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Fintech Adoption: A Study of Users in the Guangdong-Macao In-Depth Cooperation Zone in Hengqin (China)

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Abstract

Intended as an economic and development hub, the Hengqin Cooperation Zone aims to foster collaboration and integration between mainland China, Hong Kong, and Macao, serving as a platform for economic development and innovation among the three regions. The zone's development has increased demand for financial services, often offered through fintech. There is, however, a lack of interoperability between the fintech services currently used in Macao and Hengqin. This may hinder Macao users' adoption of the technology. Thus, our research objective is to identify the factors determining Macao residents' adoption of fintech services in the area and provide insights for service providers, developers, and policymakers. A framework based on the Technology Acceptance Model (TAM) and Theory of Planned Behavior (TPB) was used for this purpose. The responses of 103 Macao residents provided evidence that ease of use significantly and positively impacts the usefulness of the technology. This in turn influences attitudes towards fintech usage. Subjective norms and perceived behavioral control positively impact fintech adoption intentions. The fintech industry and the governments of Macao and Hengqin can work on improving technology's ease of use and usefulness. They can also promote them to Macao users, and provide the resources required for better access to fintech in the zone.

Keywords

Fintech, Economic Development, Financial Technology, Hengqin, Macao.

Introduction

The influx of Macao residents into the Hengqin Cooperation Zone has led to an increased demand for financial services. However, the differences in fintech services and software between the Mainland and Macao, along with their lack of compatibility, could pose challenges for Macao users. Today, many financial services in China are provided through financial technology (fintech). The digitalization of financial services began in the mainland in the 2000s, initially in the form of electronic payment services, largely driven by two major companies: Tencent, creator of WeChat Pay, and Ant Financial, developer of Alipay. Over time, fintech expanded to cover various financial services, including financial management, credit services, insurance, and securities.

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Macao has seen a surge in the popularity of fintech services, particularly mobile payments, since 2020. By November 2021, over 80% of Macao merchants had upgraded their systems to accept mobile payments (Moura, 2022). However, while fintech adoption has grown in both the Mainland and Macao, there are distinctions in the software used, primarily in the form of apps. Research on fintech explores the intersection of finance and technology. Some studies have shown how financial growth drives technological innovation (Amore et al., 2013; Chemmanur et al., 2014). Others have studied how technology enhances the efficiency and profitability of financial institutions (Canepa & Stoneman, 2008; Michalow, 2016). Fintech adoption hinges on consumer perception, defined as a customer's impression of a company or its offerings based on factors like service quality, company image, and expectations (Nagaraj, 2015). Stewart and Jürjens (2018) noted that consumer perception of fintech features significantly influences consumer willingness to use the product or service. The literature also explores internal factors (such as ease of use, relative advantage, usefulness, risk, privacy, safety, and cost) and external factors (like policies, regulations, and socio-culture) that affect fintech adoption (Andersen & Jakobsen, 2018; Huei et al., 2018; Karimi & Liu, 2020).

This study aims to uncover the drivers of fintech adoption among Macao residents in the Cooperation Zone, addressing the challenge of interoperability between Macao and Hengqin fintech services. Drawing from the Technology Acceptance Model (TAM) (Davis, 1989) and the Theory of Planned Behavior (TPB) (Fishbein & Ajzen, 2011) as relevant frameworks (Lampo, 2023), we examine factors influencing adoption. Our research holds practical significance for stakeholders: fintech providers can tailor offerings, developers can enhance user experiences, and policymakers can make informed regulatory decisions. Thus, this study bridges theory and practice, offering insights with the potential to shape the fintech landscape.

Methodology

Our study utilized a descriptive, cross-sectional design to investigate the factors influencing the intention to use fintech in the Hengqin Cooperation Zone. This approach enabled us to gather a snapshot of data at a single point in time, allowing for an in-depth exploration of the current state of fintech adoption dynamics in the region. We employed a self-administered survey with questions adapted from Venkatesh et al. (2012). Respondents rated items on a 7-point Likert scale, from 1 (strongly disagree) to 7 (strongly agree). The survey targeted Macau residents actively involved in the Hengqin Cooperation Zone. The questionnaire was initially drafted in English and then translated into Chinese using Son's back-translation technique (2018). We employed convenience and snowball sampling to expedite data collection, assuming participant similarity to the target population (Flick, 2018). The survey was administered on Wen Juan Xing, a popular Chinese online platform that allows users to create and distribute surveys for data collection purposes. To determine the necessary sample size for structural equation modeling (SEM) analysis, standard guidelines recommend between 10 to 15 observations for each predictor in the model (Hair et al., 2022). A priori sample size calculation using the GPower application suggested 92 cases for this survey (Erdfelder et al., 1996). Ultimately, we gathered 103 valid responses. Participants were assured of the anonymity of their responses, with only aggregated data reported in the results. Before applying the PLS algorithm, we conducted a preliminary analysis to address issues like missing data, outliers, non-normality, and multicollinearity to ensure data quality. The following Figure 1 illustrates the conceptual model.

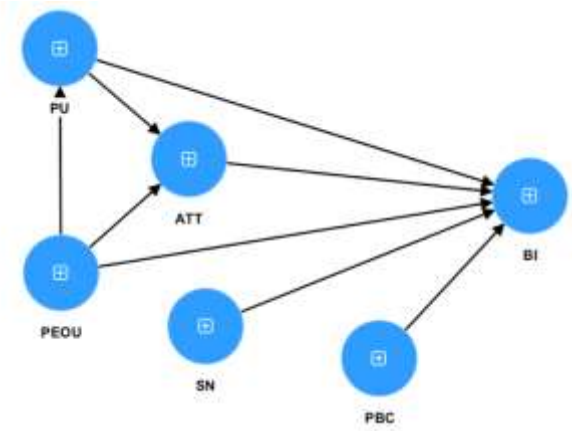


Figure 1. Conceptual Model (SmartPLS Output)

Results And Discussion

To interpret the PLS results, we initially evaluated the measurements model which describes the relationships between latent variables and their measures. More precisely, different tests (i.e., construct reliability, validity, and discriminant validity) had to be performed to establish whether the construct indicators measured the same concept and were conceptually different from the others. In the evaluation of the model, the standardized outer loading should be 0.70 or higher (Hair et al., 2022). In our case, the analysis reported lower loading for the items ATT2 (0.546) and PEOU3 (0.634). Rather than eliminating indicators below the threshold, Hair et al. (2022) recommended evaluating the model's contribution in the case when indicators had loadings between 0.40 and 0.70. As a result, ATT2 was retained due to its impact on other factors. Although the retention impacted the more conservative Cronbach's alpha, the evaluation of rho_a and rho_c confirmed the adequacy of the measurements. The analysis further suggested that all constructs had acceptable levels of reliability and validity, as well as being conceptually different from the other constructs in the model.

Table 1. Constructs Reliability and Validity

Construct	Items	Loadings	Cronbach's Alpha	rho_a	rho_c	AVE
Behavior Intention (BI)	BI1	0.786	0.821	0.840	0.983	0.737
	BI2	0.884				
	BI3	0.902				
Perceived Usefulness (PU)	PU1	0.898	0.890	0.982	0.932	0.820
	PU2	0.924				
	PU3	0.894				
Perceived Ease of Use (PEOU)	PEOU1	0.878	0.713	0.716	0.874	0.777
	PEOU2	0.885				
Attitude (ATT)	ATT1	0.857	0.644	0.725	0.805	0.598
	ATT2	0.536*				
	ATT3	0.863				

Table 1. Constructs Reliability and Validity (continued)

Subjective Norm (SN)	SN1	0.860	0.872	0.873	0.922	0.820
	SN2	0.923				
	SN3	0.893				
Perceived Behavioral Control (PBC)	PBC1	0.862	0.770	0.771	0.866	0.684
	PBC2	0.816				
	PBC3	0.802				

Notes: Evaluation criteria based on Hair et al. (2022). Loadings > 0.70, Cronbach's Alpha > 0.70, rho_A > 0.70, composite reliability (rho_c) > 0.70 and AVE > 0.50. *Retained item.

Table 2. Convergent Validity (Fornell-Larcker Criterion)

Construct	ATT	BI	PBC	PEOU	PU	SN
ATT	0.767					
BI	0.711	0.859				
PBC	0.588	0.643	0.827			
PEOU	0.496	0.437	0.42	0.881		
PU	0.654	0.583	0.482	0.573	0.905	
SN	0.758	0.644	0.522	0.422	0.523	0.893

Notes: Evaluation criteria based on Hair et al. (2022).

Then, the structural model, which involves testing the relationships between latent variables, was assessed. To confirm that collinearity did not bias the regression results, VIF statistics were examined before proceeding with the evaluation of the structural model. In our case, VIF values ranged from 1.140 to 3.072, which were below the critical value of 5 (Hair et al., 2022). Our model explained 60.9% (R^2 = 0.609) of the target construct BI, which is considered a substantial explanatory power (Hair et al., 2022). A closer examination of the structural paths found that PBC (β = 0.300) and ATT (β = 0.299) had the strongest effects on BI, followed by SN (β = 0.183). The bootstrapping routine also confirmed that these effects were significant at the 5% level. Despite the relationships PU→BI (β = 0.146) and PEOU→BI (β = 0.002) being positive, the bootstrap did not validate these results. Regarding the endogenous constructs ATT and PU, the model explained respectively 44.9% (R^2 = 0.449) and 32.8% (R^2 = 0.328) of the variance. Additionally, the relationship between PEOU and ATT (β = 0.181) was insignificant. To evaluate whether an omitted construct substantially affected behavioral intention to use fintech in Hengqin, the f^2 effect size was assessed. Values of 0.02, 0.15, and 0.35, typically represent small, medium, and large effect sizes (Hair et al., 2022). Except for PEOU, all the other constructs had some kind of effect on behavioral intention. More precisely, the analysis reported small to medium effects in the case of dropping PBC (0.143) or ATT (0.073), while eliminating either SN (0.035) or PU (0.026) would cause a small change in the impact. On the other hand, PEOU (0.001) could be safely removed from the model as there was no effect on the dependent variable BI. Finally, the standardized root mean square residual (SRMR) measurement was used to estimate the fit of the model. Our analysis reported an SRMR value of 0.086, a result below the suggested threshold of 0.10, indicating an acceptable fit of the model (Hair et al., 2022).

To conclude, five of the eight hypotheses proposed were supported. The path relationships in the model were significant at the 0.05 level and had signs in the expected directions with coefficients from 0.183 to 0.573. Table 3 reports the results.

Table 3. Summary of Hypotheses

Hypothesis	Path	Coefficient	t-Value	*p*-Value	Support
H1	PU→BI	0.146	1.454	0.146	**NO**
H2	PU→ATT	0.551	6.434	0.000	YES
H3	PEOU→BI	0.002	0.031	0.976	**NO**
H4	PEOU→PU	0.573	8.806	0.000	YES
H5	PEOU→ATT	0.181	1.762	0.078	**NO**
H6	ATT→BI	0.299	2.117	0.034	YES
H7	SN→BI	0.183	1.966	0.049	YES
H8	PBC→BI	0.300	3.553	0.000	YES

Note: Hypotheses evaluation criteria are t-Value > 1.96 and p-Value < 0.05.

Conclusion

The development plan of the Hengqin Cooperation Zone, promoting residency, work, and travel, has led to increased demand for services, including fintech. While fintech, particularly mobile payment services, gained popularity in the Mainland and Macao, differences in software availability and low interoperability across regions may hinder adoption by Macao users.

This study reveals that Macao users' perceived ease of use significantly influences the perceived usefulness of fintech, which, in turn, positively impacts their attitude toward fintech adoption in the Hengqin Cooperation Zone. Instead of directly affecting behavioral intention, perceived ease of use and perceived usefulness indirectly influence it through attitude. To enhance fintech adoption, cultivating a positive attitude by emphasizing the ease of use and utility is essential. Subjective norm and perceived behavioral control have a direct positive impact on behavioral intention, as opinions of influential people and users' resource control significantly shape their intentions. Fintech stakeholders can enhance adoption by promoting ease of use and usefulness, encouraging recommendations, and emphasizing accessibility.

Most respondents primarily used mobile payment services in the Hengqin, with other fintech services considered supplementary. Reasons for low adoption included insufficient knowledge, inadequate functionality, inconvenience, immaturity of fintech, and a preference for face-to-face services. Despite this, respondents were not strongly resistant to fintech usage, suggesting that industry and government improvements could increase adoption among Macao residents in the zone. The analysis highlights that perceived ease of use significantly impacts perceived usefulness, influencing attitudes toward fintech adoption. Behavioral intention is directly and positively affected by subjective norm and perceived behavioral control. Strategies like educating users on fintech benefits, improving accessibility, and word-of-mouth promotion could effectively boost adoption. While pioneering, this exploratory study faces limitations due to the ongoing construction of the Hengqin Cooperation Zone, making it challenging to reach the evolving population of Macao residents. Future research should address these constraints by obtaining a more representative sample and expanding the conceptual model, drawing insights from established models in technology studies. In conclusion, as the Hengqin Cooperation Zone evolves, understanding fintech adoption dynamics is crucial. This study serves as a stepping stone, guiding industry players and policymakers in fostering a seamless fintech experience for Macao users, paving the way for future research.

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