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Perceived Risk and Acceptance of Using Alipay in Online Commerce

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Abstract

This paper examines perceived risk and the acceptance of Alipay in e-commerce by studying factors that influence the adoption of this innovative technology by Chinese consumers. In testing perceived risk, perceived ease of use, and perceived usefulness in user intention, the TAM was adopted, including trust. Data were collected from 145 respondents through a survey questionnaire and were then analyzed using SmartPLS 4.0. The research showed that perceived risk and perceived ease of use significantly influence the acceptance of Alipay. Perceived ease of use and perceived usefulness were found to be strongly related to adoption intention. These findings reflect the complexity of consumer choices in payment systems and further show the desire for perceived risk to be countered by measures aimed at increasing usability and building confidence in the online platform of Alipay. This study provides a deeper understanding of the consumer decision-making process within the electronic commerce environment and underlines some very important implications for developers and

policymakers interested in improving the user experience and safety of digital payment solutions.

Keywords: Alipay, Perceived risk, Acceptance, Online commerce, Technology Acceptance Model (TAM), Perceived ease of use, Behavioral intention

1. Introduction

The rapid proliferation of digital payment systems has redefined the landscape of global commerce and reshaped how individuals and businesses engage in economic exchange. Alipay, operated by Ant Group, is one of the most popular platforms across China. It boasts over 850 million active users and annual transaction volumes amounting to trillions of yuan as of 2023 (Slotta, 2024). Even with its massive reach, Alipay faces adoption challenges rooted in perceived risk and trust (Li et al., 2019). Existing studies highlight the convenience and efficiency of such platforms, yet they often overlook the persistent tension between technological advancement and users' psychological barriers.

The present study was conducted to assess the association between perceived risk and the acceptance of Alipay in online commerce by young adults in China aged 17 to 30. This age group demonstrates significant use of digital technologies; hence, it is an important user segment for mobile payment systems. The TAM model was adapted for the present study to understand how perceived usefulness, perceived ease of use, trust, and security concerns affect user behavior (Davis, 1989). Integrating the TAM and consumer behavior literature results in a better understanding of the factors that influence the adoption of Alipay. This study employed a quantitative research approach; a structured survey was used to obtain responses from the target population regarding their perceived risk, trust, convenience, security, and intention to use Alipay. Hence, the information obtained with respect to Alipay users is based on their perceptions and attitudes. Data were statistically analyzed using descriptive statistics, correlation analysis, and structural equation modeling to assess the relationships among the variables.

The findings indicate that perceived risk significantly reduce users' concerns related to transaction-specific risks and, thus, increase their intention to use Alipay (Tian et al., 2023). Moreover, perceived ease of use and perceived usefulness have positive impacts on user acceptance through overall satisfaction and the reduction of cognitive effort during transactions. These findings suggest the significance of addressing perceived risks and developing trust to enhance the adoption of mobile payment systems. This research contributes to the growing body of knowledge on mobile payment systems and highlights the interaction between perceived risk, trust, and acceptance. Such insights will be highly valuable to policymakers, businesses, and platform developers seeking to optimize user experiences for the widespread diffusion they desire. Stakeholders must play a major role in reassuring users about their concerns and offering safe, reliable, and user-friendly systems to strengthen the mobile payment environment and ensure the sustainability of platforms such as Alipay.

2. Literature Review

The Technology Acceptance Model (TAM) is one of the most recognized theories in explaining technology adoption (Davis, 1989). TAM suggests that perceived usefulness (PU) and perceived ease of use (PEOU) are the crucial determinants of user acceptance. PU is defined as the belief that using the system will improve performance, whereas PEOU refers to the ease of using the system. Over the years, many studies have empirically supported TAM in different settings, including electronic and mobile payment systems (Türker et al., 2022). By extending TAM, trust has been recognized as a critical factor in online transactions, especially for systems like Alipay. Trust is assumed to reduce perceived risks (PR) related to privacy invasion and security threats, which usually hamper adoption (Featherman et al., 2010). For example, Egea and González (2011) extended TAM with trust; their results showed that trust reduces perceived risk and increases users' intentions for EHCR systems. Credible safeguards (e.g., advanced security protocols and transparent data governance) mitigate perceived risk, which in turn enhances users' confidence and adoption intentions toward Alipay (Sleiman et al., 2021).

At the same time, perceived usefulness has invariably emerged as the principal determinant of technology adoption. Perceived usefulness is a belief that using a system improves performance (Davis, 1989), It has been found to relate strongly to user intentions across many contexts, including those involving mobile payments (Kim et al., 2010). When using Alipay, its convenience, speed, and efficiency in transactions create significant value for users, thus encouraging adoption. Perceived ease of use is another core construct of TAM. It refers to the degree of effort involved in using a system. Several studies on mobile payments have identified that a user-friendly design can promote perceived ease of use and perceived usefulness (Lwoga & Lwoga, 2017; PH, 2023).

Prior studies on Alipay have indicated that its uncluttered interface, effortless navigation, and smooth transactions enhance PEOU and thus positively influence user adoption. Perceived risk refers to the potential loss one may face concerning privacy, security, and financial exposure (Kamalul Ariffin et al., 2018). High levels of perceived risk negatively affect intentions to use online payment systems (Rouibah et al., 2016). Meanwhile, mechanisms of trust, such as secure transaction processing protocols and transparent data handling, serve to alleviate risks and thus ensure greater diffusion of platforms such as Alipay (Sleiman et al., 2021).

3. Hypotheses Development

Perceived usefulness is expected to be positively related to the intention to transact using Alipay. If customers perceive Alipay as a tool for enhancing their transaction efficiency, they are more likely to adopt it. This notion is supported by literature identifying PU as one of the major drivers of technology acceptance in e-commerce systems (Venkatesh & Davis, 2000). Greater convenience and better service outcomes make PU a crucial factor in shaping user intentions. Furthermore, as the usage of mobile payment systems continues to increase, PU will become an even more powerful driver of adoption. Therefore:

H1: Perceived usefulness is positively related to Alipay adoption intention.

Perceived ease of use is expected to be positively related to the intention to transact with Alipay. A system that is easy to navigate and use requires less effort from users and is likely to instill confidence, thereby increasing its adoption rate. Further research has shown that systems perceived as easy to use also tend to be viewed as more useful, which strengthens their likelihood of adoption, as stated by Hess et al. (2014). This can be clearly reflected in Alipay's intuitive interface. Moreover, continuous updates and user support help ensure that PEOU is maintained and improved over time. Therefore:

H2: Perceived ease of use is positively related to Alipay adoption intention.

Perceived risk is expected to be inversely related to the intention to transact with Alipay. This means that the greater the perceived risk of potential financial loss or data breaches, the lower the likelihood that users will accept the system. Such perceived risks can only be minimized through effective security measures and process transparency to facilitate adoption. Past literature also confirms that technology acceptance can be more widespread only when perceived risk is reduced (Renn & Benighaus, 2013). Trust mechanisms, by mitigating these risks, help build confidence among users. Therefore:

H3: Perceived risk is negatively related to Alipay adoption intention.

Perceived risk refers to users' concerns about potential losses related to privacy breaches, financial insecurity, and transaction failures on digital platforms (Lee, 2009). High perceived risk often triggers negative emotions such as anxiety and diminishes the value users attach to technological systems (Abikari, 2024; Rouibah et al., 2016). Prior studies confirm that perceived risk may affect individuals' perceived utility of financial transactions (Ali et al., 2021). If users associate Alipay with vulnerabilities to fraud or data misuse, their perceived usefulness in facilitating efficient transactions is likely to decline, regardless of its technical advantages. Therefore, it is hypothesized that:

H4: Perceived risk is negatively related to perceived usefulness.

This study, therefore, incorporates TAM with perceived risk to analyze Alipay adoption and provides an overall framework for studying the interplay of PU, PEOU, and PR in influencing user intentions, as shown in Figure 1.

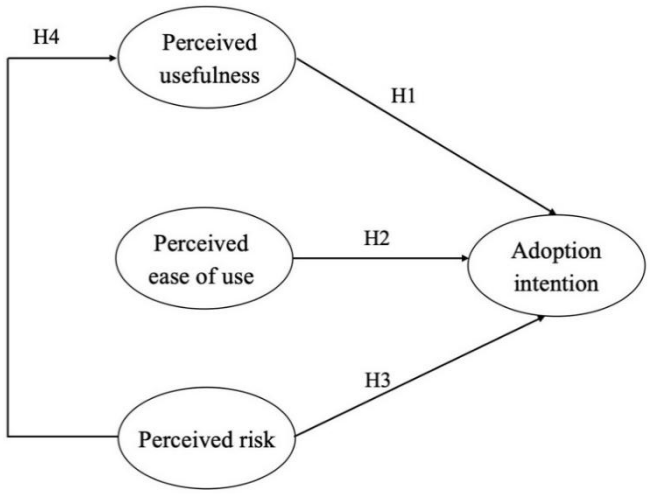

Figure 1. Research Model

4. Research Method

This paper uses quantitative research to explain the relationships among perceived risk, perceived usefulness, perceived ease of use, and behavioral intention to use Alipay when purchasing items online. This study is based on the TAM model, which is extended by adding perceived risk construct. For data collection, 145 respondents were surveyed, targeting Chinese students aged between 18 and 35 years who were studying at Universiti Teknologi Malaysia. G*Power was used to determine the minimum required sample size ($\alpha = 0.05$, power = 0.80, $f^2 = 0.15$) (Cohen, 2013). The G*Power analysis suggested a minimum total sample size of 119 participants. Thus, the sample size used in this study met the recommended threshold for adequate statistical power. The survey questionnaire was originally developed in English and then translated into Chinese. A back-translation procedure was adopted to ensure linguistic accuracy.

The questionnaire consisted of two parts: demographic information and variables such as perceived usefulness, perceived ease of use, perceived risk, and behavioral intention (see Appendix A). All variables were measured using a 5-point Likert scale. Data analysis was conducted using SmartPLS to perform descriptive statistics and regression analysis, with the aim of testing the hypotheses and examining the relationships among the variables. This approach provides a structured process for understanding the factors that influence users' acceptance of Alipay.

Table 1 summarizes the respondents' demographic characteristics. The gender distribution was relatively balanced, with 54.5% female and 45.5% male. The majority were undergraduates (57.9%), and Alipay usage was generally high, with 40.0% using it more than six times per week. In terms of experience with Alipay, 64.1% had been using it for more than four years, while only 7.6% were relatively new users (less than one year).

Table 1. Demographic description of respondents

Characteristic		Frequency	Percentage
Gender	Male	66	45.5%
	Female	79	54.5%
Age	17-20	26	17.9%
	21-25	79	54.5%
	26-30	40	27.6%
Education level	Foundation	11	7.6%
	Undergraduate	84	57.9%
	Postgraduate	50	34.5%
Using Frequency per week	Less than 1 time	12	8.3%
	1-2 times	17	11.7%
	3-4 times	32	22.1%
	5-6 times	26	17.9%
	More than 6 times	58	40.0%
How long have you been using Alipay?	Less than 1 year	11	7.6%
	1-2 years	21	14.5%
	3-4 years	20	13.8%
	More than 4 years	93	64.1%

To assess common method bias, Harman's single-factor test was used (MacKenzie & Podsakoff, 2012). The first factor accounted for 41.13% of the total variance, which is below the recommended threshold of 50%. Therefore, common method bias is not a serious concern in this study.

The measurement model assessment results showed that the constructs were reliable and valid (see Table 2). The CR values were greater than the threshold of 0.70, indicating internal reliability consistency of the items, while the AVE values were greater than 0.50 for all constructs, ensuring adequate convergent validity. Lastly, the HTMT ratios for each construct were less than 0.85, satisfying the requirement for adequate discriminant validity and establishing clear boundaries among the constructs.

Table 2. Reliability and validity test

	Cronbach's alpha	CA	CR	AVE
Adoption intention	0.856	0.859	0.896	0.633
Perceived ease of use	0.868	0.881	0.906	0.662
Perceived risk	0.869	0.900	0.902	0.650
Perceived usefulness	0.820	0.830	0.875	0.584

We performed bootstrapping with 500 resamples for the structural model analysis (see Table 3). The results indicate that perceived usefulness has a significant positive effect on adoption intention ($\beta = 0.430$, $t = 4.775$, $p < 0.001$). Similarly, perceived ease of use positively influences adoption intention ($\beta = 0.413$, $t = 4.727$, $p < 0.001$). In contrast, perceived risk exerts a significant negative effect on both adoption intention ($\beta = -0.121$, $t = 2.045$, $p < 0.05$) and perceived usefulness ($\beta = -0.224$, $t = 3.456$, $p < 0.001$).

Table 3. Structural model results

Relation	Path Coefficient (t-value)	Biased corrected 95% CI	Result
PU → BI	0.430** (4.775)	[0.242, 0.597]	H1: Supported
PEOU → BI	0.413** (4.727)	[0.253, 0.596]	H2: Supported
PR → BI	-0.121* (2.045)	[-0.253, -0.026]	H3: Supported
PR → PU	-0.224** (3.456)	[-0.379, -0.131]	H4: Supported

Notes. ** $p<0.001$, * $p<0.05$, PU=Perceived usefulness, PEOU=Perceived ease of use, PR=Perceived risk, BI=Adoption intention

5. Discussions

The present study examined the factors that influence the adoption of Alipay in e-commerce among Chinese students at Universiti Teknologi Malaysia. Based on this, the research applied the TAM model by including constructs on perceived risk to study how perceived usefulness, perceived ease of use, and perceived risk influence behavioral intentions to use Alipay. This section presents the discussion of the research findings within the context of the stated objectives and relevant literature, as well as their implications for practical purposes. The results confirm that PU and PEOU significantly and positively affect BI to use Alipay. Particularly, PU had the strongest effect on BI, which is consistent with many previous studies (Hou, 2012; Saeed & Abdinnour-Helm, 2008). This result indicates that Alipay enhances transactional efficiency and convenience, increasing value for the user. Features of Alipay, such as swift payment and seamless integration with e-commerce websites, are perceived as useful by students in their day-to-day financial activities. Thus, they are motivated to adopt Alipay. These findings highlight the performance and efficiency of transactions, which the so-called digital lifestyle has emphasized among the younger generation.

Also, PEOU was found to have a strong positive influence on BI. This means that facilitating interfaces, easy navigation, and reliability help nurture confidence in users' mindsets to adopt Alipay. This finding supports earlier research emphasizing the role of ease of use in reducing cognitive effort and enhancing user satisfaction (Amin et al., 2014; Calisir & Calisir, 2004). Some available features on the Alipay platform include simplified registration procedures, one-click payments, and multilingual support, which allow users to perceive the platform as easy to use; therefore, the probability of adoption increases.

Interestingly, PR emerges as a significant determinant of BI in this study. Although apprehension over financial and privacy risks exists among respondents, these concerns do not deter them from intending to use Alipay. Prior research has emphasized how perceived risks negatively affect user behavior (Abikari, 2024; Ali et al., 2021), plausible reasons may include the mechanisms of trust within Alipay's ecosystem, such as advanced encryption, real-time fraud detection, and buyer protection programs (Tian et al., 2023). Moreover, because respondents were familiar with Alipay and used it habitually, perceived risks may be relatively low due to their confidence in the high reliability of the platform.

The investigation extends the basic understanding of TAM in mobile payment systems by incorporating construct of perceived risk. The results once again underline the central role of PU and PEOU in technology acceptance and show how they interact in forming BI. Secondly, the significance of PR also supports the conventional perception that risk is one of the major deterrents to online transactions, suggesting that trust and experience may moderate its impact. These insights expand the applicability of TAM to the realm of trust-based models, allowing for more fine-grained views of consumer behavior within digital payment contexts.

The implications for practice are multifold. Policymakers and developers should note that usability and functionality must take precedence in designing digital payment systems. PEOU could be further strengthened by improving user interface features such as personalized recommendations and simplifying transaction processes. In addition to enhancing ease of use, marketing communications should focus on Alipay's speed and efficiency in a way that emphasizes its utility. Developers should continue to improve security protocols and communicate them clearly to users. Residual apprehensions can be alleviated through public awareness campaigns that explain Alipay's safety features and data protection policies. Institutions and businesses using Alipay should also explore collaborations to extend value-added services such as loyalty programs and student discounts that attract younger users.

A limitation of this study is that it targeted only Chinese students in one university. This reduces cultural and contextual variation. More heterogeneous samples are always preferable for providing a more representative understanding of the population under investigation. Further research should therefore involve participants from other regions or universities to achieve a more comprehensive understanding of Alipay adoption. Another limitation is the reliance on self-reported data, which may be subject to social desirability bias. In this light, qualitative approaches such as interviews or focus groups may provide deeper insights into users' attitudes and feelings. Longitudinal designs could also be used in future research to analyze changes in BI over time and how trust and perceived risk develop with continued technology adoption.

Specifically, this research highlighted PU and PEOU as two crucial drivers of Alipay adoption among Chinese students, while PR was found to be another significant determinant, likely because mechanisms are in place that instill confidence among users. From these findings, meaningful insights can be derived for developers, business executives, and policymakers who aim to enhance user experiences and promote the universal adoption of digital payment platforms. Future studies should build on this work to investigate a wider demographic and contextual application to ensure the continued relevance and effectiveness of mobile payment systems within the dynamic e-commerce landscape.

6. Conclusion

Exemplified by Alipay, the rapid development of digital payment systems has transformed the way users interact with online commerce. This study identified the factors affecting the adoption of Alipay, especially among Chinese students, by highlighting key issues with respect to users' behavior in terms of perceived usefulness, perceived ease of use, and

perceived risk. The key findings show that Alipay maintains a balance between functionalities and users' trust. It is from here that the significant drivers of behavioral intention—PU and PEOU—are extracted, with PR is being significant, which means that when mechanisms of trust are well implemented, users' apprehension can be reduced. This support conventional assumptions regarding risk. In this regard, the more familiar and confident users are with the platform, the lesser their perceived threats. The practical implications of these findings emphasize that streamlining interfaces for end-users, communicating effectively about security features, and continuously refining platform performance should be prioritized. Policymakers and developers must treat digital payment systems as dynamic instruments that need to adapt to the evolving expectations of users.

Future research should therefore consider broader demographic and cultural contexts that could reveal more subtle nuances of perception. Qualitative methods or longitudinal designs may further contribute to such depth of understanding by focusing on how trust, usability, and adoption interplay over time. In doing so, contributions to system design will be better attuned to diverse user needs. By looking beyond the limited emphasis on risks, this study has highlighted the promise of digital payment platforms in cultivating confidence and driving adoption. These results can help different stakeholders work together toward sustainable, user-centered solutions in an increasingly interconnected digital economy.

Authors contributions

Wushuang Li and Chin Fei Goh were responsible for study design, statistical analysis and revising. Junyi Li was responsible for data collection and drafted the manuscript. All authors revised the manuscript. All authors read and approved the final manuscript.

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Competing interests

The authors have no conflicts of interest to declare that are relevant to the content of this article.

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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Appendix

Appendix A

Questionnaire items

Table A1. Questionnaire items

Perceived Usefulness					
Using Alipay improves my transaction efficiency.	1	2	3	4	5
Alipay is useful for my online shopping.	1	2	3	4	5
Alipay enables me to complete transactions faster.	1	2	3	4	5
Using Alipay enhances my effectiveness in online transactions.	1	2	3	4	5
Alipay provides convenient features for managing my finances.	1	2	3	4	5
Perceived Ease of Use					
Learning to use Alipay is easy for me.	1	2	3	4	5
My interaction with Alipay is clear and understandable.	1	2	3	4	5
I find Alipay easy to use.	1	2	3	4	5
It is easy for me to become skillful at using Alipay.	1	2	3	4	5
I find Alipay user-friendly.	1	2	3	4	5
Perceived Risk					
I worry about the security of my personal information when using Alipay.	1	2	3	4	5

I am concerned about the safety of my financial information when using Alipay.	1	2	3	4	5
Using Alipay poses a risk of financial loss.	1	2	3	4	5
I feel afraid to secure my data privacy if I use Alipay.					
I feel that it is not safe whenever I use Alipay.					
Behavioral Intention to Use Alipay					
I will use Alipay when I pay for something online.	1	2	3	4	5
I will continue to use Alipay.	1	2	3	4	5
I will recommend this when people make online transactions.	1	2	3	4	5
I prefer to use Alipay when shopping online.	1	2	3	4	5
I would use it very often in the future.					