Factors Influencing Consumers' Behavioral Intention to Use Facial Recognition Payment on E-Commerce Platforms in China

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Abstract

This study investigates the factors influencing consumers' behavioral intention to use FR payment (FRP) on e-commerce platforms in China, drawing on the Unified Theory of Acceptance and Use of Technology (UTAUT). A survey was conducted, collecting data from 409 respondents through the survey. Structural equation modeling was employed to analyze the data using SmartPLS 4.0. The results reveal that performance expectancy (PE), social influence (SI), and facilitating conditions (FC) positively influence consumers' behavioral intention (BI) to use FRP. However, effort expectancy (EE) does not significantly influence BI. These findings contribute to the theoretical understanding of digital payment adoption and offer practical insights for e-commerce platforms and policymakers in promoting FRP adoption and usage.

Keywords: UTAUT model, Facial recognition payment, Behavioral intention, E-commerce platforms

Introduction

With the rapid development of the Internet, e-commerce has become a primary channel for transactions, contributing to the expansion of domestic demand and diversification of consumption. China's e-commerce transaction volume reached 43.83 trillion yuan in 2022, supported by emerging technologies like big data and cloud computing (Xinhua, 2024). E-commerce platforms have introduced high-tech innovations to optimize the shopping experience and promote technological innovation. Online payment has experienced significant growth, with 870 million users in China as of June 2021, driving the development of the mobile payment industry (Xinhua, 2021). FR payment (FRP), integrating biometric technology with mobile payment, has emerged as a secure and efficient payment method. According to the

data from the National Bureau of Statistics, the market size of FR applications in China is expected to exceed 10 billion yuan by 2024, with security being the primary application area. However, FR technology still lags behind password input and fingerprint recognition in terms of verification methods, and QR code payment remains the most frequently used payment method. Understanding the factors influencing consumers' willingness to use FRP is crucial for e-commerce platforms to enhance the shopping experience and increase user retention.

Objectives

1. To understand consumers' attitudes towards using FRP on e-commerce platforms.
2. To clarify the factors influencing consumers' continuance intention to use FRP on e-commerce platforms based on models.
3. To study the effects of various factors on consumers' BI to use FRP on e-commerce platforms.
4. Finally, to complete the data analysis based on the above purposes and draw research conclusions. This will serve as a reference for the widespread application of FRP and the development of e-commerce platforms.

Methodology

The study on FRP in e-commerce platforms was conducted using an online questionnaire distributed through the Chinese survey platform Wenjuanxing (https://www.wjx.cn/). The survey confirmed 6 research variables and 21 questionnaire items, including personal information such as age, gender, education level, and monthly income. The study aimed to investigate consumers' behavioral intention to use FRP on e-commerce platforms. As a result, 409 valid questionnaires were included in the final analysis.

The Theoretical Framework

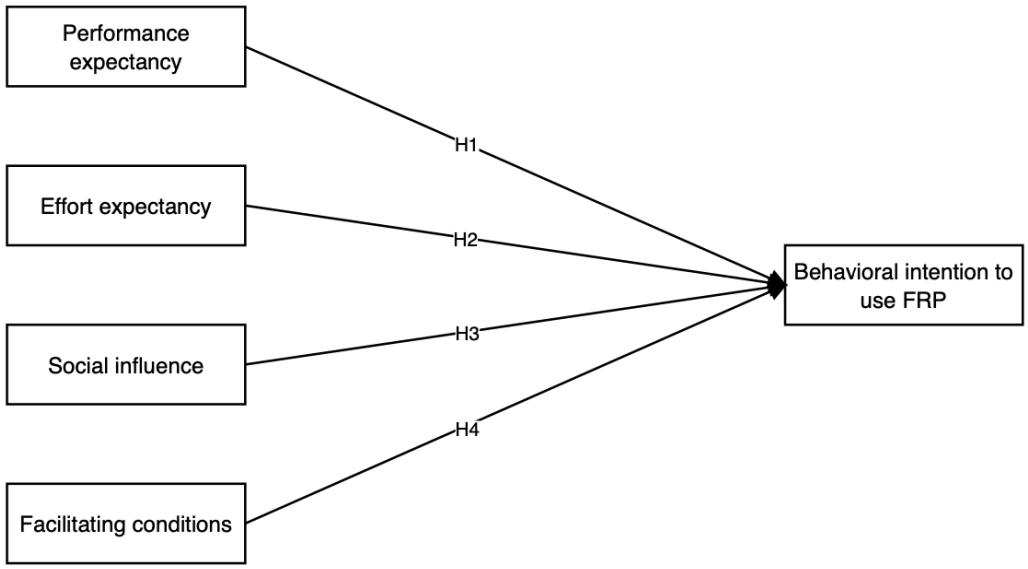

Figure 1: Theoretical framework adopted from Venkatesh, et al. (2003)

Findings/ Results

Demographic information from the 409 valid responses revealed a gender distribution of 47.7% male and 52.3% female. The majority of participants (24.7%) fell within the 36-35 age range. A significant portion (28.6%) had a bachelor's degree, and the income category of (6001-9000) represented 30.1% of the respondents.

The data analysis for the study was performed using SmartPLS 4.0. The measurement model was evaluated to assess the reliability and validity of the constructs. Reliability was assessed through factor loadings, and all factor loadings exceeded the commonly accepted threshold of 0.7. The Cronbach's alpha values for each factor ranged from 0.791 to 0.892, surpassing the recommended threshold of 0.7. Composite Reliability (CR) values ranged from 0.878 to 0.925, indicating high reliability. Convergent validity was assessed using Average Variance Extracted (AVE), and all AVE values ranged from 0.680 to 0.756, surpassing the recommended criterion of 0.5. This confirms the convergent validity of the measures (Fornell & Larcker, 1981). The study also assessed discriminant validity using the Heterotrait-Monotrait (HTMT) ratio. The highest HTMT ratio observed was 0.778, which is below the recommended criterion of 0.85 (Henseler, et al., 2015; Kline, 2023).

After conducting the analysis of the measurement model, the structural model was examined using SmartPLS 4.0. To address potential collinearity issues that could lead to an overestimation of path coefficients, the study examined the variance inflation factor (VIF) values between constructs. The VIF values for formative constructs were all below the recommended threshold of 3.3, ranging from 1.015 to 2.353, indicating the absence of significant collinearity issues in the data (Hair, et al., 2020).

As shown in Table 1, the results indicated that PE (β = 0.166, t=2.754, p < 0.01), SI (β = 0.147, t=2.892, p < 0.01) and FC (β = 0.413, t=6.889, p < 0.001) positively influenced BI to use FRP. However, EE (β = 0.054, t=1.604, p > 0.05) doesn't influence BI to use FRP. These results support H1, H3 and H4, indicating the significance of PE, SI and FC in shaping BI to use FRP in E-commerce platforms in China. H2 is not validated.

Table 1: Results of structural model assessment

Hypothesis	Relationship	Coefficient	Std. Dev.	t-value	f^2	VIF	p-value	Supported
H_1	PE⟶BI	0.166	0.060	2.754	0.034	2.142	0.006**	YES
H_2	EE⟶BI	0.054	0.034	1.604	0.008	1.018	0.109	NO
H_3	SI⟶BI	0.147	0.051	2.892	0.032	1.791	0.004**	YES
H_4	FC⟶BI	0.413	0.060	6.889	0.223	2.053	0.000***	YES

Note: PE: Performance expectancy; EE: Effort expectancy; SI: Social influence; FC: Facilitating conditions; BI: Behavioral intention to use FRP Std. Dev.: Standard Deviation; VIF: Variance Information Factor.
** P < 0.05, ** P < 0.01, and *** P < 0.001*.

The model explained 62.7% of the variance in BI to use FRP. The Q^2 values for BI to use FRP was 0.462, surpassing the specific thresholds of 0.35, demonstrating the model's effective predictive capability (Hair, et al., 2012).

Conclusion and Discussion

The findings of this study provide valuable insights into the factors influencing consumers' continuance intention to use FRP on e-commerce platforms in China. Drawing from UTAUT framework, the paper revealed several important findings. Firstly, the results

demonstrated that PE, SI, and FC positively influenced consumers' BI to use FRP. This suggests that consumers perceive FRP as a convenient, socially accepted, and easily accessible payment method (Zhong, et al., 2021), which contributes to their intention to continue using it on e-commerce platforms (Palash, et al., 2022; Dang, et al., 2022). Secondly, the study found that EE did not have a significant influence on BI to use FRP. This unexpected result may indicate that consumers do not perceive FRP as particularly effortless or easy to use compared to other payment methods available on e-commerce platforms. Overall, these findings contribute to our understanding of the factors shaping consumers' continuance intention to use FRP on e-commerce platforms in China. The study highlights the importance of factors such as PE, SI, and FC in driving consumers' acceptance and continued usage of FRP. These insights can inform e-commerce platform operators and policymakers in China in developing strategies to promote the adoption and usage of FRP among consumers, ultimately enhancing the efficiency and convenience of digital payments in the e-commerce landscape.

References

Dang, V. T., Nguyen, N., Nguyen, H. V., Nguyen, H., Van Huy, L., Tran, V. T., & Nguyen, T. H. (2022). Consumer attitudes toward facial recognition payment: an examination of antecedents and outcomes. *International Journal of Bank Marketing*, *40*(3), 511-535.

Fornell, C., Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *J. Mark. Res.*, *18*(1), 39–50.

Hair Jr, J. F., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of Business Research*, 109, 101-110.

Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science*, *40*(3), 414-433.

Henseler, J., Ringle, C.M., Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *J. Acad. Mark. Sci.*, *43* (1), 115–135.

Kline, R. B. (2023). *Principles and practice of structural equation modeling*. Guilford publications.

Palash, M. A. S., Talukder, M. S., Islam, A. K. M. N., & Bao, Y. (2022). Positive and negative valences, personal innovativeness and intention to use facial recognition for payments. *Industrial Management & Data Systems*, *122*(4), 1081-1108.

Venkatesh, V., Morris, M.G., Davis, G.B., Davis, F.D. (2003). User acceptance of information technology: toward a unified view. *MIS Q.,* 27(3), 425–478.

Xinhua (2021). *China has 872m online payment users*. from https://govt.chinadaily.com.cn/s/202108/30/WS612c4a3b498e6a12c1204ed5/china-has-872m-online-payment-users-report.html.

Xinhua. (2024). *Ministry: China remains world's largest online retail market for 11 years*. from https://www.chinadaily.com.cn/a/202401/12/WS65a0b202a3105f21a507bfca.html.

Zhong, Y., Oh, S., & Moon, H. C. (2021). Service transformation under industry 4.0: Investigating acceptance of facial recognition payment through an extended technology acceptance model. *Technology in Society*, *64*, 101515.