agreement; the user should be informed of important risk assessments and their results, as well as possible measures to enhance their safety. (Liu, 2015)

For a more trustworthy Apple payment service, banks and Apple should be responsible for providing credit cards. The bank can also display credit card information connected to the Apple payment device in a personal online bank account (Jawale, &Park, 2016).

Commercial banks are reducing deposits on financial statements. Non-bank institutions compete with banks and compete for loan opportunities. In order to pursue their own destiny, the new lender will need to provide all the services of the bank. In order to stay ahead, banks began to create their own mobile apps to cater to the needs of their members. Some companies choose to work with mobile payment providers, while others are developing applications to further enter the customer's business life. In the distant future, the blurring of boundaries between banks and IT companies may become the mainstay of the traditional banking system (Li, 2015).

## **2.3 Affected Traditional Banks and Payment Systems**

### *2.3.1 Traditional Banks and Payment Systems Affected by Payment Apps Like Alipay In China*

Alipay's daily processing of payments has surpassed UnionPay's, underscoring Alipay's dominance in the entire payments industry. In addition, the additional service, Yu 'E Bao, offers

users an annualized return of 4-7 percent, and millions of savers have chosen Alipay as the default bank account because of its good returns and convenience (Lu, 2018).

The nightmare for the U.S. financial industry is that technology companies from China and local giants like Amazon.com Inc. or Facebook Inc. are copying Alipay and WeChat. If the application starts to grab market share in the US at roughly the same rate as the Chinese market, it will need \$43 billion in revenue, and commercial banks are one of their most profitable banks (Surane, & Cannon, 2018). If technology companies succeed in grabbing market share, banks and payment networks will suffer heavy losses.

### *2.3.2 Traditional Banks and Payment Systems Affected by Payment Apps Apple Pay in U.S.*

As Wisniewski stated out that banks hope they could drive an increase in credit card usage. To some extent, mobile platforms like Apple have increased the amount of payment. Banks are usually paid according to the number of transactions. It does not change the role of the bank, it only changes speed (2014). As customers become more familiar and threatened, mobile banking is growing exponentially. Banks classify their mobile financial services based on the flow of information. Overall, the mobile banking industry has a bright future, but with the emergence of new technologies for processing funds, the case of online fraud has also emerged (Twilley, Zhou, & Wu, 2015) .

## **2.4 Global Investment Strategy and Plan**

### *2.4.1 Global Investment Strategy and Plan of Alipay*

In 2018, Alipay further established global partnerships with a number of companies, including Openpay in Mexico, Motion Pay in Canada and FreedomPay in North America. Alipay has expanded its presence in Japan, while MCM has implemented Alipay at Doha's airport and

in Europe. Eoin Connolly (2019) pointed out that Alipay and its plan to change mobile payment in Europe and China and its partnership will bring success to European brands.

#### *2.4.2 Global Investment Strategy and Plan of Apple Pay*

Apple introduced digital wallets in 2018 and 2019 in a number of new countries, including Germany, Spain, Norway, Taiwan, Poland, Ireland, Australia, Austria, Iceland, Italy and the Czech republic. More importantly, a recent study found that apple pays for about 127 million active users worldwide. Alipay and WeChat together make up more than 90% of China's mobile payment industry. However, Apple Pay is still being promoted in China, because even if it occupies a small share in the market, Apple Pay may see a huge transaction volume (Ayoub Aouad, 2017). To expand its presence in China, Apple Pay has simplified the decision-making process to develop marketing strategies and used the right language, including advertising, to convey consumers' emotions.

### 3. Methodology & Data

#### 3.1 Discussion of Data and Sample:

By using a questionnaire survey, data of this research is gathered. The part discussed is the relationship between benefit and risk payment apps brings and people's attitude and intention to them. Measurement items will be divided into perceived ease of use, perceived usefulness, risk perception, attitude and intention.

##### *3.1.1 Discussion and Explanation of Dataset:*

Each variable is measured by 3 items. **Perceived ease of use** was measured by "Using payment apps is very easy for me to learn", "Downloading payment apps is very convenient for me" and "When I use payment apps, there is no trouble". **Perceived usefulness** was measured by "Using the payment apps when paying makes my life convenient", "I find payment apps changes my life a lot" and "When using payment apps, I can get the benefits from payment technology". **Risk perception** was measured by: "I think some third platform will steal my personal information", "When I input my bank card, I am afraid that my account number will be leaked" and "The payment apps can get my personal information from its service". **Attitude** toward using payment apps was measured by "Using payment apps makes me feel good", "Using payment apps is a wise choice" and "It changes my daily life a lot". **Intention** to use payment apps was measured by "I will continue to use payment apps", "I will introduce others to use the payment apps" and "I am growing my preference with mobile payment apps than with cash". Those measurement items are measured using 7-point Likert scales.

### *3.1.2 Discussion of Sample:*

The research looks up previous studies and then adapt several measurable items to fit into this study. Then using the questionnaire to test the reliability and credibility of the questionnaire. With the feedback, items and questions are modified to get the final questionnaire. In order to avoid the high popularity rate of using payment apps in WKU campus, the samples collected are from different places in the country to reflect willingness of using payment apps.

### **3.2 Discussion of Methodology & Model:**

In the methodology, 2 relationship will be analyzed, including relationship between benefit of payment apps and willingness of using them, and the relationship between perceived risk of payment apps and willingness of using them. I want to search which item influence using of payment apps stronger or both of them do not have a notable relationship.

#### *3.2.1 Discussion and Explanation of Methodology:*

Regression will be used to examine the relationship between these measurement items. In this case, benefit is independent variable X1 and willingness of using apps is dependent variable Y1. Besides, opposite to the benefit, perceived risk is independent variable X2 and willingness of using apps is dependent variable Y2.

#### *3.2.2 Discussion and Explanation of Model and Hypotheses:*

There are two parts of questionnaire. The first one is demographic information. The second part is measurement items and questions. Questionnaire is attached as appendix.

Two null hypothesizes will be proposed:

H0: There is no relationship between benefit of payment apps and willingness of using them.

H0': There is no relationship between perceived risk of payment apps and willingness of using them.

## 4. Analysis & Findings

### 4.1 Data collection

| Demographic Characteristics |                                    | number | percentage |
|-----------------------------|------------------------------------|--------|------------|
| gender                      | male                               | 61     | 46.56%     |
|                             | female                             | 70     | 53.44%     |
| age                         | 0-18                               | 0      | 0.00%      |
|                             | 18-30                              | 84     | 64.12%     |
|                             | 30-40                              | 20     | 15.27%     |
|                             | 40-50                              | 19     | 14.50%     |
|                             | above 50                           | 8      | 6.11%      |
| educational level           | Junior middle school<br>or below   | 0      | 0.00%      |
|                             | high school                        | 19     | 14.50%     |
|                             | undergraduate or<br>junior college | 75     | 57.25%     |
|                             | graduate student or<br>above       | 37     | 28.24%     |
| monthly household<br>income | less than 2000                     | 1      | 0.76%      |
|                             | 2000~4999                          | 83     | 63.36%     |
|                             | 5000-9999                          | 34     | 25.95%     |
|                             | 10000~30000                        | 13     | 9.92%      |

|  |             |   |       |
|--|-------------|---|-------|
|  | above 30000 | 0 | 0.00% |
|--|-------------|---|-------|

Table1 Respondents' demographic characteristics

Questionnaires were sent online and a total of 131 people complete it. As shown in Table 1, most of the respondents are relatively young (concentrated between the ages of 18-30), and most people are well educated people and are middle-incomed generally. The features of the samples are consistent with those of smartphone users. Therefore, the samples are representative. The dataset is in the appendix C.

#### 4.2 Analysis

Reliability assessed by Cronbach's alpha. According to Cronbach's alpha, when the value is higher than 0.8, it has a high reliability.

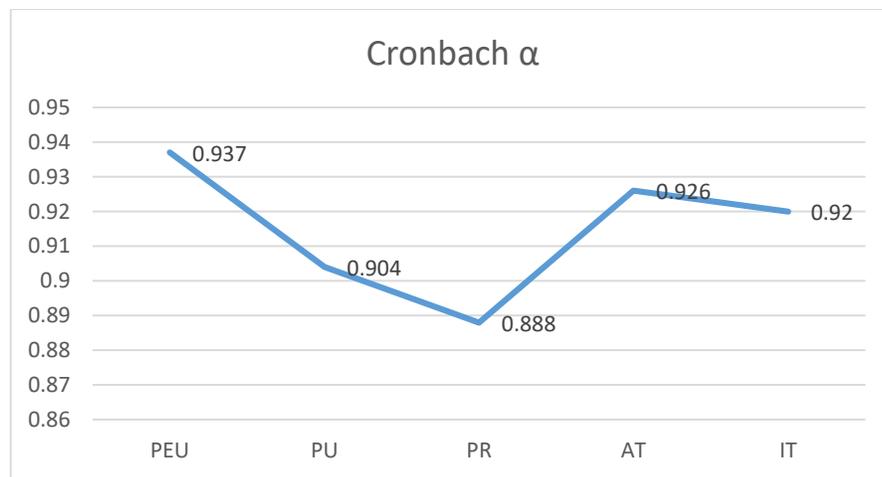


Figure 1 Cronbach's alpha

According to the value of the reliability of the research data, the Cronbach's alpha is higher than 0.8 which means that those items are reliable and can be used in further research.

Besides, the reliability coefficient value after deleting of the item is not significantly improved.

Those data indicate that reliability in the questionnaire is high and can be used for later analysis.

Validity was often assessed by factor loading. The corresponding relationship between items and factor loading is analyzed and if the relationship is almost the same as expected, the validity is good. If the KMO is higher than 0.6 but lower than 0.7, the validity is acceptable.

|                       |      | Loading and Cross-Loading Item |        |        |        |        | Communalities |
|-----------------------|------|--------------------------------|--------|--------|--------|--------|---------------|
|                       |      | 1                              | 2      | 3      | 4      | 5      |               |
| Perceived ease of use | PEU1 | 0.925                          | -0.03  | -0.037 | -0.029 | -0.061 | 0.863         |
|                       | PEU2 | 0.953                          | 0.046  | -0.011 | -0.022 | -0.065 | 0.916         |
|                       | PEU3 | 0.936                          | 0.017  | 0.082  | -0.051 | -0.033 | 0.886         |
| Perceived usefulness  | PU1  | 0.061                          | -0.034 | 0.897  | 0.001  | -0.048 | 0.811         |
|                       | PU2  | -0.001                         | 0.038  | 0.94   | 0.018  | -0.081 | 0.892         |
|                       | PU3  | -0.03                          | 0.074  | 0.908  | -0.015 | 0.013  | 0.832         |
| Risk perception       | PR1  | 0.05                           | 0.026  | 0.018  | 0.901  | 0.01   | 0.816         |
|                       | PR2  | -0.077                         | 0.027  | 0.024  | 0.956  | 0.085  | 0.928         |
|                       | PR3  | -0.076                         | 0.033  | -0.036 | 0.893  | 0.016  | 0.806         |
| Attitude              | AT1  | -0.054                         | 0.91   | -0.025 | 0.027  | -0.068 | 0.838         |
|                       | AT2  | 0.025                          | 0.954  | 0.024  | 0.053  | 0.005  | 0.914         |
|                       | AT3  | 0.06                           | 0.901  | 0.078  | 0.006  | -0.029 | 0.823         |
| Intention             | IT1  | -0.016                         | 0.016  | -0.016 | 0.059  | 0.882  | 0.782         |

|  |     |        |        |        |       |       |       |
|--|-----|--------|--------|--------|-------|-------|-------|
|  | IT2 | -0.063 | -0.088 | -0.019 | 0.003 | 0.942 | 0.9   |
|  | IT3 | -0.078 | -0.025 | -0.081 | 0.043 | 0.090 | 0.841 |

Table 2 Validity Test

According to the Figure 2, each question's factor in the same item has relatively high value but low or negative in the other factors. so it means that each of the items is fit with the factor loading and means that each 3 questions are valid to the 1 item. No items or question is needed to be revised or deleted. As KMO value is 0.688, greater than 0.6, which means the data has validity.

After analyzing reliability and validity, regression is used to test the relationship between benefit and enthusiasm of using apps, and the relationship between recognized risk and enthusiasm of using those apps.

| Regression |      |         |                |
|------------|------|---------|----------------|
|            | t    | p-value | R <sup>2</sup> |
| Benefit    | 16.8 | 0.000   | 0.686          |
| D-W: 1.941 |      |         |                |

Table3: Regression: relationship between benefit and willingness of using apps

Regarding benefit getting from using apps as independent variable X and willingness of using apps as dependent variable Y, we can see that p-value is 0.000 which is less than 0.1, while maximum p-value should be less than 0.1. Hence we do reject H0 "There is no

relationship between benefit of payment apps and willingness of using them”. As a result, we conclude that benefit of payment apps has positive impact on willingness of using them.

| Regression |       |         |                |
|------------|-------|---------|----------------|
|            | t     | p-value | R <sup>2</sup> |
| Benefit    | 0.582 | 0.598   | 0.002          |
| D-W: 2.001 |       |         |                |

Table4: Regression: relationship between perceived risk and willingness of using apps

Regarding benefit getting from using apps as independent variable X and willingness of using apps as dependent variable Y, we can see that p-value is 0.598 which is larger than 0.1, while maximum p-value should be less than 0.1. Hence we do not reject H1 “There is no relationship recognized danger of payment apps and eagerness of using them”. As a result, we conclude that there is no relationship between recognized danger and eagerness of using them.

### 4.3 Finding

In the analysis, questionnaires were sent to people who generally from different place from the country and most of the mare young high-educated people. Reliability and validity is analyzed and the relationship is tested by regression.

This study shows that ease of using payment apps and convenience have a significant impact on users' eagerness to use those payment apps. The result is consistent with Thomas Guillemaud (2017) who points out that most places in China can use payment apps because of its usefulness. This means that saving time and convenience counts greatly to people’s use of payment apps. Therefore, enterprises should put more effort to improve the service on

payment apps to improve the relationship between these two and people's rate of utilization. For example, the technology of Alipay is using QR code to scan to pay while it need fraction of a second to react. Developer should pay attention to resolve the problem to make payment quicker. If there is a long row of people, waiting time is long and not effective because of reaction time of scanning of each person. Also, service on payment apps is too much and most people cannot figure out which service can they really use. More service does not means high accuracy rate because people will confused with those service they are not familiar. Develop could simplify items and put more efforts on programs with high competitiveness.

The results also show that anticipated risk has no relationship with people's enthusiasm of using apps. The risk of using payment apps does not keep people away from using those apps. Although they recognize the danger of personal information leaking, they still insist to applying those apps. However, no relationship does not indicate that developers and enterprises can ignore the potential risk. On the contrary, they should higher their safe bottom to protect users' right. Because apps keeping people's money safe once cannot ensure safety, people will ignore the ease of using and convenience and stop using it. In order to higher the safety, laws and regulations should be improved and perfected. For users, knowledge about laws should be armed when they read agreement and contract before using apps. A great many of people do not reading carefully because of troublesome and lack of knowledge. Leading-edge security technologies could be invested to prevent personal information from being leaked and higher people's risk perception. Although users' risk perception does not have direct impact to using payment apps, their right of getting respect and personal data should be protected.

Apart from the relationship between benefit and willingness, perceived risk and willingness, other results are also be found. Different from Apple Pay and Samsung Pay which use NFC Technology, Alipay uses QR code to scan. The dominant markets for each app are the U.S., Korea and China. As for affected traditional banks and payment systems, they are impacted strongly by those payment apps and are not just by national companies by the whole world's. In order to keep away from suffering greater losses, they are planning to expand their mobile financial services to lift their service quality. They also collaborate with other apps like delivering and shopping to provide payment service to compete with those apps like Apple Pay and Alipay. Because payment apps like Apple Pay and Alipay want to expand their service area, they will still promoting in foreign countries like Alipay in Europe and Apple Pay in China.

## 5. Conclusion

Payment apps is playing a growing significant role in consumers' life all over the world recently. The purpose of the study is to understand the growth, benefit, problem and possible reinforcement of payment applications. Different payment apps have different service so that they can adjust better in their local country and expand to other country. Some market are occupied by a few companies, but other companies also plan to come in to generate revenue. They develop their technology skills and put efforts to service quality. Once they get credibility from their customer and generate revenue, they can expand their service area to earn more profit. However, although they bring benefits to customer with easily payment and other usefulness service, perceived risk cannot be neglected, like technique bugs, uncompleted law principle and customers' low precautionary awareness.

Result of the previous analysis shows that ease of use and usefulness have significant impact on the enthusiasm of people to use payment apps. Recognized danger does not have impact on users' attitude and intention to use payment apps. In order to increase people's willingness of downloading and using those payment apps, we should focus on ease of use and usefulness. According to previous results, measures are listed to help with enthusiasm of using. The current research uncovers the relationship between determinants and utilization, while there are still some limitations in this research. First of all, the number of respondents is few so that there can be a lot of problems on analyzing. The questionnaire should be sent for more few days to get more respondents. Besides, the analysis only consider several determinants and do not include other possible determinants like trend, country's policy and development of

electronic commerce. Apart from young people, old people should also be counted to search for reasons of using payment apps because they intend and are accustomed to use cash more often. Other determinants, such as some stores only receiving electronic money but reject cash should also be counted. Finally, We could extend our study to the factors that affect payment apps users' using behavior. In the future, we should pay attention to this research topic.

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## **7. Tables and Contents**

1. Table1 Respondents' demographic characteristics
2. Figure 1 Cronbach's alpha
3. Table 2 Validity Test
4. Table3: Regression: relationship between benefit and willingness of using apps
5. Table4: Regression: relationship between perceived risk and willingness of using apps

## Appendix

### Appendix A: Regression: relationship between benefit and willingness of using apps

| Regression         |                             |                |                           |       |         |     |                |                          |
|--------------------|-----------------------------|----------------|---------------------------|-------|---------|-----|----------------|--------------------------|
|                    | Unstandardized Coefficients |                | Standardized Coefficients | t     | p-value | VIF | R <sup>2</sup> | F                        |
|                    | B                           | Standard error | Beta                      |       |         |     |                |                          |
| constant           | 0.635                       | 0.263          | -                         | 2.415 | 0.017*  | -   | 0.686          | F(1,129)=282.228,P=0.000 |
| Benefit            | 0.828                       | 0.049          | 0.828                     | 16.8  | 0.000** | 1   |                |                          |
| D-W : 1.941        |                             |                |                           |       |         |     |                |                          |
| * p<0.05 ** p<0.01 |                             |                |                           |       |         |     |                |                          |

### Appendix B: Regression: relationship between perceived risk and willingness of using apps

| Regression         |                             |                |                           |        |         |     |                |                        |
|--------------------|-----------------------------|----------------|---------------------------|--------|---------|-----|----------------|------------------------|
|                    | Unstandardized Coefficients |                | Standardized Coefficients | t      | p-value | VIF | R <sup>2</sup> | F                      |
|                    | B                           | Standard error | Beta                      |        |         |     |                |                        |
| constant           | 4.561                       | 0.417          | -                         | 10.932 | 0.000** | -   | 0.002          | F(1,129)=0.279,P=0.598 |
| Perceived risk     | 0.044                       | 0.083          | 0.046                     | 0.528  | 0.598   | 1   |                |                        |
| D-W : 2.001        |                             |                |                           |        |         |     |                |                        |
| * p<0.05 ** p<0.01 |                             |                |                           |        |         |     |                |                        |

### Appendix C: Questionnaire data

| items                 | Questions   | Mean | Average |
|-----------------------|---|------|---------|
| Perceived ease of use | Using payment apps is very easy for me to learn                         | 3.78 | 3.89    |
|                       | Downloading payment apps is very convenient for me                      | 4.01 |         |
|                       | When I use payment apps, there is no trouble                            | 3.88 |         |
| Perceived usefulness  | Using the payment apps when paying makes my life convenient             | 3.96 | 4.06    |
|                       | I find payment apps changes my life a lot                               | 4.11 |         |
|                       | When using payment apps, I can get the benefits from payment technology | 4.11 |         |

|                |  |      |      |
|----------------|--|------|------|
| Perceived risk | I think some third platform will steal my personal information               | 3.72 | 3.78 |
|                | When I input my bank card, I am afraid that my account number will be leaked | 3.85 |      |
|                | The payment apps can get my personal information from its service            | 3.78 |      |
| Attitude       | Using payment apps makes me feel good  | 3.93 | 4.08 |
|                | Using payment apps is a wise choice  | 4.15 |      |
|                | It changes my daily life a lot   | 4.15 |      |
| Intention      | I will continue to use payment apps  | 3.97 | 4.02 |
|                | I will introduce others to use the payment apps                              | 4.08 |      |
|                | I am growing my preference with moblie payment apps than with cash           | 4.01 |      |