

An Application of Analytical Hierarchy Process in the Comparison of the Use of GCash, Paymaya, and Debit Card Applications as a Payment Option in the Philippines

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Abstract

The Philippines was considered to be one of the first few countries who have started the use of mobile money or simply digital payments. The country had an inconsistent development as they were starting with the technological field, so the government partnered with its related sectors in order to fully facilitate and promote the use of digital payments. Adjusting to this type of payment system may be difficult from the start, but as progress and development continues, people were able to manage all challenges experienced, which resulted in the sudden increase of usage in digital payments such as GCash, Paymaya, and Debit Card applications as these were considered to be the payment options that are widely used in the country in completing any transaction. In this study, the researchers aim to investigate which of the three (3) payment options are considered to be the most beneficial in terms of the factors of aesthetics, benefits/rewards, ease of use, loading convenience, range of transactions, security, and service fees by conducting an online survey to GCash, Paymaya, and Debit Card users in order to measure their customer satisfaction with the applications. The gathered data was used in the application of the Analytical Hierarchy Process, by using the software Expert Choice. The criteria weights and local weights acquired in using the software were used in calculating the global weight for each of the payment options in order to identify which is the best option among the three. Through the analysis of the related literature and gathered data, under the criteria used by the researchers, the factor of security was highly prioritized and considered by its users. Aside from that, Paymaya obtained the highest number of global weight in the calculations, being the best and most beneficial mobile application as a payment option in completing transactions in the Philippines, considering all factors mentioned, most especially the factor of security.

Keywords

E-payment, PayMaya, GCash, Debits cards, and Transactions

1. Introduction

1.1 Background

The Philippines was among the first nations to spearhead digital payments with the launch of mobile money in 2001. As it slowly shifts to being completely digital, the use of electronic payments are constantly being used over the years since it started. Ever since, the Bangko Sentral ng Pilipinas (BSP) has been aiming for a modernized retail payment system in the country and has partnered with the government and numerous members from the banking, retail, and regulatory sectors to facilitate digital payments. The reason being is that they recognized the

unfulfilled needs for financial inclusion and that these payment systems will be valuable for businesses, financial solutions, and monetary stability.

Filipinos may not be quick in adapting to the new environment of e-commerce, but to keep the momentum going, the BSP released guidelines for banks on e-banking and e-money issuance in order to boost the use of digital payments. As it was being used by the majority, the officials had been aiming for electronic fund transfers to be more secure and convenient for its users. Moreover, financial inclusion has low charges which provide mobile money the opportunity to supply a large percentage of people their first digital store of value. Progress was sluggish initially, despite these attempts. In contrast, over the last three (3) years, the Philippines has made tremendous progress in creating an equitable digital payments environment. Although digital payments contributed only 10% of the total trade volume of the country in 2013, the BSP carried out a follow-up diagnostic report. They found out that the number of digital purchases increased in 2018, contributing to a 20% share of the total transaction value. These numbers represent substantial progress and change. BSP had a big turn in the economic sector by focusing on serving their retail consumers by opening their services not just to their own employees but to other consumers as well. They have leveled up their status by launching applications that include the completion of payments through the use of QR codes or remittances.

With this, the presence of digital technology is developing rapidly, continuously having a surge in use in every digital payment instrument such as e-money accounts, debit cards, credit cards, and prepaid cards. When traditional banks expand their reach, more customers will be able to use digital payment infrastructure. Nonetheless, the increase in the use of digital payments not just drove innovation but competition between various companies. Especially with the popularization of mobile wallets led by GCash and PayMaya, fintechs successfully introduced advanced payment methods, drawing investments from major companies. However, it would proceed to the establishment of other new products and services in the market, which may improve one's value and experience.

This research aims to determine the analytical hierarchy in comparison of e-wallets in the Philippines such as GCash, Paymaya, and Debit Cards in terms of aesthetics, ease of use, range of transactions, loading convenience, service fees, security, and benefits/rewards. Specifically, this research paper seeks to find answers to the following questions:

1. Which among the payment options is better than the other?
2. How do these payment options in terms of customer satisfaction?
3. What are the advantages and disadvantages of the chosen payment options?
4. How do these payment options benefit people in terms of transaction?
5. How do the criterias affect the decision of people in using the chosen payment options?

1.1 Objectives

General Objective: To determine and evaluate the distinctions between the three (3) most used digital payment options in the Philippines, and to find how the users of each platform rate their experience of their preferred platform with their respective criteria.

Specific Objectives:

- To define the demographics of debit cards and mobile wallet users in the country, including their age and gender.

- To examine the relationship between customer satisfaction with debit cards versus mobile wallet services and age and gender.
- To generate a list of the main challenges and advantages of debit cards/mobile wallets from the perspective of consumers.
- To offer suggestions for steps that commercial banks should take in order to improve the effect of debit cards and mobile wallets on customer loyalty.

2. Review of Related Literature

2.1 What is E-payment?

Industry study of Electronic money

In the study of Iturralde, E., Rosendo, R. R., and King, N. C, (2019). They have conducted a local study of market segments set in the Philippines. Where they received the following results regarding the use of Electronic money or “E-cash”. The following advantages that E-cash provides when purchasing for products in the market was Faster Payments, Smarter Payments and lastly more efficient. The researchers also recommended in their topic that both business owners as well as buyers should start using E-cash in their transactions because of the strengths and advantages that E-cash has to offer. Although there are risks in using E-cash if the users are able to be educated with the said risks then it would be beneficial for the users.

2.1.2 Effects of E-payment

Effect of Cashless Payment Methods: A Case Study Perspective Analysis

In this study, Thirupathi et. al (2019) have examined the use of various cashless payment methods within the country of India. The researchers have gathered data on what the positive and negative effects it brought to the country and as well as its importance in the transaction system. Summarizing their gathered data, use of cashless payments have six (6) advantages:

1. More comfortable: Cashless payments can be completed anytime and anywhere, which does not require one to wait in a queue in order to complete a transaction.
2. Low Cost: Service fees are charged at a low cost whenever one makes a transaction. There are also others who do not require service fees.
3. Waivers, discounts and cashbacks: Rewards such as cashbacks and discounts are being offered to consumers especially to regular users, which attracts people to use the specific digital payment application or mobile wallet more.
4. Record of digital money: Both the consumers’ and merchants’ transactions are recorded which can also be tracked anytime they complete one.
5. Convenient for paying bills: Bills have been an essential payment for every living household, so the majority of digital wallets have a service of paying bills for electricity, water, internet and other utilities.
6. Helps to control black money: The government can track the digital transactions circulating the system which can prevent black money from going around.

On the other hand, disadvantages of using digital payments were identified, which are similar to the advantages as well. Four (4) disadvantages were identified as listed below:

1. Security issues: One of the dangers of using cashless payments is that there’s the possibility of having your account and details hacked.

2. Internet link: Having access to an internet connection is a must whenever one uses a cashless payment method, and without one, a user won't be able to complete a transaction.
3. Costly: There are other costs needed to attend to in case the storage of the mobile application exceeds its basic capacity.
4. Data management: Since personal and payment details are being shared with a third party, the third party has to ensure that the data being shared with them should be kept safe, which gives more risk to the user since his/her details are being shared.

Despite the disadvantages mentioned on the use of digital payments, it was still considered to be a hassle-free procedure of completing any transaction. Other than that, after the fulfillment of using cashless transactions in India has occurred, it resulted in beneficial occurrences. Cashless transactions have prevented more illegal transactions and robbery from happening as money is kept in mobile applications. Use of digital payments have increased the convenience to people, reducing the physical effort humans have been exerting, when it comes to completing a transaction wherever they go.

2.2 FACTORS

2.2.1 AESTHETICS

Design aesthetics as drivers of value in mobile banking: does customer happiness matter?

Banking organizations dispersed the usage of mobile banking applications which represents a one-stop channel to users in performing transactions conveniently and offer a window for banks to build and nourish relationships with users. In this research paper, the researchers proposed the application of a potential factor that will make consumers adapt to online banking which is classified to be the design of mobile banking applications. To address this issue, this research paper creates and identifies environmental psychology and the use of the S-O-R model which is a common framework used to examine the outcomes of environmental stimuli with the user's decision. Additionally, this research aims to determine the potential aspects of value that design aesthetics can influence. According to Sánchez-Fernández and Iniesta-Bonillo (2007), emotional value in terms of the specific context of mobile banking identifies as enjoyable, fun, and positive feelings that users get in using mobile banking applications. The addition of images, symbolism, animations, and colors may likely stimulate customers' curiosity (Roig et.al, 2006). As a result, the effect of design aesthetics with the use of the S-O-R model possesses a positive outcome in psychology to predict happiness from users from aesthetics. The designers of an application can insert pictures and other entertaining systems in banking applications.

2.2.2 EASE OF USE

The Impact of Cost, Customer Experience, Ease of Use, and Trust towards Adoption of Online Banking

Online banking became popular throughout the years since it is user-friendly and convenient, which is its major selling point. This system allows people to fund transfer, pay bills, balance checking, and many more. However, some people still do not accept the new system. This study aims to analyze the four (4) criteria to determine the adaptation of people towards online banking. According to Gentile, et.al. (2007), customer experience is considered to be an interaction between the customer and another party, which can be a product, company, or anything that is part of the organization, that can provoke a reaction. A user has to be familiar with and have a set of experience towards technology. Thornton and White (2001) states that when people obtain knowledge, confidence, and together with the increase of computer usage, people may adapt to online banking.

Trust is an essential criteria considered in an online banking system. A person would not go through with a transaction if the system is trustworthy and liable. This is one of the factors that make consumers and users adapt to

online banking systems. According to Selvanathan (2015), when it comes to buyer-seller interactions, trust will always be the dominant factor to consider whenever one makes a transaction.

Banking services such as transfer fees, loading fees, and service charges are also considered in the factors of banking especially in online banking services as a way of profit in exchange for the services they provide. Depending on what age group a person belonged in, the factors of costs and charges are inconsistent.

Another influential factor is the ease of use of an online banking system. According to Selvanathan, et.al. (2016), customers would accept or continue to use online banking through its ease of use. The accessibility of online banking 24/7 compared to face-to-face banking interactions leads customers to gravitate towards online banking. However, this may also depend on the user's age group.

2.2.3 RANGE OF TRANSACTIONS

Cashless Payments in the Philippines

Covid-19 has put most places in Luzon in quarantine and this resulted in an increase of usage of cashless payments since it is highly recommended to be used especially when you purchased goods from the grocery or pharmacy because of the contactless transactions that are very beneficial in a pandemic. The Filipino citizens have already been using e-wallets such as Gcash and Paymaya. and the perks of using these apps are the following.

For Gcash it enables you to transfer currency to several banks such as BDO, metrobank and etc. several establishments and retailers have also been accepting gcash as mode of payment through QR code. For paymaya it also allows the transfer of money to commercial banks. However unlike Gcash, transfer fees are present in paymaya. Paymaya can also be used as a mode of payment to retailers and establishments alike.

2.2.4 LOADING CONVENIENCE

Financial Innovation and Efficiency on the Banking Sub-sector: The Case of Deposit Money Banks and Selected Instruments of Electronic Banking

In determining a bank's productivity, its capacity to turn capital to profit should be concise and uncomplicated measurement ratio. The expansion in the number of bank institutions and complexity of the advanced payment mechanisms and changes in handling the capital was the outcome of the banking sub-advances sector. And that is because of technical developments and the growth of organizations as the competition increases. Customers in Nigeria are dependent on the effects of financial advancements on productivity and efficiency of financial advancements compared to banks.

2.2.5 SERVICE FEES

Transaction Pricing and the Adoption of Electronic Payments: A Cross-Country Comparison

Customers are usually used to responding to pricing deals although the opportunity to trade off perceived payment preferences with relative costs does not appeal to them because commonly, their payment consumption has been considered as free. Consumers have conventionally paid for payment services indirectly through minimal or no interest on transaction accounts, thus businesses pay for payment services directly through direct transaction fees or charging balances. According to consumer surveys, certain implied costs (such as affordability, ease of use, and security) can influence payment preference (Borzekowski and Kiser 2006; Klee 2006) and models have been developed to differentiate between financial and behavioral explanations for credit card versus debit card usage (Zinman 2005). Now that per-transaction pricing of consumer payments is uncommon in Europe and the United States, these analyses cannot discuss the impact of overt pricing. Such pricing is unusual because banks are

reportedly afraid of losing deposit market share if they are the first (and only) to implement it, although antitrust regulators will be wary of industry attempts to negotiate the introduction of per-transaction rates to limit increases in relative market shares.

2.2.6 SECURITY

E-Banking: Security risks, provisions and recommendations

From an era of post mail to the digital era, online banking made life easy by transferring money to applying for a credit card. This system has become beneficial for both users and banks. However, this system may have encountered several issues. According to Jayaran & Prasad (2013), e-banking has various multidimensional advantages, not just for the companies, but for the customer individuals as well. These advantages were possible to be attained without the challenges and concerns they have encountered with security and the interest of their customers. Security in mobile banking has become a top priority to ensure that customers may feel that the bank can be trusted. There are many listed risks that online banking possesses. The most common risks that banks encounter is operational risk wherein it covers the area of maintenance, misuse of products and services, and security risk due to hackers and malwares. This paper focuses on e-banking, analysis on the issues of attacks, and provides recommendations on how to strengthen bank security. In order to prevent these attacks, educating customers of potential risks can be a factor. According to Bamrara (2015), education among users should be properly organized in order to ensure that they would understand all considerations such as sensitivity of the data, its level of confidentiality and the mechanisms that allow in securing the transaction. Banks should assess the security issues as a major aspect to provide better security management in online banking and to collaborate with technological industries for a stronger risk prevention with online banking.

2.2.7 BENEFITS/REWARDS

Rewarding Loyal Customers to Increase Mobile Payments Adoption

In a research conducted by Elisa Tavilla, she has examined whether mobile loyalty rewards and benefits have an impact on consumers that use mobile payment technologies. Depending on the preferences of the consumers, retailers continue to provide loyalty programs and rewards to its customers in order to value the existing ones and attract new customers which can consistently bring benefits to both the retailer and consumer. Those who engage in such programs usually have exclusive perks and receive more discounts and benefits. Usually, one earns points from purchases which can be converted into incentives that can be used for future purchases.

Mobile loyalty benefits were designed to be fully functional with the use of mobile applications. In the past, implementing such benefits were not applicable with the use of a desktop but nowadays, it's now serviceable with the use of one's smartphones. There are various examples on how retailers use mobile loyalty solutions to gain more customers and value their existing ones.

- Coffee shops and QSRs

Enabling their regular customers' redeeming mobile coupons, customized offers, discounts and extra reward points whenever one purchases a drink. As a retailer creates their own mobile application and processes one's order through that application, one can enjoy these types of benefits.

- Pharmacies / Drug Stores

There are a number of retailers who have their own application and provide its users or members with various digital rewards such as discount coupons and the ability to be able to manage prescriptions.

- Supermarkets and Grocery Stores

This was said to be the largest participating category when it comes to providing rewards and benefits to its consumers. With this, they provide coupons and shopping features in their

applications, where they can obtain loyalty points to be able to be redeemed to their future purchases.

- Department Stores

They offer more mobile payment capabilities, loyalty rewards, mobile coupons and exclusive offers to their regular customers which is a big advantage to both parties. They also accept more cashless payment options which could be convenient to those who have different types of e-wallet. The rewards this category offers have a lot of varieties that are not common to other establishments. One of these are reward certificates and in-store benefits customer service.

- Hotels

The rewards this category offers are usually in loyalty points or miles which are related to travelling. These rewards can be redeemed into various travel experiences, hotel stays, and free airplane flights. Most of these rewards are all associated with the use of mobile applications, given that the consumer is a regular customer to the specific retailer.

Incorporating such use of rewards for payments would encourage their consumers to buy from the same retailer, paying for more purchases just to maximize the incentives they will be receiving. However, launching different rewards and programs should be utilized, releasing it one by one or slowly to prevent negative feedback and confusion among shoppers. Like what Tavilla (2017) has concluded, retailers should be able to assess their judgements on their business and customer needs in order to come up with the most suitable solution of obtaining consistency among the programs they have and with their employees or staff. Implementing such types of rewards and incentives can develop relevant features in mobile technology which could increase convenience to both parties and as well as customer engagement. It can highly influence every consumers' payment behavior which could result in greater familiarity and comfort with using mobile payments, increasing the usage of that retail segment.

2.3 HOW DOES PHILIPPINES CATCH UP?

Pandemic Accelerated PH Consumers' Shift from Cash to Digital Payments

As the pandemic has started in the Philippines, a lot of Filipinos are relying on the use of digital channels when it comes to completing important transactions. A study was conducted by Paypal that addresses the Filipinos' use of Paypal where those who prefer using physical currency before the COVID19 outbreak, have now shifted to the use of digital solutions for convenience and practicality. In the article Lucas (2020) has stated, the online survey from Paypal has resulted in Filipinos' rise to the use of digital payments with 87% of the 500 local respondents. On the other hand, 90% have responded in preferring the use of digital payments rather than cash during the pandemic.

Aside from these realizations, as the people shifted to the use of digital technology, the locals have been exposed to global or overseas shopping as well. According to Agrawal, Filipino shoppers have been more exposed to global e-commerce whenever they use digital payments, which they continue to make use of as they get to experience their top considerations - convenience and security. As the number of Filipino shoppers being introduced to global e-commerce have increased, they were able to discover other digital payments platforms and one of which is Paypal. According to Lucas (2020), 77% of the obtained respondents have stated that Paypal is their preferred method since it is flexible in making purchases internationally. Nonetheless, the use of digital payments within the country is still at its peak, Filipinos preferring and relying on the use of it rather than the usage of cash. It is evident on how these cashless payments have been essential in the lives of the Filipinos, most especially during this pandemic.

3. Methods

This study is considered a quantitative research which emphasizes the use of quantitative data and

mathematical analysis through the use of questionnaires, surveys, and alike. In this study, an online survey was conducted among a total of 236 individuals who use either GCash, Paymaya or Debit Cards. The sample chosen for this study are Filipino citizens who are using GCash, Paymaya, and Debit Cards. On the other hand, the sampling technique used was quota sampling, where a minimum number of 70 respondents should be reached for every payment option considered. Through this technique, the researchers were able to reach the quota for each payment option, wherein each of the respondents' responses were used as the data for this study.

4. Data Collection

As for the instrument of this study, an online survey was conducted through the use of Google Forms. The survey consisted of twelve (12) questions. The first three (3) questions collected the respondents' profile such as their names, age, and gender. Question four (4) asks the respondents' for their chosen payment option. And lastly, questions five (5) to twelve (12) of the survey consists of the respondents' satisfactory rate in terms of aesthetics, ease of use, range of transactions, loading convenience, service fees, security, and benefits offered by their preferred payment option. The survey used a 1-4 rating scale (with 4 being the highest and 1 being the lowest) with a detailed summary of the respondents' experience to make it easier for them to react and for the researchers to view the results quantitatively.

5. Results and Discussion

5.1 Numerical Results

Paymaya							
SUM	255	259	257	252	207	245	207
# OF RESPONDENTS	72	72	72	72	72	72	72
MEAN	3.5417	3.5972	3.5694	3.5000	2.8750	3.4028	2.8750
	AESTHETICS	EASE OF USE	RANGE OF TRANSACTIONS	LOADING CONVENIENCE	SERVICE FEES	SECURITY	BENEFITS/REWARDS
Gcash							
SUM	310	307	314	312	253	268	229
# OF RESPONDENTS	87	87	87	87	87	87	87
MEAN	3.5632	3.5287	3.6092	3.5862	2.9080	3.0805	2.6322
	AESTHETICS	EASE OF USE	RANGE OF TRANSACTIONS	LOADING CONVENIENCE	SERVICE FEES	SECURITY	BENEFITS/REWARDS
Debit cards							
SUM	241	264	270	239	186	249	147
# OF RESPONDENTS	76	76	76	76	76	76	76
MEAN	3.1711	3.4737	3.5526	3.1447	2.4474	3.2763	1.9342
	AESTHETICS	EASE OF USE	RANGE OF TRANSACTIONS	LOADING CONVENIENCE	SERVICE FEES	SECURITY	BENEFITS/REWARDS

Figure 1. Data summary.

Based on the data shown above, the following are the total number of respondents that answered from each payment option. The researchers also obtained the average value of rating for each criteria in each payment option in order to use it as a basis when involving the application of the analytical hierarchy process. With the application of the analytical hierarchy process, the researchers were able to pinpoint on which criteria have resulted with the least and highest weight in terms of its importance in the application as a whole. With security as the criterion to have the greatest weight has shown how important it is in considering what payment option to be used. Upon finishing the pairwise comparisons among the different criteria for this study, the researchers were able to obtain the criteria weights and local weights for each criterion which are essential in computing for the global weights as they are the factors that could determine which of the payment options is the best. It is shown below:

LOCAL WEIGHT FACTOR FOR EACH ALTERNATIVE							
PAYMENT OPTION / FACTOR	Security	Range of Transactions	Ease of Use	Benefits / Rewards	Loading Convenience	Service Fees	Aesthetics
Paymaya	0.54	0.333	0.413	0.57	0.429	0.429	0.429
GCash	0.163	0.333	0.327	0.333	0.429	0.429	0.429
Debit Card	0.297	0.333	0.26	0.097	0.143	0.429	0.143

Figure 2. Local weights.

Upon computing the global weights for each payment option using the Analytical Hierarchy Process, the payment option that obtained the highest number of global weights is Paymaya, as shown in Figure 3. It can be concluded that the respondents who use paymaya as their payment option have a good experience with the application.

EXPERT CHOICE SUMMARY (Global Weights = Criteria Weight x Local Weight)								
	Security	Range of Transactions	Ease of Use	Benefits / Rewards	Loading Convenience	Service Fees	Aesthetics	TOTAL
Weights of each goal's criteria	0.35	0.232	0.167	0.101	0.071	0.047	0.032	
Paymaya	0.189	0.077256	0.068971	0.05757	0.030459	0.020163	0.013728	0.457147
GCash	0.05705	0.077256	0.054609	0.033633	0.030459	0.020163	0.013728	0.286898
Debit Card	0.10395	0.077256	0.04342	0.009797	0.010153	0.020163	0.004576	0.269315

Figure 3. Global Weights.

5.2 Graphical Results

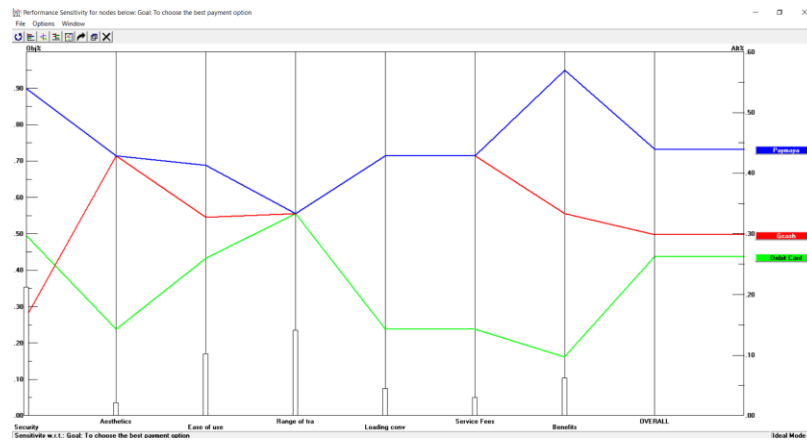


Figure 4. Sensitivity Analysis Graph.

Using Expert Choice, the sensitivity analysis graph (Figure 4) for the gathered data was obtained, considering all criteria included. For all criteria included, Paymaya is the first and leading among the three options. As for the other criteria except security, GCash is also leading over Debit Cards. With this, it can be concluded that Paymaya is the best among the three payment options, to be followed by Gcash as the second, and Debit Card as the third and last.

5.3 Proposed Improvements

Security in terms of mobile banking application exhibits the greatest concern of users in utilizing and adapting to the new transaction system. With risks and attacks regarding the usage of mobile banking applications such as viruses, identity thefts, and fraud, security systems ensure customer's authentication and prevent such malware attacks. As seen on the data, the criteria for security has attained to be the better criterion compared to the others which banks should put as their highest priority in constructing mobile banking applications and educate users in mobile banking security by posting privacy policies and providing users choices in ensuring mobile banking transactions. Moreover, conducting data privacy audits and minimizing data collection. This way, banking organizations can assess privacy protection and defend process information. This criteria puts user's trust into the new modern technology and for more people to adapt into using mobile banking. Furthermore, the other criterias have also shown tremendous importance in the liking of users in modern technology as the range of transactions succeeds security in the analytical hierarchy. As for the better payment options, Paymaya conquered the scale in attaining the best features and attributes with regards to overall satisfaction in the usage of mobile banking transactions. This e-wallet system exceeds convenience and serviceability in online transactions as it tips the scale in the results. Paymaya shows remarkable performance and accessibility in quality e-banking systems.

5.4 Validation

On the last table, it is shown that the most preferred e-payment option is Paymaya, followed by Gcash and debit cards. The information from the expert choice shows the current ranks of e-payment systems that give awareness to consumers who prefer transferring money online considering the security factor. On the top rank is Paymaya as it gives an outstanding service in means of online payment service and transferring money. Consumers also have excellent accessibility to these e-payment systems to do money transactions such as drawing money, account-to-account transferring of money, and paying bills via mobile wallets, debit cards, and other digital gateways. Paymaya is indeed designed to be user-friendly that even the smallest transactions choose to have it done through this. According to past researchers, charging debit and credit cards and e-money is uncommon because there are numerous premises that are made in all countries to provide service to people. Furthermore, other payment options also provide outstanding satisfactory service for the needs of the people.

6. Conclusion

A major concern of a company when entering the market of e-commerce is choosing an e-payment system that works excellently with the way their business/companies runs that is both well-known and secured. This study surveyed major criteria and the e-payment systems' situation right now in the Philippines. The tool used in ranking the e-payment systems together with its given criteria was the AHP decision-making tool in which the results of this tool were extensively discussed. The findings of this study are both applicable to the researchers, future researchers, and business establishments that are planning to take on or revamp an e-payment system.

People create developments to make lives for everyone easier just like the e-payment system. This system was made and imposed so that people don't need to carry cash around, waiting in line to pay bills, and wait for their change. This development is exactly what people need being that digital technology is now part of everyone's daily life. By connecting their debit cards, mobile wallets, and other digital gateways to shopping accounts, consumers can now buy and pay for products online. However, under criteria from the seven (7) factors given by the researchers, respondents prioritize security when choosing a payment option. Results show that PayMaya was able to offer excellent service in all the criteria, most especially in terms of security. Overall, most respondents are satisfied with their chosen payment option, although some respondents are not pleased by their experience through the cashless system; but it varies on their preference in buying or their behavior.

REFERENCES

- Adeoti, O. & Osotimehin, K. (2012). "Adoption of Point of Sale Terminals in Nigeria: Assessment of Consumers' Level of Satisfaction", *Research Journal of Finance and Accounting*, vol. 3, no. 1, pp. 1-6
- Appiah, F., Banson, K., Sey, E., & Sakoe, J. (n.d.). *Asian Journal of Business and Management Sciences THE ROLE OF MOBILE DEPOSIT IN DEPOSIT MOBILIZATION IN GHANA*. Retrieved from website: https://www.researchgate.net/profile/Francis-Banson/publication/301604850_The_Role_of_Mobile_Deposit_in_Deposit_Mobilization_in_Ghana/links/571e77dd08aeaced7889e337/The-Role-of-Mobile-Deposit-in-Deposit-Mobilization-in-Ghana.pdf
- Bolt, W., Humphrey, D. B., & Uittenbogaard, R. (2005). The Effect of Transaction Pricing on the Adoption of Electronic Payments: A Cross-Country Comparison. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.871102>
- Chaouali, W., Lunardo, R., et.al (2019). Design aesthetics as drivers of value in mobile banking: does customer happiness matter? Retrieved from <https://sci-hub.se/https://www.emerald.com/insight/content/doi/10.1108/IJBM-03-2019-0100/full/html>

- Chaouali, W., Yahia, I., et.al (2019). Reconsidering the “what is beautiful is good” effect When and how design aesthetics affect intentions towards mobile banking applications. Retrieved from <https://scihub.se/https://www.ingentaconnect.com/content/mcb/032/2019/00000037/00000007/art00002>
- Chavez, S., Iturrlade, E., et.al (2019). Industry Study of Electronic Money. Retrieved from https://www.researchgate.net/profile/Nyker-Matthew-King/publication/341669939_Industry_Study_of_Electronic_Money/links/5ece0ce24585152945148dca/Industry-Study-of-Electronic-Money.pdf
- Golar Gorgani. (2016). The effect of e-banking on bank customers’ deposits. Retrieved May 11, 2021, from <https://www.semanticscholar.org/paper/The-effect-of-e-banking-on-bank-customers%E2%80%99-deposits-Gorgani/f3298b98775a85f2cc40db1a7580367b18e3b35f>
- Jamdaade, K., Champaneri, H., et.al (2015) “A Review: Secured Electronic Payment Gateway”, International Journal of Technology Enhancements and Emerging Engineering Research, vol. 3, no. 6, pp. 70-72
- Khan, B., Masihuddin, M., Mattoo, M., & Olanrewaju, R. (2017) A Survey on E-Payment Systems: Elements, Adoption, Architecture, Challenges and Security Concepts. Retrieved from: https://www.researchgate.net/profile/Burhan-Khan-6/publication/318076004_A_Survey_on_E-Payment_Systems_Elements_Adoption_Architecture_Challenges_and_Security_Concepts/links/5c90c1f3a6fdcc38175cfd30/A-Survey-on-E-Payment-Systems-Elements-Adoption-Architecture-Challenges-and-Security-Concepts.pdf
- Lee, Z.-Y., Yu, H.-C., & Kuo, P.-J. (2001). *An Analysis and Comparison of Different Types of Electronic Payment Systems*. Retrieved from website: <https://fardapaper.ir/mohavaha/uploads/2018/02/Fardapaper-An-analysis-and-comparison-of-different-types-of-electronic-payment-systems.pdf>
- Lucas, D. (2020). Pandemic accelerated PH consumers’ shift from cash to digital payments. Retrieved from <https://business.inquirer.net/311579/pandemic-accelerated-ph-consumers-shift-from-cash-to-digital-payments>
- Masally, K., Ricart, R., & Bambawale, M. et.al (2019). The State of Digital Payments in the Philippines. Retrieved from https://responsiblefinanceforum.org/wp-content/uploads/2020/02/The_State_of_Digital_Payments_in_the_Philippines-Feb20.pdf
- Paymaya. (2020). How cashless payment solutions benefit merchants and consumers alike. Retrieved from <https://www.paymaya.com/stories/how-cashless-payment-solutions-benefit-merchants-and-consumers-alike>
- Rachna, & Singh, P. (2013). Issues and Challenges of Electronic Payment Systems. International Journal for Research in Management and Pharmacy, 2(9), 25–30. Retrieved from http://raijmr.com/wpcontent/uploads/2014/02/3_25-30-Rachna-et-al..pdf
- Selvanathan, M., Tan, P., et.al (2016). The Impact of Cost, Customer Experience, Ease of Use, and Trust towards Adoption of Online Banking. Retrieved from https://www.researchgate.net/publication/309450944_The_Impact_of_Cost_Customer_Experience_Ease_of_Use_and_Trust_towards_Adoption_of_Online_Banking
- Simon, O. O., Jibreel, G., Mohammed, A., & Ezekiel, O. M. (2013, September 1). Retrieved May 10, 2021, from citeseerx.ist.psu.edu website: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.401.9759&rep=rep1&type=pdf>
- Tabiaa, M., Madani, A., et.al. (2017). E-Banking: Security risks, previsions and recommendations . Retrieved from https://www.researchgate.net/publication/325120601_E-Banking_Security_risks_previsions_and_recommendations

- Tavilla, E. (2017). Rewarding loyal customers to increase mobile payments adoption. Retrieved from <https://www.bostonfed.org/-/media/Documents/PaymentStrategies/rewarding-loyal-customers-to-increase-mobile-payments-adoption.pdf>
- Thirupathi, M., Vinayagamoorthi, D.G., Mathiraj, D.S. (2019). Effect of cashless payment methods: a case study perspective analysis. Retrieved from <https://www.ijstr.org/final-print/aug2019/Effect-Of-Cashless-Payment-Methods-A-Case-Study-Perspective-Analysis.pdf>
- U-Yun Wong. (2020, April 24). The Digitization of the Philippine Wallet: E-Money's Emergence in the Philippines. Retrieved May 13, 2021, from Ycpsolidiance.com website: <https://ycpsolidiance.com/white-paper/the-digitization-of-the-philippine-wallet-e-moneys-emergence-in-the-philippines>
- View of Financial Innovation and Efficiency on the Banking Sub-sector: The Case of Deposit Money Banks and Selected Instruments of Electronic Banking (2006 - 2014). (2014). Retrieved May 11, 2021, from Journalajeba.com website: <https://www.journalajeba.com/index.php/AJEBA/article/view/9851/17610>
- Wazid, M., Zeadally, S., et.al. (2019). Mobile Banking: Evolution and Threats. Retrieved from <https://sci-hub.do/https://ieeexplore.ieee.org/abstract/document/8634991>

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