Review of Socio-Economic Research and Development Studies 2024
Volume 8 No. 1, 126-165
https://reserds.vsu.edu.ph
Research Article

ASSESSING THE ADOPTION OF CASHLESS PAYMENT SYSTEM FOR HOUSEHOLD UTILITIES - A CASE AMONG SELECTED BARANGAYS IN ALBUERA, LEYTE, PHILIPPINES

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The adoption of cashless payment systems for household utilities faces significant challenges, hindering efficient and modern financial transactions. This study assesses the adoption of cashless payment systems for household utilities in the municipality of Albuera, Leyte, Philippines. The research aimed to determine the factors influencing the adoption of cashless payment system among the residents. Utilizing a sample size of 246 participants, the study employs preference analysis and logit regression for statistical analysis, to evaluate responses from a 5-point Likert scale and open-ended questions. Stata was used for the descriptive statistics, preference analysis and regression analysis, while Smart PLS 4 facilitated the confirmatory factor analysis for the latent variables. The key findings reveal that effort expectancy, performance expectancy, social influence, and perceived risk significantly impact the adoption of cashless payment systems. Conversely, demographic variables such as age, gender, education level, income, as well as the past experience, internet access, and facilitating conditions do not show a significant effect. These highlights the critical factors that utility services, e-wallet providers and policymakers should consider to enhance the adoption of cashless payment methods in Albuera, Leyte. This study contributes to the broader understanding of technology adoption in the context of essential household utilities.

***Keywords*:** Cashless payment, E-wallet, Digital payment, Adoption

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Received: May 7, 2024 | Revised: August 9, 2024 | Accepted: August 30, 2024

***JEL Classification codes*:** E42, O33, D12

1. INTRODUCTION

The advent of COVID-19 changed the transfer of money and modes of payments. Many consider the pandemic to be a strong signal towards complete change on a universal level. Cashless payments are the alternative to traditional methods of transactions, various cashless payment methods are available in our disposal such as credit and debit cards, online banking, e-wallets and QR-codes to name a few (Foo et al., 2022). Cashless payment methods have revolutionized the way we conduct transactions through fusions of convenience, security, and modernity within financial landscapes. The global financial environment is changing because of rapid technological development that is replacing physical money transactions with a digital alternative. These digital payment instruments could be used by people for conducting transaction without the need to carry a large sum of money, hence people can have lower risks dealing with physical currencies. Along with this, the implementation of an efficient and practical method of transacting business in the course of goods provision is a step responding to demands in the society (Hrytsai, 2022).

The benefits of cashless transactions have been acknowledged by the Philippine government and they have initiated measures to encourage and promote its adoption. Digitizing 50% of all retail payments is the target of Bangko Sentral ng Pilipinas. Initiatives like the National Retail Payment System (NRPS) which envisions technologically interoperable and secure digital payment ecosystems (BSP, 2020). The Paleng-QR Ph program, created through a collaboration between the Bangko Sentral ng Pilipinas (BSP) and the Department of the Interior and Local Government (DILG), aims to develop the digital payments ecosystem in the country. This initiative promotes cashless transactions in public markets and local transportation (BSP, 2020). These initiatives hold primary importance in the promotion of financial inclusion in which the traditional banking is automatically reinforced. This is according to Asian Development Bank (2022) who reported that the cashless payment in Philippines is getting a good attention. Such variety of payment methods meets everyone's needs. Filipinos prefer mobile wallets (64%) followed by online card payments (52%), to shop card payments (44%) and QR payments (31%). This trend indicates an increased adoption of cashless payment methods. Particularly mobile wallets

and online card payments. Influenced significantly by the pandemic resulting in substantial number of first-time users. Meanwhile, contactless payments are emerging as a noteworthy method. A significant 83% of Filipinos are aware of contactless payments, with 69% making such payments in 2021 (Asian Development Bank, 2022).

Cashless payment is now being utilized in paying for household utility bills such as telephone, electricity, water, and internet. Consumers are provided with an opportunity to pay for their online purchases easily and, hence, efficiently at any place they like given that smartphones, tablets, as well as computers are everywhere. Furthermore, those who are used with paying bills in person will be happy to hear that there are e-wallets such as GCash, PayMaya and Unionbank among others now available in this country. These means make it possible for users to conveniently clear their monthly recurring bills and/or debts including utilities by directly transferring money into a specified account or using provided reference number. The world moves toward cashless transactions signifies a paradigm change in how people make transactions. This transition may be traced on a global scale or within a nation to illustrate it more vividly. The benefits related to a cashless society are inarguable even though there are barriers currently present. It gives us an idea about the future where transactions will be simple, convenient and secure.

Despite the developments and potential benefits of digital payment systems, acceptance for household utilities remains low, leading to slow adoption. In the municipality of Albuera, Leyte many households still rely on cash for utility bills, resulting in burdensome processes like long queues, especially for water and electricity. The Albuera Municipal Water Supply System, responsible for water supply, lacks an online payment system, forcing residents to use traditional methods and causing congestion near due dates. While Leyte V Electric Cooperative Inc. (LEYECO V) offers an online electricity payment system, consumers still experience long queues, indicating underutilization of existing digital solutions.

Given that most research on cashless payments focuses on urban areas and lacks specific studies on household utilities, there is a pressing need to understand and improve their adoption. Therefore, this study aims to assess the adoption of cashless payment systems for household utility bills in Albuera.

Specifically, it seeks to describe the socio-demographic characteristics of consumers, determine factors influencing the adoption of cashless payment systems, identify reasons for both adoption and non-adoption, and provide recommendations to relevant stakeholders for increasing cashless payment adoption.

2. THEORETICAL AND CONCEPTUAL FRAMEWORK

The theoretical foundation of this study is founded on prior knowledge concerning Technology Acceptance Model (TAM) by Fred Davis (1985) and Unified Theory of Acceptance and Use of Technology (UTAUT). By elucidating usage behavior spurred by system acceptance and user intentions to utilize it, the UTAUT was designed to enhance the TAM (Duy Phuong, et al., 2020). In other words, UTAUT provides measurable information on each user's specific technological behavior from their point of view (Napitupulu et al., 2021). UTAUT is widely regarded as the industry benchmark for evaluating customer acceptability, emphasizing the person above the business. According to Abdullah et al. (2020), research that is more impacted by human factors is therefore simpler to comprehend.

The proposed conceptual framework, shown in Figure 1, serves as the foundation for exploring the diverse dimensions that contribute to individuals' decisions in adopting or not adopting cashless payment methods. Based on conceptual framework, there are 11 hypotheses generated from the proposed conceptual model which can be described as follows:

***H1**: Performance Expectancy (PE) has a significant positive effect on Cashless Payment System Adoption.*
***H2**: Effort Expectancy (EE) has a significant positive effect on Cashless Payment System Adoption.*
***H3**: Social Influence (SI) has a significant positive effect on Cashless Payment System Adoption.*
***H4**: Facilitating Condition (FC) has a significant positive effect on Cashless Payment System Adoption.*
***H5**: Perceived Risk has a significant negative effect on Cashless Payment System Adoption.*

***H6**: Past Experience has a significant positive effect on Cashless Payment System Adoption.*
***H7**: There is an association between age and the likelihood of adoption of cashless payment system for household utilities.*
***H8**: There is an association between family monthly income and the likelihood of adoption of cashless payment system for household utilities.*
***H9**: There is an association between gender and the likelihood of adoption of cashless payment system for household utilities.*
***H10**: There is an association between educational attainment and the likelihood of adoption of cashless payment system for household utilities.*
***H11**: Internet Access has a significant positive effect on Cashless Payment System Adoption.*

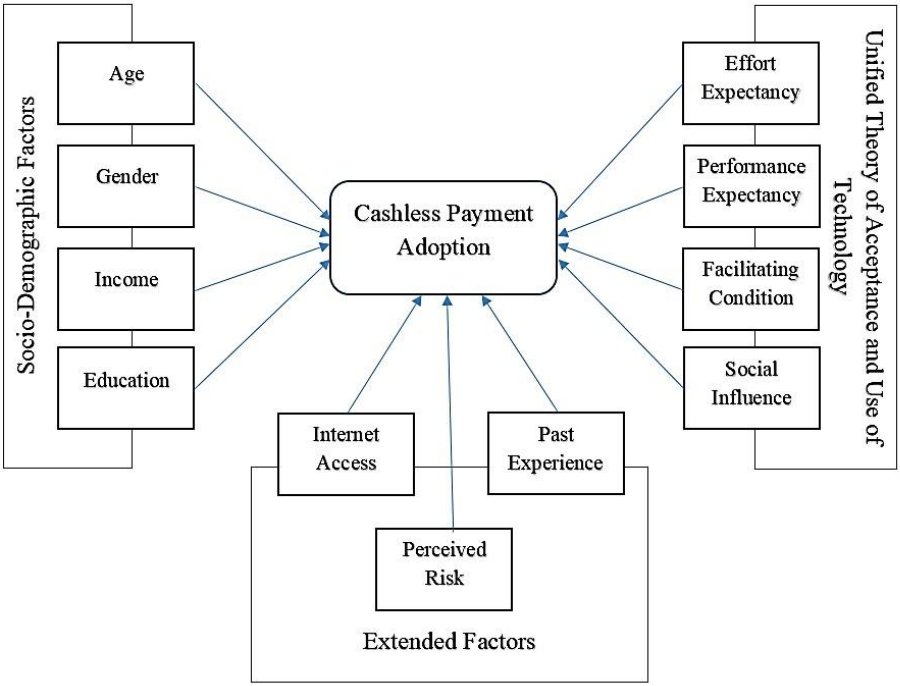

Figure 1. Conceptual Framework

3. METHODOLOGY

Respondents and Location of the study

This research did involve the residents or consumers of Leyte Electric Cooperative (Leyeco), internet service providers, and other household utility consumers as the primary respondents. The study was conducted in the municipality of Albuera, situated in the province of Leyte as shown in Fig. 2.

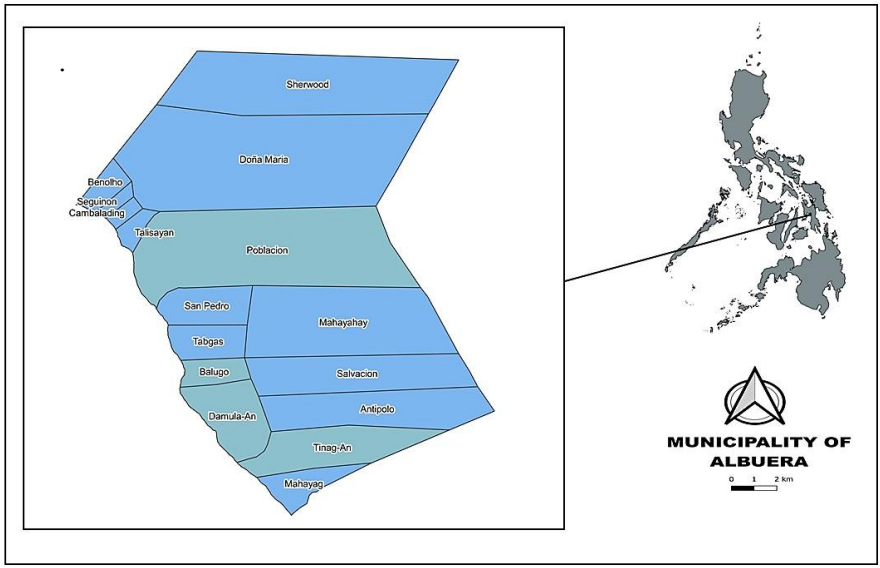

Figure 2. Map of the Location of study (Albuera)
Source: Developed using QGIS software

As shown in Table 1, Albuera is comprises of 16 barangays and has a total population of 47,151 based on the Philippine Statistics Authority 2020 Census of Population and Housing (PSA, 2020). In this study, four (4) urban barangays in Albuera were selected and clustered for the study. Poblacion being the Barangay with the largest population comprises 21% of Albuera's total population followed by Balugo, Damula-an and Tinag-an, which comprises 11%, 9% and 7% of the total population respectively. With the combined urban barangays, it comprises of 48% of the total population, almost half of the total population of Albuera. Thus, selecting the four urban barangays will be enough to have a good representation of the entire municipality of Albuera.

Table 1. Population of Albuera

Barangay	Population	%
Antipolo	1,256	2.66
Balugo	5,096	10.81
Benolho	1,929	4.09
Cambalading	2,299	4.88
Damula-an	4,113	8.72
Doña Maria	1,333	2.83
Mahayag	1,173	2.49
Mahayahay	1,400	2.97
Poblacion	9,905	21.01
Salvacion	860	1.82
San Pedro	3,986	8.45
Seguinon	2,434	5.16
Sherwood	2,098	4.45
Tabgas	3,090	6.55
Talisayan	2,882	6.11
Tinag-an	3,315	7.03
Total Population	**47,151**	**100**

Source: Retrieved from https://psa.gov.ph/content/2020-census-population-and-housing-2020

Sampling Procedure and Sample Size

The Cochran sampling process that was used in to get the sample for this research. The z value is 1.96, the p value is 0.8, the margin of error is 0.05, and the confidence level is 95%, a sample size of 246 was obtained. Using Cochran sampling, one may determine the optimal sample size based on the degree of accuracy, degree of confidence, and estimated percentage of the characteristic in the population.

$$n_o = \frac{z^2(p)(1-p)}{e^2} \quad (1)$$

Where:

n_o – sample size
e – Margin of error
z – Value from the T- table
p – Proportion of the population

Using proportionate sampling, the number of sample from each of the four urban barangay was determined in proportion to the population.

Table 2. Proportionate Sample for each Urban Barangay

Barangay	Population	Sample
Balugo	5,096	54
Damula-an	4,113	44
Poblacion	9,905	106
Tinag-an	3,968	42
Total Population	**23,082**	**246**

Data Collection Procedure

A mixed of quantitative and qualitative approach was used in this study. Probability sampling method was utilized, specifically systematic random sampling to ensure population is represented in the final sample of the study. As for the questionnaire, an open-ended, close-ended and a 5-point Likert scale survey questionnaire were utilized to gather the data. The questionnaire was divided into four sections; first one is the demographics or the personal data of the respondents, second section is the general information about cashless payment system, third section is focused on the cashless payment system adoption, and lastly, the respondents' reasons of using and/or not using cashless payment.

Data Analysis

The data was analyzed using both descriptive and inferential statistics in order to meet the study's objectives. Descriptive characteristics of the respondents were analyzed using Statistical Package for the Social Sciences (SPSS) software. Subsequently, the primary analytical approach used in the study is Logistic regression analysis to rigorously test the proposed conceptual model. Logistic regression, a multivariate statistical technique was also applied in this study in analyzing the observed factors, including age, gender, income, education, past experience, and internet access, as well as the latent factors including effort expectancy, performance expectancy, facilitating condition, social influence and perceived risk in regards to a dichotomous dependent variable—the adoption or non-adoption of cashless payment systems. Logistic regression is applied in this regard because it perfectly suits the modeling of the probability of binary

outcomes and hence is the most apt method in regard to determining the factors that influence the adoption of cashless payment systems. Preference analysis was also used to quantify and analyze the reasons for adoption and non-adoption of cashless payment system. With this, the researcher can quantify what is the most cited or mentioned reasons for adoption and non-adoption.

Diagnostic Test

Confirmatory Factor Analysis (CFA) rigorously evaluated the internal and external validity and reliability of the research model to ensure accurate results for the study on cashless payment system adoption for household utilities. This preliminary step used smartpls4 software. Reliability and internal consistency were measured using Cronbach's alpha, Composite Reliability (CR), and Average Variance Extracted (AVE), with CR, Cronbach's alpha, alpha (α), and rho A expected to fall between 0.70 and 0.95 (Dijkstra & Henseler, 2015). Convergent validity was evaluated by AVE (score ≥ 0.5), while discriminant validity was assessed via the Fornell-Larcker, 1981 criteria. Multicollinearity and specification error (using Linktest) were also examined (Fornell, 1981; Hair et al., 2010).

Econometric Model

It is posited in this study that the proposed conceptual framework, and the generated hypotheses in this study, could be translated into a logistic regression model in the analysis of the factors that may influence the adoption of cashless payment systems. Thus, logistic regression is suitable for the analysis, as the variable adoption of cashless payments is dichotomous (has been adopted or has not). The proposed model aims to define the probability (P) that an individual accepts the cashless payment system through several predictors. In particular the logistic regression equation can be represented in terms of its log - odds form which takes the shape of models in the linear prediction family.

Mathematically, the logistic regression model can be represented as:

$$\boldsymbol{log}\left(\frac{P}{1-P}\right) = \beta 0 + \beta 1PE + \beta 2EE + \beta 3SI + \beta 4FC + \beta 5PR + \beta 6PastExp + \beta 7Age + \beta 8Income + \beta 9Gender + \beta 10Educ + \beta 11Int\_access + \epsilon$$

Here, $\log\left(\frac{P}{1-P}\right)$ is the log-odds of the probability of adopting the cashless

payment system, $\beta 0$ is the intercept, and $\beta 1$ to $\beta 11$ are the coefficients of the respective independent variables:

Where:

PE = Performance Expectation
EE = Effort Expectation
SI = Social Influence
FC = Facilitating Condition
PR = Perceived Risk
PastExp = Past Experience (1 = has prior experience, 0 otherwise)
Age = Age of respondents/consumers (in years)
Income = Income of respondents/consumers (1 = above poverty threshold, 0 otherwise)
Gender = Gender of respondents/consumers (1 = Male, 0 otherwise)
Educ = Education level of the respondents/consumers (1 = highest elementary level, 2 = elementary graduate, 3 = attended high school, 4 = graduated high school, 5 = attended college, 6 = graduated in college)
Int_access = Internet access (1 = has access to internet, 0 otherwise)
ε = Error term

4. RESULTS AND DISCUSSION

Descriptive Analysis

Descriptive analysis was conducted and analyzed which aim to define respondent's demographic profile. This method is used to summarize the data collected from a survey, offering insights into the overall responses. As shown in Table 3, E-wallet is the most commonly used cashless payment method for their utility bills which comprises of 61.38% of the adopters. It is followed by online banking which is used by 15.85% of the cashless payment adopters, and next to it is the debit and credit cards which is also used by 11.79% of the cashless payment adopters. Lastly, a very few have also used crypto or bitcoins (e.g. coinsPH) which comprises of only 2.03% of the adopters.

Table 3. Cashless payment used by the respondents

Cashless Payment Method*	n	%
E-wallet	151	61.38
Online Banking	39	15.85
Debit/Credit Cards	29	11.79
Crypto/Coins	5	2.03

*Multiple Response

A total of 246 respondents, with 75 males (30.49%) and 171 females (69.51%) constitutes the sample (Table 4). For the adopters, 47 are male, representing 31.76%, and 101 are females, comprising 68.24%. For the non-adopters, 28 are males, comprising 28.57%, and 70 are females, comprising 71.43%. The descriptive statistics indicate that there are more females in both adopters and non-adopters because the females, to begin with, also make up the larger percentage of the sample.

Table 4. Gender of the respondents

Gender	Adopters		Non-Adopters		Total	
	n	%	n	%	n	%
Male	47	31.76	28	28.57	75	30.49
Female	101	68.24	70	71.43	171	69.51
Total	148	100	98	100	246	100

In Table 5, respondents that are single comprises of 57.72% of the sample. On the other hand, 41.06% are married and only about 1.22% are widowed. Among the adopters, 65.54% are single and 34.46% are married. As for the non-adopters, 45.92% single, 51.02% are married and 3.06% are widowed. This suggest that respondents that are single are more likely to adopt cashless payments than those who are married or widowed.

Table 5. Civil Status of the respondents

Civil Status	Adopters		Non-Adopters		Total	
	n	%	n	%	n	%
Single	97	65.54	45	45.92	142	57.72
Married	51	34.46	50	51.02	101	41.06
Widowed	0	0	3	3.06	3	1.22
Total	148	100	98	100	246	100

Table 6 demonstrates that majority of the respondents have at least attended high school education (40.65%) while 26.42% are high school graduates. A notable proportion of the respondents has attended college (17.07%). However, a small fraction reports that 8.94% has elementary education and 1.22% has completed elementary education. Furthermore, among the adopters, 31.76% have at least attended high school and 32.43% are high school graduates, 25% have some college education while 8.78% are college graduates, 1.35% have some elementary education, and 0.68% is an elementary graduate. Among the non-adopters, 54.08%, also attended high school but did not complete their education, followed by 20.41% who had completed some primary school and 17.35% who had completed their high school education, 5.10% with some college education and 2.04% primary graduates and 1.02% college graduates. Based on the adoption percentage within each educational group, it shows that higher adoption rates are found among individuals with higher educational attainment and those with some college degree, whereas lower adoption rates are seen among those with lower educational attainment. A slightly high adoption rates are also shown by high school attendance and graduates. Given that most non-adopters have poorer educational backgrounds, this suggests that higher education levels are linked to greater adoption rates.

Table 6. Education of the respondents

Education	Adopters		Non-Adopters		Total	
	n	%	n	%	n	%
Elementary Level	2	1.35	20	20.41	22	8.94
Elementary Graduate	1	0.68	2	2.04	3	1.22
High School Level	47	31.76	53	54.08	100	40.65
High School Graduate	48	32.43	17	17.35	64	26.42
College Level	37	25	5	5.10	42	17.07
College Graduate	13	8.78	1	1.02	14	5.69
Total	148	100	98	100	246	100

Table 7 shows that majority of the respondents has a family monthly income of below 12,030 pesos, which comprises of 52.44% of the respondents. There is also significant portion of the respondents who earns a monthly income of 12,030 to 24,060 pesos, which comprises of 34.15% of the respondents. A smaller portion of the sample earns a monthly income of 24,061 to 48,120 pesos, which

comprises of 10.57% of the respondents. However, only a very small fraction of the sample earns a monthly income above 48,120 pesos.

Table 7. Income levels of the respondents

Income	n	%
< 12, 030	129	52.44
12,031 – 24,060	84	34.15
24, 061 – 48,120	26	10.57
48,121 – 84,120	6	2.44
84,121 – 144,360	1	0.41
Total	246	100

Source: Bases on PIDS income categories

Based on the poverty threshold published by the Philippine Statistics Authority (2022) which is less than 12,030 pesos a month, out of the total sample, 104 individuals (42.28%) have incomes of above the poverty threshold, while 142 individuals (57.72%) have incomes below the poverty threshold as shown in Table 8 above. Among the adopters, 51 individuals (34.46%) have incomes above the poverty threshold, whereas 97 individuals (65.54%) have incomes below the poverty threshold. Of the people who did not adopt, 53 (54.08%) have incomes that are higher than the poverty line, and 45 (45.92%) have incomes that are lower. Surprisingly, given that most adopters have a monthly income below the poverty threshold, the descriptive statistics suggests that people with an income below poverty threshold are more likely to adopt.

Table 8. Classification of the respondents by poverty threshold

Income	Adopters		Non-Adopters		Total	
	n	%	n	%	n	%
Above Poverty Threshold	51	34.46	53	54.08	104	42.28
Below Poverty Threshold	97	65.54	45	45.92	142	57.72
Total	148	100	98	100	246	100

Source: Poverty Threshold is based on the published poverty threshold by PSA 2022

About 95.53% of the respondents has internet access at home while 4.47% says they do not have access to internet (Table 9). Only 0.68% of the adopters do not have internet connection, compared to 99.32% who has internet access. Of

those who are not adopters, 89.80% have access to internet, and 10.20% do not have access to internet. Based on the result of the descriptive statistics, people with internet access are more likely to adopt cashless payments as expected.

Table 9. Internet Access of the respondents

Internet Access	Adopters		Non-Adopters		Total	
	n	%	n	%	n	%
Has Internet Access	147	99.32	88	89.80	235	95.53
No Internet Access	1	0.68	10	10.20	11	4.47
Total	148	100	98	100	246	100

As shown in Table 10, 4.47% has past experience or had previously used cashless payments, whereas 45.53% do not have prior or past experience of using cashless payment. Moreover, 69.59% have prior experience, compared to 30.41% who do not have prior experience. Among those who are not adopters, 31.63% have prior experience of using cashless payment, and 67 people (68.37%) do not. Based on the adoption rates, adopters make up 76.87% of individuals with prior or past experience (103 out of 134), whereas those without prior experience make up 40.18% (45 out of 112). On the other hand, 59.82% of people without prior experience (67 out of 112) are non-adopters, compared to 23.13% of those with prior experience (31 out of 134).

Table 10. Past Experience of the respondents on cashless payments

Past Experience	Adopters		Non-Adopters		Total	
	n	%	n	%	n	%
Yes	103	69.59	31	31.63	134	54.47
No	45	30.41	67	68.37	112	45.53
Total	148	100	98	100	246	100

Table 11 displays the summary statistics of age, effort expectancy, performance expectancy, facilitating condition, social influence and perceived risk, consisting of 246 observations. The average age of the respondents is 34.84 years old, which indicates that on average they were all conceivable in their mid-thirties with a standard deviation of 9.74, showing a medium amount of spread from the mean age. Finally, the age range of sampled individuals ranges from 20 to 64 years, with a minimum age of the respondents aged as young as 20 and a

maximum age of 64. The analysis includes several latent factors with standardized scores, namely Effort Expectancy, Performance Expectancy, Facilitating Conditions, Social Influence, and Perceived Risk. The mean score for Effort Expectancy is approximately 0.0001 (SD = 1.08), indicating that the distribution of this factor is centered around the mean with values ranging from -2.81 to 1.01. Performance Expectancy has a mean score of -0.00006 (SD = 0.92), with a range from -3.07 to 0.81. Facilitating Conditions also show a mean score of -0.00006 (SD = 0.93), with values ranging from -2.91 to 0.97. Social Influence has a mean score of nearly zero (0.000004) with a standard deviation of 0.86, ranging from -1.33 to 1.52. Lastly, Perceived Risk has a mean score of 0.00004 (SD = 0.86), with scores ranging from -2.38 to 1.39. These standardized factor scores indicate that the data for each latent factor are symmetrically distributed around their means, facilitating direct comparison between the factors.

Table 11. Summary Statistics of continuous and latent variables

Variables	Mean	SD	Min	Max
1. Age	34.84	9.74	20	64
2. Effort Expectancy	0.0001016	1.08	-2.81	1.01
3. Performance Expectancy	-0.0000569	0.92	-3.07	0.81
4. Facilitating Condition	-0.0000569	0.93	-2.91	0.97
5. Social Influence	0.00000407	0.86	-1.33	1.52
6. Perceived Risk	0.0000407	0.86	-2.38	1.39

Reliability and Convergent Validity

Construct reliability is evaluated through measures such as composite reliability (CR), Cronbach's alpha (CA) and average variance extracted (AVE). Dijkstra and Henseler (2015) recommended that composite reliability and Cronbach's alpha should be greater than 0.70. Adequate convergent validity is indicated by an AVE value of at least 0.5 (Fornell and Larcker, 1981). Table 12 displays the results concerning reliability and convergent validity of the measurement used in this study. Based on the result shown Table 12, within each construct, all composite reliability (CR) and Cronbach's alpha values are greater than 0.7. Moreover, the average variance extracted (AVE) values in each construct are greater than 0.5, thus, the indicators have adequately measured the construct they are intended to measure (Hair et al., 2010).

Table 12. Construct Reliability and validity

	Cronbach's alpha (standardized)	Composite reliability (rho_c)	Average variance extracted (AVE)
Effort Expectancy	0.975	0.975	0.928
Facilitating Condition	0.924	0.924	0.806
Performance Expectancy	0.949	0.949	0.862
Perceived Risk	0.916	0.916	0.785
Social Influence	0.918	0.931	0.807

Table 13 shows the item loadings of indicators for each constructs. Each item loading values within each construct should be higher than 0.50 (Hair et al., 2010). As shown in the Table 10, all item loadings are higher than 0.5 and even closer to 1, thus, it indicates a strong relationship between the observed indicators and the latent construct it is intended to measure.

Table 13. Latent Factors' Item Loadings

Indicators		EE	FC	PE	PR	SI
It does not take long time to learn to use cashless payment systems	EE_1	0.952				
I find cashless payments easy to use	EE_2	0.974				
Learning how to use various cashless payment modes are easy for me	EE_3	0.964				
I have the resources necessary to use cashless payments	FC_1		0.926			
I have the knowledge necessary to use cashless payments	FC_2		0.883			
I am equipped with a good featured smartphone to use various payment services	FC_3		0.883			
Using cashless payments helps me accomplish payments more quickly	PE_1			0.888		
I can save time when I use cashless payments when compared to cash payments	PE_2			0.941		

Using cashless payments allows me to manage my transactions efficiently	PE_3		0.956		
Paying through cashless payments would involve more financial risk when compared to cash payments	PR_1			0.883	
I fear of losing my money while using cashless payments	PR_2			0.902	
The risk of data theft of the mobile wallet is high	PR_3			0.873	
Most of people around me are using cashless payments	SI_1				0.745
People who influence my behavior think that I should use cashless payments	SI_2				0.960
People who are important to me think that I should use cashless payments	SI_3				0.972

Discriminant Validity

According to Ghasemy et al. (2020), discriminant validity refers to the ability of measurement model to distinguish between different constructs or latent variables. It ensures the distinctness of the constructs and the difference in the measurement items or indicators used for measuring these constructs. This relationship between latent variables is assessed through discriminant validity. The purpose of discriminant validity is to examine the relationships between latent variables. It is a crucial approach that must be employed to prevent multicollinearity issues.

The HTMT (Heterotrait-Monotrait) method is a technique employed to assess discriminant validity within a model. It serves the purpose of identifying potential multicollinearity issues among constructs. According to Ab Hamid et al. (2017), the HTMT criterion indicates a potential lack of discriminant validity when its values approach or approximate 1. This would mean that variables of constructs in the model are highly correlated with each other, which presents some questions on the distinctiveness of constructs. However, Kline proposes that the

discriminant validity in the model can be established with a threshold of 0.85. Based on the result on Table 13, all the ratio of HTMT are less than 1.0 which means that this model is well-fitting. Furthermore, all the value that showed on Table 14 are less than the threshold of the HTMT value of 0.85, which indicates good discriminant validity within the model.

Table 14. Heterotrait-Monotrait ratio (HTMT)

	EE	FC	PE	PR	SI
EE					
FC	0.836				
PE	0.686	0.722			
PR	0.556	0.471	0.423		
SI	0.529	0.555	0.466	0.409	

Note: EE: Effort expectancy; FC: Facilitating Condition; PE: Performance Expectancy; PR: Perceived Risk; SI: Social Influence

Another popular way for testing discriminant validity is the Fornell and Larcker criteria, which compares the squared correlations with other constructs to the square root of the AVE of its indicators. The measurement model's validity is supported if the criterion is satisfied. If not, more research or model modifications could be required. As stated by Hair et al. According to al. (2010), each indicator's square root of the AVE on the relevant construct need to be larger than the squared correlations of that construct with every other construct in the model. The value of the square root of the AVE, or the top number, is greater than the value of the other latent variables, based on the results displayed in Table 15. The findings are 0.963, 0.898, 0.929, 0.826, and 0.898 in that order. Consequently, there is enough discriminant validity in the study's data.

Table 15. Fornell-Larcker criterion

	EE	FC	PE	PR	SI
EE	0.963				
FC	0.826	0.898			
PE	0.692	0.723	0.929		
PR	-0.556	-0.465	-0.431	0.886	
SI	0.487	0.504	0.436	-0.376	0.898

To test for the assumption of multicollinearity in logit model, the researcher used variance inflation factor test. Based on the result shown in the Table 16, all VIF are less than 10, therefore there is no issue of high collinearity in the model, thus, the assumption of multicollinearity in the model is not violated.

Table 16. Variance Inflation Factor

Factors/Variables	**VIF**
Age	2.12
Gender (Male)	1.05
Marital Status	1.70
Income (Above poverty threshold)	1.26
Education (Elementary level = reference category)	
Elementary Grad	1.25
High School Level	5.59
High School Grad	5.42
College Level	4.42
College Grad	2.32
Internet Access	1.45
Past Experience	1.37
Effort Expectancy	3.72
Performance Expectancy	2.24
Facilitating Condition	3.72
Social Influence	1.55
Perceived Risk	1.71
Mean VIF	**2.56**

Table 17 presents the results of the linktest, which is utilized to detect misspecification in the regression model. The non-significance of the _hatsq coefficient suggests that the test does not reject the null hypothesis (H0), indicating the absence of misspecification errors. Therefore, there is no need to include or omit any variables. The results imply that the predicted Yhat closely matches the actual values of the Y dependent variable, confirming that the model specification is correct.

Table 17. Linktest

CPA	Coefficient
_hat	1.066***
	(0.179)
_hatsq	-0.045
	(0.044)
_cons	0.131
	(0.312)
Observations	246
Pseudo R2	0.7257

Note: Robust standard error in parentheses. *p<0.1, **p<0.05, ***p<0.01

Logit Regression Analysis

The Table 18 shows the variables used in the regression model. The dependent variable "cashless payment adoption" is a dichotomous variable, thus it takes a value of 0 and 1. In this model, there are twelve (11) independent variables, one continuous variable (age), five categorical variables (income, gender, education, internet access and past experience) and lastly, five (5) latent variables (effort expectancy, performance expectancy, facilitating condition, social influence and perceived risk).

Table 18. Description of regression variables used in the study

Variable	Mean	SD	Variable Description
Dependent Variable			
Cashless Payment Adoption	0.601626	.4905613	1 if cashless payment is adopted and 0 otherwise (dummy variable)
Explanatory Variables			
Age	34.85366	9.740874	Age of the respondent
Income (Above Poverty Threshold)	.4756098	.5004229	1 if family monthly income is above poverty threshold and 0 otherwise (dummy variable)

Gender (Male)	.304878	.4612943	1 if male and 0 otherwise (dummy variable)
Education	3.585366	1.221754	1 highest education attained is elementary level, 2 if graduated in elementary, 3 if attended high school, 4 if graduated high school, 5 if attended college and 6 if graduated in college (categorical dummy variable)
Internet Access	.9552846	.2070998	1 if has access to internet at home and 0 otherwise (dummy variable)
Past Experience	.5447154	.4990118	1 if has past or prior experience of using cashless payment and 0 otherwise (dummy variable)
Effort Expectancy	.0001016	1.079175	How much a person perceived that using cashless payment is easy and free of effort (latent variable).
Performance Expectancy	-.0000569	.9216808	How much a person perceived that using cashless payment is useful and helpful (latent variable)
Facilitating Condition	-.0000569	.9270223	The extent to which a person has the knowledge and resources to use cashless payment (latent variable)
Social Influence	.00000407	.8588339	How much a person is influenced by family, friends or the people around them to use cashless payment (latent variable)
Perceived Risk	.0000407	.8603177	

	How much a person perceived that using cashless payment is not deemed safe (latent variable)

Table 19 presents the results of a logistic regression analysis, predicting the likelihood of cashless payment system adoption based on various predictor variables. R-squared indicates that 72.29% of the variation in the dependent variable (cashless payment adoption) can be explained by the model. The coefficient for age is 0.052 with a standard error of 0.04, suggesting that age has a positive but statistically nonsignificant effect on the likelihood of adopting cashless payment system. For Income (Above Poverty Threshold = 1) it has a coefficient of 0.164 with a standard error of 0.60, suggesting if a respondent is above the poverty threshold increases the odds of adopting cashless payment system by 0.164 than if a respondent is below the poverty threshold, but this effect is statistically non-significant. Gender (Male = 1) has a coefficient of 0.760 with a standard error of 0.04, suggesting that being male increases the likelihood of adoption by 0.760 than being female, but this effect is statistically nonsignificant.

Furthermore, education levels were compared against the reference category, which is "Elementary Level", being elementary graduate or having at least high school education has a coefficients of -0.93 (SE = 3.19) and -0.86 (SE = 1.86) respectively. The coefficients indicates that having graduated in elementary or attended some high school decreases the likelihood of adopting cashless payment compared to those with only elementary education. However, this effect is statistically not significant, suggesting no meaningful difference in adoption likelihood between these education levels. Being a high school graduate, having attended college level or college graduate has a coefficients of 0.37 (SE = 1.94), 1.49 (SE = 1.96) and 1.16 (SE= 2.32) respectively. The coefficients indicates that having graduated in high school, attended college or graduated in college increases the likelihood of adopting the cashless payment compared to those with only elementary education. Again, this effect is statistically non-significant, meaning there is no substantial evidence of a difference in adoption likelihood between these education levels and those with only elementary education. For Internet access, it has a coefficient of 2.16 with a standard error of 1.70 suggesting that having internet access increases the likelihood of adoption by 2.16 than the respondents without internet access, but this effect is statistically non-significant.

For past experience, it has a coefficient of 0.65 with a standard error of 0.63 suggesting that having prior or past experience of using cashless payment system increases the likelihood of adoption by 0.65 than those without past experience of using cashless payment, but this effect is statistically non-significant.

This suggests that regardless of the socio-demographics, it does not influence the consumers' decision to adopt to cashless payment system. This has supported the study conducted by Hoo et al. (2021), revealed that age does not significantly influence the adoption of e-wallets. This is similar to what Kasirye and Masum (2021) observed in their studies in which they indicated that there were no significant correlations between the age of the participants and the ability and usage of e-wallets by users. In the study performed by Lohana & Roy (2023), the study also suggest that the gender of the respondents has no influence on the consumers' use of e-wallet. In another study by Ridell & Song (20170, it is clear stated that education does not affect the use of technology like cash registers and sales terminals or the computer controlled and computer-aided ones. However, this is in contrast with the finding of the study conducted by Kraiwanit et al. (2023), where it is concluded that gender, age, income, and education do affect the attitude of customers towards the use of e-wallet.

This study has also found that having access to the internet does not significantly influence cashless adoption in any way with respect to a payment system. This is consistent with a past study by Malik et al. (2020), in which it was reported that internet connectivity does not have a major influence on the adoption of digital wallets. It also mentioned that past experience is irrelevant to adopting cashless payments. This is not in support of the findings of Saadon and Long, 2020; Zhou et al., 2018, where it was discovered that past experiences with e-wallets have been a significant determinant of the use of electronic wallets.

Moreover, for the latent variables, effort expectancy has a coefficient of 2.24 with a standard error of 0.63, significant at the 1% level, showing positive relationship between respondents' attitude and likelihood of adopting cashless payment system. This suggest that, that higher effort expectancy significantly increases the likelihood of adopting the cashless payment system. In other words, if a person perceive cashless payment system as easy to use, they are more likely to adopt. This has supported several earlier studies including the study by Gupta and Arora (2020) among others, establishing that Effort Expectancy has a positive

and significant impact on the behavioral intention to adopt mobile payment systems in India. This is also in line with Ming et al. (2020) who stated that perceived ease of use and perceived usefulness will compel the users to adopt E-wallet services. Similarly, Soodan and Rana (2020) and Chresentia and Suharto (2020) also addressed Effort Expectancy as a critical factor in the consumers' intentions to use e-wallets. The good and consistent evidence from different studies has further emphasized the importance of ease of use in the use of digital payment systems. The findings support that effort to make interface easy and clearly laid out to increase public utilization of cashless payment systems. By so doing, it can help developers and policymakers to come up with better solutions that would improve the accessibility and utilization of the cashless payment solutions for efficiency and effectiveness.

Performance expectancy has a coefficient of 1.28 with a standard error of 0.52, significant at the 5% level, indicating that higher performance expectancy significantly increases the likelihood of adoption. Performance expectancy refers to the likelihood that a user will be more inclined to adopt an E-wallet service if they perceive the technology or system to be beneficial and effective. When users find the technology useful, their favorable attitude towards adopting the E-wallet service increases. This has supported several previous works such as Balakrishnan and Shuib (2021) whereby the usefulness perceived by a customer is found to have a significant influence to the adoption of cashless payment system. Their study revealed that the use and acceptance of cashless payment systems are more likely to be adopted when users perceived those systems as valuable means in enhancing and simplifying their payments experience. This is also consistent with our observation regarding with efficiency and convenience thus stressing the importance of such system to the potential users of cashless technology.

Similarly, it has supported the findings of the study conducted by Rahman et al. (2020) that examined the adoption of cashless payments in Malaysia using the unified theory of adoption and use of technology, and Salloum et al. (2019) study of E-Payment Systems Adoption in Higher Education in United Arab Emirates (UAE). They found that consumers who perceived that cashless payments would enhance their performance were more willing to adopt these systems. This further underscores the importance of users' perceptions regarding the positive impact of cashless payments on their performance, which our study also supports.

Social influence has a coefficient of 1.11 with a standard error of 0.40, significant at the 1% level, indicating that greater social influence significantly increases the likelihood of adoption. The study revealed that greater social influence significantly increases the likelihood of adoption. This suggest that people within the consumer or users' social network system or simply the people around them including family members, friends or colleagues and even neighbors may play a part in the users' decision in the use of cashless payments. This has supported the earlier studies conducted, including the study by Jawad et al. (2022) and Rahman et al. (2020), which revealed that the social influence has a positive influence on the use of cashless or the online payment method. However, the findings is not consistent with previous study conducted by Widodo et al. (2019) and Tun (2020), suggesting that social influence do not have a significant influence in determining users' intention to adopt mobile wallets. As for facilitating condition, the study revealed that facilitating condition do not have a positive significant effect on the likelihood of adopting cashless payment system. This is consistent to the study conducted by Yang et al. (2021), revealed that facilitating condition do not have a positive significant impact on consumers' intention to use e-wallet. However, the result deviate from the studies conducted by Rahman et al. (2020) and Khechine et al. (2020), suggesting that facilitating condition have a positive significant influence on cashless payment and technology adoption.

Perceived risk has a coefficient of -1.90 with a standard error of 0.55, significant at the 1% level, this indicates that the higher the perceived risk of the respondents, the less likely they are to adopt cashless payment. This has supported the previous study conducted by Singha et al. (2021), revealed that perceived risk has a negative and significant influence on the intention to use digital payments in Thailand. This is also further supported the study conducted by Ming et al. (2020) and Singh et al. (2020), indicating that the users are more likely to reject the use of e-wallets when they perceived a high level of risk. On the other hand, the finding of this study rather disagrees with the study Teoh Teng Tenk (2020), suggests that perceived risk does not influence the use of e-wallet.

However, facilitating condition has a coefficient of 0.05 with a standard error of 0.60, not statistically significant, indicating that facilitating conditions do not have a significant effect on the likelihood of adopting cashless payment system. This is consistent to the study conducted by Yang et al. (2021), revealed that facilitating condition do not have a positive significant impact on consumers'

intention to use e-wallet. However, the result deviate from the studies conducted by Rahman et al. (2020) and Khechine et al. (2020), suggesting that facilitating condition have a positive significant influence on cashless payment and technology adoption.

To check for the robustness of the results of the logit regression, the researcher compared the results across different models such as probit and OLS regression. Based on the results shown from the Table 19, effort expectancy, performance expectancy, social influence and perceived risk are found to be a consistent predictor of cashless payment adoption across different models.

Table 19. Logistic Regression Result

Variables	**LOGIT** CPA	**PROBIT** CPA	**OLS** CPA
Age	0.0525	0.0302	0.00446*
	(0.0372)	(0.0208)	(0.00245)
Gender (Male = 1)	0.760	0.476	0.0368
	(0.667)	(0.371)	(0.0423)
Income (Above Poverty Threshold = 1)	0.164	0.126	0.0141
	(0.600)	(0.332)	(0.0428)
Education (Elementary level = reference category)			
Elementary Graduate	-0.929	-0.525	-0.120
	(3.188)	(1.714)	(0.194)
High School Level	-0.855	-0.493	-0.0397
	(1.864)	(1.082)	(0.0915)
High School Graduate	0.365	0.184	0.0917
	(1.941)	(1.121)	(0.101)
College Level	1.491	0.765	0.127
	(1.960)	(1.130)	(0.107)
College Graduate	1.164	0.549	0.0981
	(2.320)	(1.245)	(0.126)
Internet access (Yes = 1)	2.165	1.246	0.150
	(1.691)	(0.958)	(0.111)

Past Experience (Yes = 1)	0.653	0.345	0.0940**
	(0.632)	(0.355)	(0.0445)
Effort Expectancy	2.240***	1.282***	0.147***
	(0.631)	(0.336)	(0.0341)
Facilitating Condition	0.0520	0.0370	-0.00640
	(0.596)	(0.312)	(0.0398)
Performance Expectancy	1.276**	0.732**	0.0803**
	(0.519)	(0.298)	(0.0311)
Perceived Risk	-1.894***	-1.079***	-0.124***
	(0.553)	(0.301)	(0.0289)
Social Influence	1.109***	0.610***	0.124***
	(0.395)	(0.217)	(0.0277)
Constant	-4.003	-2.310	0.199
	(2.727)	(1.538)	(0.177)
Observations	246	246	246
Pseudo R2	0.7229	0.7255	--
R-squared			0.650

Note: Robust standard error in parentheses. *p<0.1, **p<0.05, ***p<0.01

Motivating Factors for Adoption and Non-Adoption of Cashless Payment

In analyzing the data taken from the open ended question in the questionnaires, the researcher quantified the responses to determine the most frequent reasons of adoption and non-adoption. The researcher identified and analyzed patterns to interpret and understand the reasons for adoption and non-adoption of cashless payment system. Table 18 shows the most frequent reasons mentioned by the respondents who adopted cashless payment system.

The result of the analysis of responses with regards to the adoption of cashless payment systems for household utility bills shown in Table 20 suggest that the primary drivers of adoption are convenience, ease of use, less hassle, fast transaction and cost efficiency. Convenience is the most frequent cited reason for adopting cashless payment with 66 (44.59%) respondents said that using cashless payment is convenient for them. It is followed by ease of use which is cited by 44 (29.73%) respondents, this suggest that consumers appreciates a simple and

intuitive interface that is very easy to navigate and make transactions. Less hassle is also among the cited reasons of adoption with 26 (17.57%) respondents said that cashless payment is less hassle as they no longer have to go to the payment centers and avoid long queues. Additionally, cost effectiveness and the speed of transactions are also commonly cited or mentioned reasons influencing the adoption of cashless payment for household utilities. Users do appreciate the ability to pay bills quickly and efficiently without the need to travel, queue, or handle cash, thus saving time and reducing expenses. These insights suggest that cashless payment systems meet a critical demand for efficiency and ease, making them an attractive option for many users.

Table 20. Reasons for Adoption

Reasons for Adoption*	**n**	**%**
Convenience	66	44.59
Easy to use	44	29.73
Less Hassle	41	27.70
Fast transaction	26	17.57
Time Saving	23	15.54
Cost Efficient	8	5.41

Note: * Multiple response

Following this, Table 21 shows the most frequent reasons mentioned by the respondents who did not adopt cashless payment system for their household utility bills. The result of the analysis of responses with regards to the adoption of cashless payment systems for household utility bills suggest that the primary inhibitors of adoption includes about safety and security concerns, a preference for cash, established habits, doubts and distrust about system stability, and cost related concerns. The most cited reason which comprises of 28.57% of the non-adopters is the safety and security concern. The fear of falling prey to scammers and losing money in online transactions is a big barrier to the adoption of cashless payments. Respondents perceived the digital or cashless payment transaction as not safe due to fraud and several cyber related incidents which exist and continue to happen in the country. Furthermore, 26.53% of the consumers have little or no knowledge about the correct procedures in embracing cashless payment options, for instance, understanding the operational procedures of Smartphone or the underlying processes of performing cashless payment. Specifically, the lack of

understanding pertains to the elderly people, thereby preventing them from adopting to cashless payment systems.

In addition, another factor that can be attributed to its non-adoption which is cited by 15.31% of the non-adopters is the continuous preference for cash over its digital counterpart and other forms of payment which also inhibits the transition to the use of other forms of payment such as digital or cashless payments. Cash transactions are considered more concrete and reliable, which in turn strengthens the tendency to stay with what is familiar and trusted. People have a certain level of comfort and security in such methods as they have been used for many years, and that is why people resist changes, as 19.39% of them said that they are used and it became their habit to pay their bills personally at offices or payment centers, which is evident as non-adopters cited that they did not adopt because they are already used to paying their bills over the counter. Other reason is system reliability concern cited by 7.14% of the non-adopters.

The abrupt updates, delayed issuance of receipts, intermittent connectivity, and sometimes failed transactions also make the users fear cashless payment system to be unreliable compared to physical cash, thus causing them to be reluctant to transact digitally. Finally the issue of high service fees and other charges associated with the use of cashless payment methods as mentioned by 5.10% of the non-adopters, discourages their use, particularly overpriced service fees for cash-ins in the e-wallet. These additional costs are perceived by the users to be very discouraging they rather prefer to make cash payments since they are cheaper. In other words, the use of cashless payment systems is hampered by certain issues of trust, lack of information, and previous experience, concerns over the reliability, and cost factors.

Table 21. Reasons for non-adoption

Reasons for non-adoption*	**n**	**%**
Safety and Security Concern	28	28.57
Knowledge Gap	26	26.53
Routine and habit	20	19.39
Preference for Cash	15	15.31
System reliability Concern	7	7.14
Cost Issues	5	5.10

Note: *, Multiple response

5. CONCLUSION AND RECOMMENDATIONS

The study was conducted to look into the potential of using cashless systems for paying the household utility bills in the municipality of Albuera, Leyte focusing on the sociodemographic characteristics of household utility consumers, influencing factors towards adoption of cashless payment systems and the reasons for adopting or not adopting them. This is one of the few studies that investigate the adoption of cashless payment systems in the context of household utilities, particularly in the Philippines.

The findings of this study show that consumers in Albuera are more likely to adopt cashless payments, with approximately 60.16% having already used cashless payment systems for their household utility bills, indicating a growing acceptance of digital and cashless payment transactions. The main reasons identified for adapting to cashless payment systems include convenience, time saving, ease in using the system, quickness in transaction process as well as cost effectiveness. Users or consumers value the fact of being able to pay their bills at home without travelling or queuing or handling money itself due to its efficiency and speed which makes it appealing for the electronic payments services as well. Nevertheless, there are barriers that hinder the acceptance of cashless payment systems. These barriers include concerns related to safety and security, a strong preference for physical currency, deeply ingrained habits of using cash, lack of knowledge, and issues with system reliability. Users are discouraged by fears of being victims of scams and fraud, which are worsened by frequent cyber incidents. Many people, particularly older individuals, encounter challenges with digital systems. Additionally, problems such as unexpected system updates, delayed transaction confirmations, network disruptions, and high fees further dissuade individuals from embracing cashless transactions. To further enhance the adoption of cashless payment systems, it is essential to address these barriers. Based on the findings of the study, the recommendations are made:

1. For the household utility providers. They should address technical concerns such as slow transaction, system downtime, and delivery of receipts to improve reliability and trustworthiness of the system which affects the level of satisfaction of the users. Security features of the platforms should be strongly encouraged and users should be given clear guidelines on how to protect their information to reduce their apprehension on the safety of transactions. They may consider

offering incentives such as discounts or loyalty points to entice the consumer to adopt especially those who has a strong preference for cash.

2. For the financial technology/e-wallet/digital wallet providers. Fintech and e-wallet providers should consider lowering transaction fees and other charges, making it affordable and appealing for the consumers. Improve the overall customer experience by providing a simple and intuitive interface for payment to minimize the perceived and actual effort of consumers in paying their bills.

3. For the Local Government Units (LGU). LGUs should initiate education and awareness programs to inform the community about the benefits of cashless transactions and its safety, especially for the elderly and those who are not accustomed to mobile and digital technologies.

4. For future Researchers. Future researchers could use this study to understand the factors that influence the adoption of cashless payment system. Future researchers could try to include more constructs into the model of the study such as perceived cost and personal innovativeness to validate the cost concern and long standing habit and routine identified in this study. Lastly, comparing the adoption from rural and urban area would also Considering these recommendations could help add more insights on the adoption of cashless payment system especially on context that are understudied.

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