Exploring Mobile Wallet Adoption in the Philippines: A Partial Least Squares Path Modelling Approach

Jean Paolo G. Lacap

Office of the Vice President for Research, Extension, and Quality Assurance, City College of Angeles, Philippines

Abstract

Underpinned on the technology acceptance model (TAM) and cognition-affect-behavior (CAB) model, the present undertaking aims to examine the factors affecting the perceived satisfaction of users towards mobile wallet services, and how perceived satisfaction leads to the intention to recommend the said technology to others. Using purposive sampling, the identified respondents were composed of active users of the leading mobile wallet in the Philippines (n = 749). To measure the hypothesized relationships, structural equation modelling via partial least squares was utilized. The results reveal that perceived ease of use, perceived usefulness, perceived risk, and attitude have a significant effect on mobile wallet users' perceived satisfaction. It was also found that perceived satisfaction and trust translate to users' intention to recommend mobile wallets to others. Moreover, perceived satisfaction and trust were identified to be significantly and directly related. Regarding mediation analysis, the results show that trust has an indirect effect on the relationship between perceived satisfaction and intention to recommend. Similarly, the results showed the mediating role of perceived satisfaction on the links between the exogenous variables – perceived ease of use, perceived usefulness, perceived risk, and attitude, and intention to recommend (endogenous variable). And lastly, it was found that technological stress and social influence do not moderate the link between perceived satisfaction and intention to recommend.

Keywords: *technology adoption, mobile wallet, technology acceptance model, CAB model*

INTRODUCTION

The coronavirus disease (COVID-19) outbreak has badly affected major sectors and industries of the world economy. It brought negative impacts not only in the aspect of public health, but also, on the livelihood and well-being of enterprises and individuals (Açikgöz & Günay, 2020). The disruption created by this pandemic significantly hit business operations, the labor market, supply chains, and overall economy of every country (Fairlie, 2020). And until today, many of the enterprises and individuals are facing the challenges brought about by this pandemic.

With the limitations in mobility due to COVID-19 pandemic health policies and protocols, mobile wallets became a necessity for everyone. A mobile wallet is a virtual wallet (or e-wallet) that allows users to payment transaction using a mobile device (Kenton, 2022). The COVID-19 virus is said to be the main reason for the decrease in the usage of cash because of the risk of contamination. Because people need to still buy and consume products and services in this time of pandemic, the demand for contactless payment tremendously surged. With this, many of the business enterprises opened their doors to cashless payments which accelerated the market from cash to digital transactions (Lee, 2020).

Exploring Mobile Wallet Adoption in the Philippines: A Partial Least Squares Path Modelling Approach
Jean Paolo G. Lacap

Prior studies investigated the factors affecting mobile services and digital payments in the Philippines. For instance, Valencia et al. (2021) examined the factors affecting the utilization of e-wallet payment among Generation X and Y users. Moreover, Raon et al. (2021) explored the factors influencing the adoption of digital payment among Filipino consumers. While Amoroso et al. (2021) scrutinized the influence of reciprocity on the intention to use mobile wallets. These previous studies utilized technology acceptance model (TAM), theory of planned behavior (TPB), and unified theory of acceptance and use of technology (UTAUT) as theoretical underpinnings. There is a dearth of study that combines TAM and cognition-affect-behavior (CAB) model. Despite the growth of e-commerce platforms and mobile payments, in terms of digital technologies, the Philippines is still lagging behind as compared to its regional neighbors (Llorito, 2020). Therefore, understanding the factors that affect the level of satisfaction and intention to recommend mobile wallet services is timely and relevant. The present study aims to examine the factors affecting satisfaction and intention to recommend mobile services based on TAM and CAB model. Furthermore, mediation and moderation analyses were employed to explain the indirect and interaction effects in the proposed model.

LITERATURE REVIEW
The present study is anchored on two (2) theoretical frameworks – the technology acceptance model (TAM) and the cognition-affect-behavior (CAB) model.
The technology acceptance model (TAM) by Davis (1989) is considered one of the most influential theoretical underpinnings on technology acceptance. Based on TAM, there are two (2) main factors that affect the intention of an individual to use new technology namely: perceived ease of use and perceived usefulness (Charness & Boot, 2016). Perceived ease of use refers to the degree in which a new technology is easy to use and there is the absence of interface complications. On the other hand, perceived usefulness refers to the degree by which an individual sees a new technology or system as something that would help their work performance (Davis, 1989).
The CAB model was also utilized as the theoretical framework of the study. The model is widely used in the fields of consumer behavior and marketing. It contains three (3) elements – cognition, affect, and behavior. The cognition aspect includes elements related to awareness or learning. On one hand, the affect aspect refers to the elements related to an individual's feeling, interest, or desire. And the behavior is the outcome factor that is related to action of an individual. Hence, the behavior of an individual is due to cognition, which is mediated by affect (Babin & Harris, 2010; Barry, 1987).

Figure 1 presents the conceptual framework of the undertaking. Using TAM and CAB model, perceived ease of use, perceived usefulness, perceived risk, attitude, technological stress, and social influence were the cognition factors, while satisfaction and trust were the affect elements. Moreover, intention to recommend was the behavior factor.

Exploring Mobile Wallet Adoption in the Philippines: A Partial Least Squares Path Modelling Approach
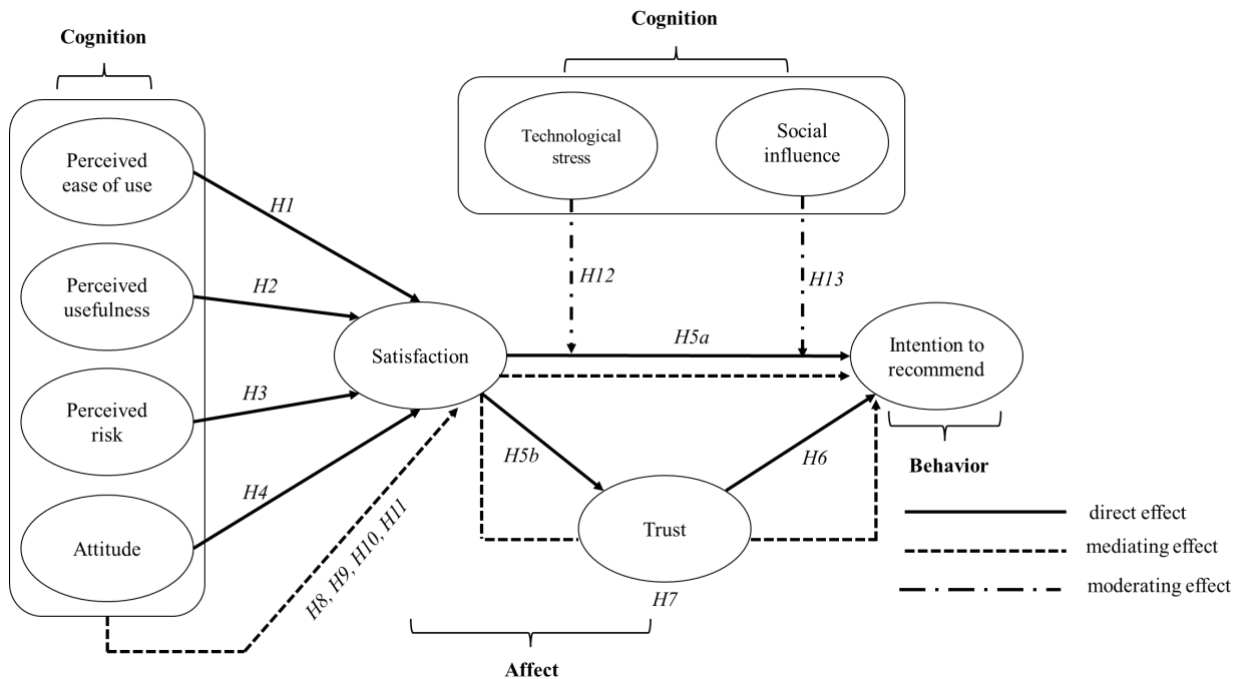Jean Paolo G. Lacap

Figure 1. Conceptual Framework of the Study

Mediation analysis was employed to measure the indirect role of satisfaction on the relationship between cognition factors - perceived ease of use, perceived usefulness, perceived risk, and attitude - and intention to recommend, and of trust (affect) on the link between satisfaction and intention to recommend. Moderation analysis was also utilized in the present study to examine how technological stress and social influence act as moderators on the relationship between satisfaction and intention to recommend.

RESEARCH METHOD

The participants of the study were users of GCash, the leading mobile wallet in the Philippines. GCash was introduced in 2004 and it is owned by Mynt (also known as Globe Fintech Innovations Inc.). As of January 2021, GCash is owned and operated by Mynt (40%) of Globe Telecom (one of the biggest names in the Philippine telecommunications industry), Ant Financial (40%) (a company that is affiliated with Alibaba Group), Bow Wave (13%) (a New York-based capital management firm), and Ayala (7%) (one of the largest conglomerates in the Philippines) (Camus, 2021; Mynt website, 2021). In March 2019, GCash is the top downloaded mobile wallet application in both iOS App Store and Google Play Store, according to the App Annie, a data analytics firm (TheNerve, 2019). Being the leading mobile wallet in the Philippines, with approximately 40 million users as of the 1st quarter of 2021 (Manila Bulletin Technews, 2021), GCash users are the most appropriate respondents of the current undertaking.

Exploring Mobile Wallet Adoption in the Philippines: A Partial Least Squares Path Modelling Approach
Jean Paolo G. Lacap

Purposive sampling technique using river sampling was utilized as the study's sampling approach. River sampling is a type of non-probability online sampling technique where participants are identified through invitation via an online survey link placed on online platforms such as social media and emails (Lehdonvirta et al., 2021).

The sample size was estimated using a-priori analysis via a software called G*Power. An a-priori estimate is done before the actual data collection to compute for the minimum sample size (Memon et al., 2020). Power analysis computes the minimum size of the sample by evaluating the research model with the biggest number of predictors (Hair et al., 2017; Roldan & Sanchez-Franco, 2012). Using a medium effect size of 0.15, $\alpha = 0.05$, and statistical power of 0.95, and following the rule of maximum number of arrows pointing to a variable in a proposed model (in the present study there were four arrows), the calculated minimum sample size is 129. The present study, however, utilized 749 valid responses, more than the minimum sample size suggested by G*Power.

Structural equation modelling (SEM) via partial least squares (PLS) was the statistical test that was utilized in measuring all the hypothesized relationships of the study. The present study employed causal-predictive research design and will involve model development and prediction, hence, PLS path modelling is the appropriate statistical approach (Chin et al., 2020; Hair et al., 2017).

FINDINGS AND DISCUSSION

In evaluating the measurement model, reliability, convergent, and discriminant validity tests were performed. For reliability analysis, Cronbach's alpha and composite reliability must be 70% and above (Fornell & Larcker, 1981; Kock, 2014). On the other hand, convergent validity includes assessment of the factor loadings and average variance extracted (AVE). For factor loading each indicator must have a load of at least .50, and the corresponding p-value must be at most 0.05 (Amora, 2021; Hair et al., 2009). As for AVE, the coefficient for each latent construct must be at least 0.50 (Fornell & Larckker, 1981; Kock & Lynn, 2012). Based on the results in Table 1, all latent constructs exhibit reliability and convergent validity.

Table 1. Internal Consistency and Convergent Validity

Item/Construct	Factor loading	AVE	CA	CR
Perceived ease of use		0.731	0.877	0.916
EOU1	0.871			
EOU2	0.866			
EOU3	0.821			
EOU4	0.861			
Perceived usefulness		0.759	0.894	0.927
PU1	0.863			
PU2	0.849			
PU3	0.897			
PU4	0.877			
Perceived risk		0.734	0.879	0.917
PR1	0.800			

Exploring Mobile Wallet Adoption in the Philippines: A Partial Least Squares Path Modelling Approach
Jean Paolo G. Lacap

		AVE	CA	CR
PR2	0.905			
PR3	0.861			
PR4	0.859			
Attitude		0.658	0.826	0.885
AT1	0.749			
AT2	0.853			
AT3	0.847			
AT4	0.792			
Technological stress		0.835	0.901	0.938
TS1	0.918			
TS2	0.929			
TS3	0.894			
Social Influence		0.643	0.815	0.878
SI1	0.779			
SI2	0.818			
SI3	0.819			
SI4	0.792			
Trust		0.788	0.933	0.949
TR1	0.847			
TR2	0.908			
TR3	0.918			
TR4	0.894			
TR5	0.870			
Perceived satisfaction		0.781	0.907	0.935
PS1	0.898			
PS2	0.886			
PS3	0.864			
PS4	0.886			
Intention to recommend		0.890	0.938	0.960
IR1	0.946			
IR2	0.952			
IR3	0.932			

AVE – average variance extracted; CA – Cronbach's alpha; CR – composite reliability. All indicator loadings are significant (p < 0.001).

Table 2 presents the results of discriminant validity test using the approach heterotrait-monotrait ratio of correlations 2 (HTMT2) as recommended by Roemer et al. (2021). The conservative requirement for HTMT2 is, the values ratio of correlations must be at less than 0.85 (Voorhees et al., 2016). As evident in Table 2, all latent constructs passed the requirement for discriminant validity.

Exploring Mobile Wallet Adoption in the Philippines: A Partial Least Squares Path Modelling Approach
Jean Paolo G. Lacap

Table 2. Discriminant Validity using HTMT2

	EOU	PU	PR	AT	TS	SI	TR	PS	IR
EOU									
PU	0.838								
PR	0.128	0.070							
AT	0.683	0.743	0.057						
TS	0.340	0.258	0.537	0.193					
SI	0.169	0.326	0.088	0.382	0.219				
TR	0.360	0.411	0.284	0.468	0.016	0.414			
PS	0.584	0.642	0.187	0.691	0.196	0.349	0.699		
IR	0.534	0.619	0.221	0.653	0.215	0.350	0.611	0.836	

EOU – perceived ease of use; PU – perceived usefulness; PR – perceived risk; AT – attitude; TS – technological stress; SI – social influence; TR – trust; PS – perceived satisfaction; IR – intention to recommend. All HTMT ratios are significant (p < 0.001).

Table 3 manifests the results of hypothesis testing, part of the structural model assessment. The findings showed that perceived ease of use (β = 0.075, p = 0.020) perceived usefulness (β = 0.270, p < 0.001), and attitude (β = 0.338, p < 0.001) significantly and directly influence perceived satisfaction. On the other hand, perceived risk was found to be significantly and negatively related to perceived satisfaction (β = -0.175, p < 0.001). Therefore, H1, H2, H3, and H4 are supported.

Furthermore, the results revealed that perceived satisfaction is significantly and positively related to intention to recommend (β = 0.685, p < 0.001), and trust (β = 0.647, p < 0.001). Additionally, trust was found to be significantly and positively related to intention to recommend (β = 0.131, p < 0.001). Hence, H5a, H5b, and H6 are supported.

In interpreting the effect sizes of the hypothesized relationships, Cohen (1988) suggests the following: 0.02 (small), 0.15 (medium), and 0.35 (large). Among the direct hypothesized relationships in Table 3, the influence of perceived satisfaction on intention to recommend (f^2 = 0.530) and on trust (f^2 = 0.418) exhibit substantial effect sizes. Additionally, the influence of perceived usefulness on perceived satisfaction (f^2 = 0.157), and the influence of attitude on perceived satisfaction (f^2 = 0.204) showed medium or moderate effect sizes. And the rest of the direct hypothesized relationships all indicate small effect sizes.

Table 3. Direct, Mediating, and Moderating Effects

Hypothesis	β	p	SE	f^2
Direct effects				
H1. EOU → PS	0.075	0.020	0.036	0.039
H2. PU → PS	0.270	<0.001	0.036	0.157

Exploring Mobile Wallet Adoption in the Philippines: A Partial Least Squares Path Modelling Approach
Jean Paolo G. Lacap

H3. PR → PS	-0.175	<0.001	0.036	0.061
H4. AT → PS	0.338	<0.001	0.035	0.204
H5a. PS → IR	0.685	<0.001	0.034	0.530
H5b. PS → TR	0.647	<0.001	0.034	0.418
H6. TR → IR	0.131	<0.001	0.036	0.076
Mediating effect				
H7. PS → TR → IR	0.085	<0.001	0.026	0.065
H8. EOU → PS → IR	0.051	0.024	0.026	0.025
H9. PU → PS → IR	0.185	<0.001	0.025	0.105
H10. PR → PS → IR	-0.120	<0.001	0.026	0.025
H11. AT → PS → IR	0.231	<0.001	0.025	0.133
Moderating effect				
H12. TS* PS → IR	0.010	0.395	0.037	0.002
H13. SI* PS → IR	-0.054	0.067	0.036	0.006

EOU – perceived ease of use; PU – perceived usefulness; PR – perceived risk; AT – attitude; TS – technological stress; SI – social influence; TR – trust; PS – perceived satisfaction; IR – intention to recommend. β – path coefficient; p – p-value; SE – standard error; f² – effect size.

The mediation model revealed that the following: trust has an intervening influence on the relationship between perceived satisfaction and intention to recommend with a small effect size (β = 0.085, p < 0.001, f^2 = 0.065). On the other hand, perceived satisfaction was found to have a mediating influence between perceived ease of use and intention to recommend (β = 0.051, p = 0.024, f^2 = 0.025), perceived usefulness and intention to recommend (β = 0.185, p < 0.001, f^2 = 0.105), perceived risk and intention to recommend (β = -0.120, p < 0.001, f^2 = 0.025), and attitude and intention to recommend (β = 0.231, p < 0.001, f^2 = 0.133). All the mediating effects in the structural model exhibit small effect sizes. Thus, H7, H8, H9, H10, and H11 are all supported.

Moreover, moderation analysis was also performed. The findings showed that technological stress (β = 0.010, p = 0.395) and social influence (β = -0.054, p = 0.067) have no moderating influence on the relationship between perceived satisfaction and intention to recommend. Therefore, H12 and H13 are not supported.

CONCLUSION

In the era of cashless society, enterprises and consumers are expected to move towards electronic transactions as the landscape of the marketplace is transforming into digital spaces. The surge in the use of mobile wallet is a manifestation of how governments, particularly those from developing countries such as the Philippines, are aiming for efficient and convenient means of financial dealings. Going cashless does not only promote financial inclusion, but it also caters the underserved market. The present study provides a holistic view of the factors that can affect users' satisfaction and intention to recommend mobile wallet services to others. And based on results of the study, mobile wallet adoption favorably translates to higher satisfaction among users. It can be

Exploring Mobile Wallet Adoption in the Philippines: A Partial Least Squares Path Modelling Approach
Jean Paolo G. Lacap

noted from the findings that perceived satisfaction substantially result into greater trust among users and higher propensity to recommend mobile wallet to others. Therefore, firms, regardless of their sizes, need to embrace mobile wallets to be more flexible in terms of payment and shopping options to add value to the new financial ecosystem. With the popularity of e-commerce platforms, and the convenience and speed of contactless payments, enterprises are expected to provide seamless payment methods, such as the use of mobile wallets to better serve their customers and provide favorable shopping experience.

With the growing number of users, mobile wallets companies should strategically expand their merchant partnerships for mobile wallet adoption to further swell. Moreover, these mobile wallet companies should not only expand their financial services, but with expansion, they need to continuously educate the consumers on the advantages associated with cashless transactions. Despite the growing number of mobile wallet users in the Philippines, 94% of Filipinos still prefer cash as payment method, compared to 64% for mobile wallet (Statista Research Department, 2022). Mobile wallets companies, partner merchants, and the government must work synergistically to educate consumers on the benefits of utilizing mobile wallets and the other financial services that consumers may take advantage of such as banking and investment needs. They need to promote financial inclusion among consumers through effective and sustainable financial education initiatives.

The current study shows how TAM and CAB model can be utilized to explain the formation of satisfaction and behavioral intentions of consumers in the context of mobile wallet adoption. The undertaking expands the TAM by including not only perceived ease of use and perceived usefulness, but also, perceived risk and attitude, as cognition factors, as antecedents of satisfaction. Moreover, it also proves that satisfaction and trust as affect factors lead to intention to recommend (behavior factor) mobile wallet services to others.

The present study proves that mobile wallet adoption can be explained from a technology acceptance perspective using TAM, while examining its impact to consumer behavior via CAB model. The perceived ease of use, perceived usefulness, perceived risk, and attitude (cognition) were found to be factors affecting mobile wallet users' satisfaction (affect), which then results to higher trust (affect) and intention to recommend (behavior).

Like any other research, the study poses some limitations. First, it only covers users of the leading mobile wallet in the Philippines. Second, it focused on the factors affecting satisfaction and intention to recommend. And third, technological stress and social influence were utilized as moderators, and they were found to be insignificant factors. From these limitations, other scholars may conduct a similar study by comparing mobile wallet adoption between developed and developing countries. Furthermore, other researchers may want to focus on satisfaction, loyalty, and intention to continuous use mobile wallets. Others may want to test again, in a different research locale, if technological stress and social influence will really influence satisfaction and intention recommend mobile wallet services to others.

Exploring Mobile Wallet Adoption in the Philippines: A Partial Least Squares Path Modelling Approach
Jean Paolo G. Lacap

REFERENCES

Açikgöz, Ö., & Günay, A. (2020). The early impact of the Covid-19 pandemic on the global and Turkish economy. *Turkish Journal of Medical Sciences*, *50*, 520-526. https://doi.org/10.3906/sag-2004-6

Amora, J. T. (2021). Convergent validity assessment in PLS-SEM: A loadings-driven approach. *Data Analysis Perspectives Journal*, 2(3), 1-6.

Amoroso, D., Lim, R., & Roman, F. L. (2021). The effect of reciprocity on mobile wallet intention: A study of Filipino consumers. *International Journal of Asian Business and Information Management*, *12*(2), 57-83. https://doi.org/10.4018/IJABIM.20210401.oa4

Barry, T. E. (1987). The development of the hierarchy of effects: An historical perspective. *Current issues and Research in Advertising*, *10*(1-2), 251-295. https://doi.org/10.1080/01633392.1987.10504921

Babin B. J., & Harris, E. G. (2010). *CB2*. South-Western Cengage Learning.

Charness, N., & Boot, W. R. (2016). Technology, gaming, and social networking. In *Handbook of the Psychology of Aging* (pp. 389-407). Academic Press.

Chin, W., Cheah, J. H., Liu, Y., Ting, H., Lim, X. J., & Cham, T. H. (2020). Demystifying the role of causal-predictive modeling using partial least squares structural equation modeling in information systems research. *Industrial Management & Data Systems*, *120*(12), 2161-2209. https://doi.org/10.1108/IMDS-10-2019-0529

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 319-340. https://doi.org/10.2307/249008

Fairlie, R. (2020). The impact of COVID-19 on small business owners: Evidence from the first three months after widespread social-distancing restrictions. *Journal of Economics & Management Strategy, 29*(4), 727-740. https://doi.org/10.1111/jems.12400

Fornell, C., & Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research,* 18(1), 39-50. https://doi.org/10.1177/002224378

Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2009). *Multivariate data analysis*. Prentice Hall.

Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications.

Kenton, W. (2022 March 02). Mobile wallet. *Investopedia*. https://www.investopedia.com/terms/m/mobile-wallet.asp

Kock, N., & Lynn, G.S. (2012). Lateral collinearity and misleading results in variance-based model assessments in PLS-based SEM. *International Journal of e-Collaboration*, 10(3), 1-13.

Lee, N. (2020, December 3). The coronavirus pandemic has caused a surge in demand for contactless payments, accelerating the shift from cash to digital options. *CNBC*. https://www.cnbc.com/2020/12/03/covid-19-pandemic-accelerating-the-shift-from-cash-to-digital-payments.html

Llorito, D. (2020). Harnessing digital technologies can help Philippines overcome impact of pandemic, hasten recovery. *The World Bank*. https://www.worldbank.org/en/news/press-

Proceeding on The International Halal Science and Technology Conference (IHSATEC)
Vol.15 (1), 14-23

Exploring Mobile Wallet Adoption in the Philippines: A Partial Least Squares Path Modelling Approach
Jean Paolo G. Lacap

release/2020/10/05/harnessing-digital-technologies-can-help-philippines-overcome-impact-of-pandemic-hasten-recovery

Raon, C. J. B., De Leon, M. V., & Dui, R. (2021). Adoption of E-Payment Systems in the Philippines. *Ilmu Komunikasi, 18*(1), 127-134.

Roemer, E., Schuberth, F., & Henseler, J. (2021). HTMT2–an improved criterion for assessing discriminant validity in structural equation modeling. *Industrial Management & Data Systems*, 121(12), 2637-2650. https://doi.org/10.1108/IMDS-02-2021-0082

Statista Research Department (2022 August 10). Leading payment method in the Philippines 2021. *Statista*. https://www.statista.com/statistics/1246268/payment-methods-philippines/

Valencia, S., Bautista Jr, R., & Jeong, L. S. (2021). Know Your Customers: How Generations X and Perceive Mobile Payment. *DLSU Business & Economics Review*, *31*(1), 16-28.

Voorhees, C. M., Brady, M. K., Calantone, R., & Ramirez, E. (2016). Discriminant validity testing in marketing: An analysis, causes for concern, and proposed remedies. *Journal of the Academy of Marketing Science*, *44*(1), 119-134. https://doi.org/10.1007/s11747-015-0455-4