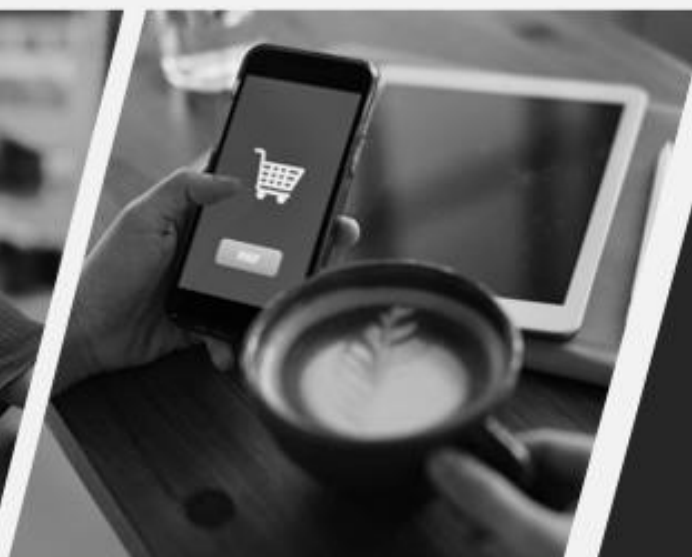




BANK OF THAILAND



Occasional paper

Consumer Payment Diary Survey Project

December 2021



Contents

Contents.....	2
Introduction.....	3
Executive Summary	4
1. Key Findings	5
1.1 Payment Instrument Usage	5
1.2 Cash holdings and spending.....	6
1.3 Payment Usage Experience and Participation in Government Stimulus Programs.....	6
1.4 The impact of the COVID-19 pandemic.....	7
2. Findings from the Statistical Models.....	8
2.1 Analysis of Factors Influencing Payment Behavior	8
2.2 Categorizing Consumers according to Their Payment Behaviors.....	11
3. Implications for Policy Implementation.....	13
3.1 Implications for Promoting e-Payment Usage	13
3.1.1 Implications for promoting the use of e-Payment through businesses.....	13
3.1.2 Implications for promoting the public e-Payment usage	13
3.2 Policy Implications on Banknote Production and Management.....	14
3.2.1 Banknote demand projection.....	14
3.2.2 Effective respond to banknotes demand.....	14
3.2.3 Reducing cash dependency in certain segment	15

Introduction

The Bank of Thailand (BOT) has launched the Consumer Payment Diary Survey Project to better understand Thai consumers' payment behavior and psychological factors through an in-depth analysis of consumers' payment diaries. The study is the first in Thailand and Asia to adopt Crujisen and Horst (2019)'s Payment Behavior with Socio-Psychological Factors model. This socio-psychological model was applied in the design of the questionnaire to obtain more detailed and accurate information than previous payment behavior surveys. The payment diary is considered a reliable data collection tool used by many central banks around the world.

This quantitative study was conducted through in-person and telephone interviews with 6,020 participants. Participants were evenly distributed by gender, age, occupation, and area of residence, which covered seven regions throughout Thailand, namely Bangkok and its vicinities (Nonthaburi, Samut Prakan, and Pathum Thani), the North, Northeast, Central, East, and Western regions.

The survey was conducted from February to April 2021, before the third wave of the COVID -19 outbreak in Thailand began in April 2021. The survey consisted of two parts. One was the socio-psychological questionnaire, and the other was the payment diary, in which daily payment transactions were recorded over a period of one week. Participants were distributed in similar proportions across each week of the month.

The BOT initiated this project to gain insights into Thai consumers' payment behaviors to help identify target groups and strategies to promote e-Payments under the Payment Systems Roadmap No. 5 (2022 - 2024) and enable effective banknote management planning. This valuable data will also be used for in-depth analysis to support policy formulation consistent with Thai consumers' behaviors.



Executive Summary

According to the survey results, most Thai consumers still paid with cash. Cash was the main mean of payment for everyday spendings with a low average value per transaction, such as food and beverage purchases, transportation fees, and personal product purchases. Although the adoption of mobile/internet banking has been much higher than before, the proportion of e-Payment usage in daily life was moderate. This presents an opportunity for the expansion of e-Payment. Popular e-Payment instruments among survey participants were Pao Tang, a mobile application introduced under the government stimulus package, and mobile/internet banking. In addition, the socio-psychological factors that influenced participants' choice of payment instruments were the acceptance/needs of the business partner, the behavior of surrounding people, convenience, speed, and accessibility.

However, the projection of cash demand shows that the use of cash is on a declining trend and is expected to continue to decline in the longer term. Cash usage is now being replaced by e-Payment, which is steadily increasing due to the change in consumers' behaviors and the changing environment, as evident by the changes during the COVID -19 lockdown and the use of the Pao Tang app under the government's economic stimulus program. In addition, the survey found that most Thai consumers (92%) already own devices that support the use of e-Payment and have had prior experiences with e-Payment.

It is therefore essential to promote e-Payment as the main payment instrument in the future. Policies should focus on promoting the use of e-Payment in all sectors, i.e., the public sector, the business sector, and the government sector, to concretely drive its use. A series of payment diary surveys will help to monitor and empirically observe these changes.

1. Key Findings

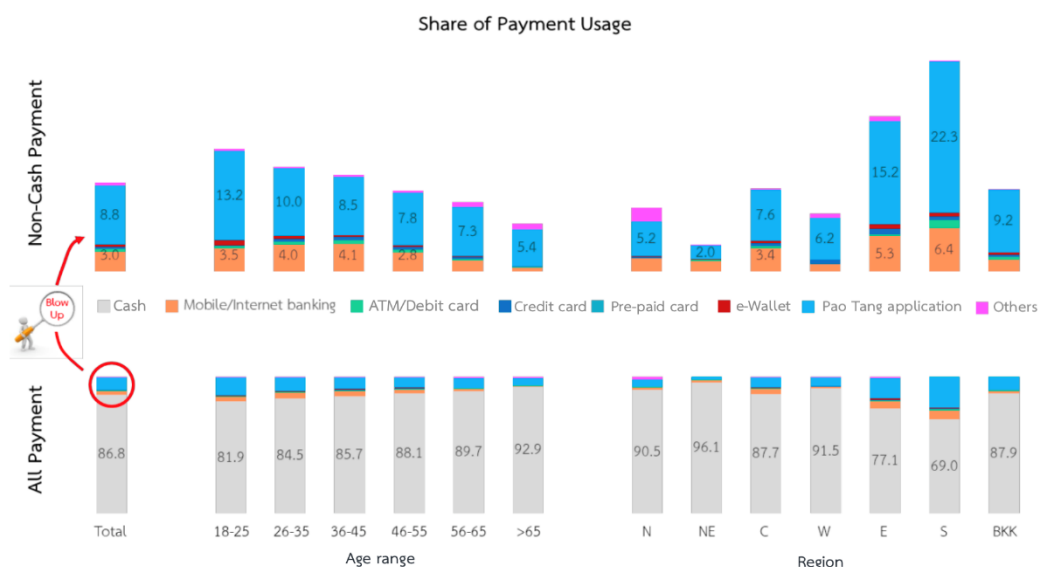
1.1 Payment Instrument Usage

The payment behavior in the daily life of the 6,020 participants over the survey period can be described as follows:

- **Payment behavior:** Participants used cash as the main payment instrument for their everyday spendings while e-Payment usage was still moderate. The average number of payments was 88 times/month/person (with a total of 123,895 transactions). Of these, cash payments accounted for 77 times or 86.8% of total transactions, with an average value of 118 Baht/transaction. Meanwhile, e-Payment accounted for 11 times or 13.2% of total transactions, with an average value of 440 Baht/transaction. The preferred e-Payment instruments were the Pao Tang application (8.8%) and mobile/internet banking (3.0%). This represents a great opportunity for the growth of e-Payment and demonstrates the importance of government policies in promoting the use of e-Payment in the public sector.

- **Payment behavior by age range:** Older participants had a higher proportion of cash usage compared to younger participants. The adoption of e-Payment was inverse to cash usage. Participants aged 65 and above had the lowest proportion of e-Payment use, accounting for 7.1% of total transactions. In contrast, participants aged 18 to 25 had the highest proportion of e-Payment use, accounting for 18.1% of total transactions. An in-depth analysis revealed that age is an important demographic factor influencing e-Payment usage.

Figure 1: Share of Payment Usage

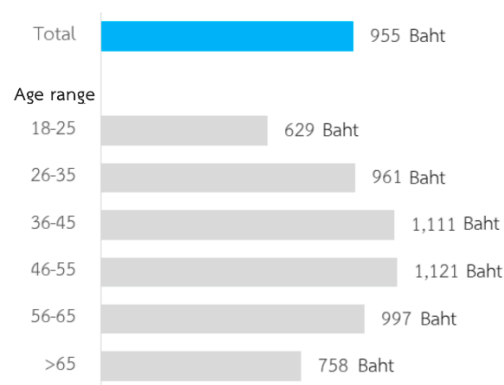


1.2 Cash holdings and spending

- **Cash holdings:** Cash is still the primary payment instrument for everyday spending in Thailand. All participants held cash and had an average daily cash balance of 955 baht (at the beginning of the day).

- **Cash holdings by age range:** Participants in the middle age group (36-55 years) held more cash daily than any other age group. This is consistent with their income, which was also higher than those of other age groups.

Figure 2: Average Daily Cash Holdings
Average Daily Cash Holding



- **Spending category:** Participants' daily expenses were mainly for everyday necessities. Most of the spending was on food and beverages, which accounted for 75.3%, followed by purchases of personal items (6.7%) and transportation-related expenses (6.1%).

- **Spending Location:** Spending location is related to where participants made cash payment. Most transactions were made at food and beverage outlets, which accounted for 29.9% of total spending. Other locations were markets, which accounted for 22.2%, and community shops (e.g., shops near participants' work or home), which accounted for 13.7%.

1.3 Payment Usage Experience and Participation in Government Stimulus Programs

- **Experiences with Payment Instruments:** A total of 5,449 participants (90.5%) reported using e-Payment in the past two years, while 5,485 participants (91.1%) owned a smartphone and had accessed the internet through this device. Thus, most participants were well-equipped with compatible devices and familiar with e-Payments. The most popular e-Payment instruments are:

- Mobile/Internet banking, commonly used for all purposes, especially for funds transfers (62.0%), point-of-sale payments (51.7%), and online payments (50.4%).
- Pao Tang application, mainly used for goods and services purchases at the point of sale (58.9%).
- ATM and debit cards, mainly used for cash withdrawals (86.7%) and funds transfer (44.8%).

- **Government stimulus programs:** Most participants (61.5%) reported having participated in government stimulus programs. The programs in which most participants had participated were the "Khon La Khrueng" 50-50 co-payment scheme (40.4%), followed by the "Rao Chana" financial aid scheme (37.9%). The "Mor33 Rao Rak Kan" subsidy program was the least participated (5.1%). Upon expiration of these programs, 64.8% of participants indicated

that they would return to using cash, 35.8% expressed their intention to continue using mobile banking, and 27.4% to stay with the Pao Tang application. Government policy is therefore critical to promoting the adoption of e-Payment in the public sector.

Figure 3: Experiences with Payment Instruments



1.4 The impact of the COVID-19 pandemic

- **Cash reserves:** Most participants (52.8%) reduced their cash reserves after the lockdown due to decreased income whereas expenses increased.

- **ATM Cash Withdrawals:** The average number of participants' ATM cash withdrawals was 4.5 times before the lockdown, 3.7 times during the lockdown, and 4.3 times after the lockdown. The average value of ATM withdrawals increased during the lockdown, which averaged at 2,668 baht/transaction. The findings suggest that, during the COVID -19 pandemic, the public tended to make fewer ATM cash withdrawals, but they withdrew at a higher amount each time.

- **E-Payment usage:** Only 23.9% of participants reported increased e-Payment usage. The main reasons for this increase were convenience over cash (63.1%), the need to have less contact with cash (57.2%), and the need to avoid close contact with other people (51.7%). Nevertheless, most participants (66.3%) expressed the intention to continue using e-Payment at the same frequency.

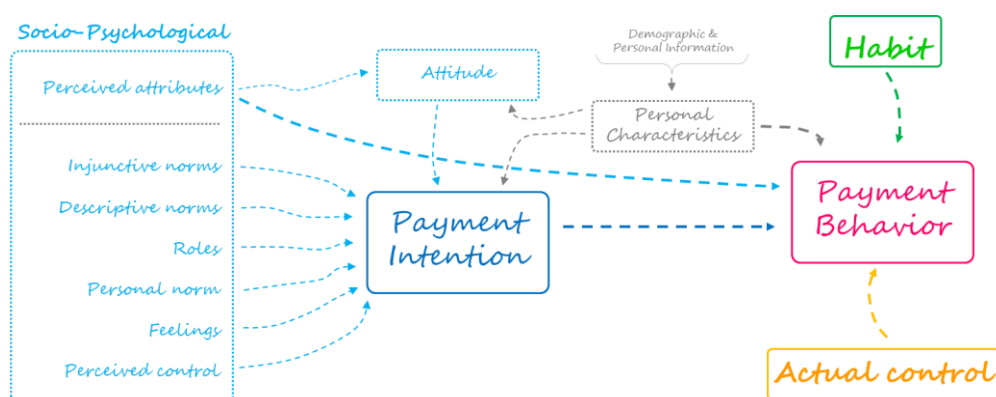
2. Findings from the Statistical Models

In this study, the model of payment behavior with socio-psychological factors by Crujisen and Horst (2019) was applied to structure the questionnaire, design the sequence of questions, and develop the questions.

The results reveal the relationships between the model variables. Payment behavior was correlated with personal characteristics and three key factors, namely payment intention, habit, and actual control. The model can be used to analyze payment behavior in relation to two payment channels/methods:

- **Cash payments** which include payments with banknotes and coins (making it necessary for people to hold cash)
- **E-Payments** such as pre-paid card, credit card, debit card, funds transfer via ATM or mobile application, etc.

Figure 4: Model of Payment Behavior with Socio-Psychological Factors



2.1 Analysis of Factors Influencing Payment Behavior

2.1.1 Key factors influencing payment behavior

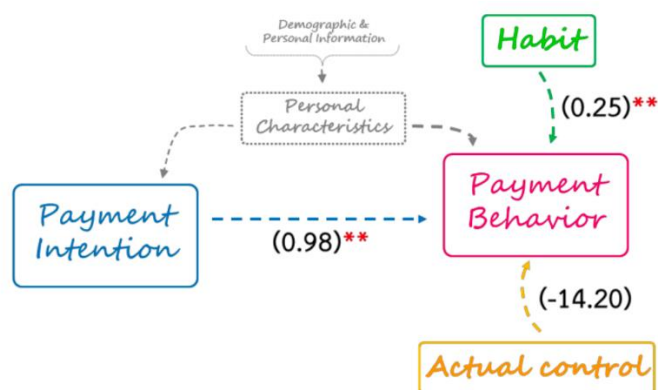
The results of the ordinal logistic regression model indicate that three main factors influencing payment behavior are payment intention, habit, and actual control.

1) **Payment intention** influenced payment behavior with a statistically significant coefficient of 0.98.

2) **Habit** influenced payment behavior with a statistically significant coefficient of 0.25.

3) **Actual control** was found to have no influence on payment behavior.

Figure 5: Impact on Payment Behavior



Notes: 1. Numbers in parentheses indicate the coefficients of the main variables influencing payment behavior
 2. ** Statistically significant level of 0.05 and 3 * Statistically significant level of 0.10.

2.1.2 Personal characteristics variables influencing payment behavior

- **Age:** Participants aged 56 years or older made more cash payments than younger participants (< 56 years)

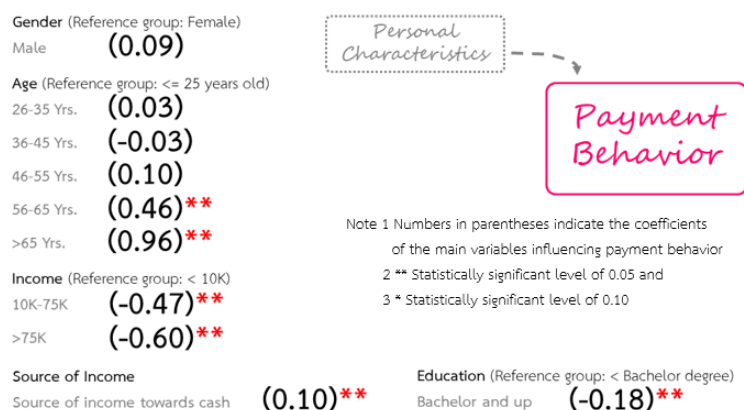
- **Income:** Participants with an income of 10,000 baht or greater used e-Payment more than participants with lower incomes (<=10,000 baht).

- **Source of income:** Participants who received their wages and salaries in cash were more likely to make cash payments than those who received their wages and salaries through electronic channels.

- **Education:** Participants with a higher education level (bachelor's degree or higher) used e-Payment more than participants with a lower education level (less than a bachelor's degree).

- **Gender:** The gender of the participants had no influence on payment behavior.

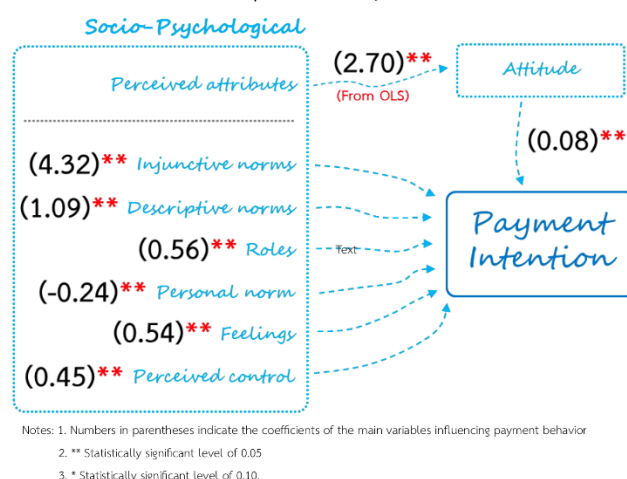
Figure 6: Impact on Payment Behavior



2.1.3 Variables directly influencing payment intention and indirectly influencing payment behaviors

Attitude and socio-psychological factor influenced payment intention at a statistical significance level of 0.05 and indirectly influenced payment behaviors. Key findings are described below.

Figure 7: Impact on Payment Intention



1) **Attitude towards payment instruments (Attitude)**: a study that participants have positive attitudes towards cash payments or e-Payments, or both were found to make no difference. Findings suggest that attitude influenced payment intention with a statistically significant coefficient of 0.08 because of speed, ease of use and convenience, the ability to make payments anywhere and anytime, and security which were key attributes influencing participants' choices of payment instruments.

2) **Individual perception and understanding (Injunctive norms)**: a study that the payer's acceptance and willingness to follow the payee (e.g., seller/PoS/partner)'s choice of payment instruments. Findings suggest that injunctive norms influenced payment intention with a statistically significant coefficient of 4.32.

3) **Behaviors of close contacts (Descriptive norms)**: a study that participants were more likely to follow the behaviors of their acquaintances. The results suggest that descriptive norms influenced payment intentions with a statistically significant coefficient of 1.09. Still, the level of influence of these acquaintances could be classified into two groups:

- The high influential group: boyfriend/ girlfriend/ spouse, schoolmates, and colleagues.
- The low influential group: parent/ adult relatives/ siblings/ cousins/ children/ grandchildren/ great-grandchildren/ great-great-grandchildren.

4) **Behaviors of people with similar attributes (Roles)**: When people with similar attributes such as age, income, and lifestyle changed their payment behaviors in their daily lives, participants were more likely to follow those behaviors. The results indicate that roles influenced payment intention with a statistically significant coefficient of 0.56. However, the level of influence of people with similar characteristics was different and could be classified into two groups:

- The high influential group: those with similar age range, income, and lifestyle.

- The low influential group: those who live in the same neighborhood.

5) **Perception on possibilities of payment channels' accessibilities (Personal norms):** a study that participants' perceptions on whether cash payment and e-Payment should be accessible anywhere/anytime. The results indicate that personal norms influenced payment intention with a statistically significant coefficient of -0.24. If an individual perceives that cash payment can be accessible anywhere and at any time, "more than" that of e-Payment, that individual will opt to use cash as the main payment channel.

6) **Sentiments on payment channels (Feelings):** The study compared participants' sentiments on the two payment channels whether they gave pleasant, safe, familiar, modern, valuable, and simple feelings. The results indicate that feelings strongly influenced payment intention with a statistically significant coefficient of 0.54. If an individual agrees that cash payment "makes it feel better" than e-Payment, that individual will use cash as the main payment channel.

7) **Perception of the future constraints to payment channels (Perceived control):** In terms of participants' perceptions of the possibility of future usage of the two payment channels, perceived control was found to influence payment intentions with a statistically significant coefficient of 0.45. The results suggest that if an individual perceives "fewer" future constraints on cash payments than those of e-Payments, such an individual will use cash as the main payment instrument.

In summary, key factors influencing payment behaviors are:

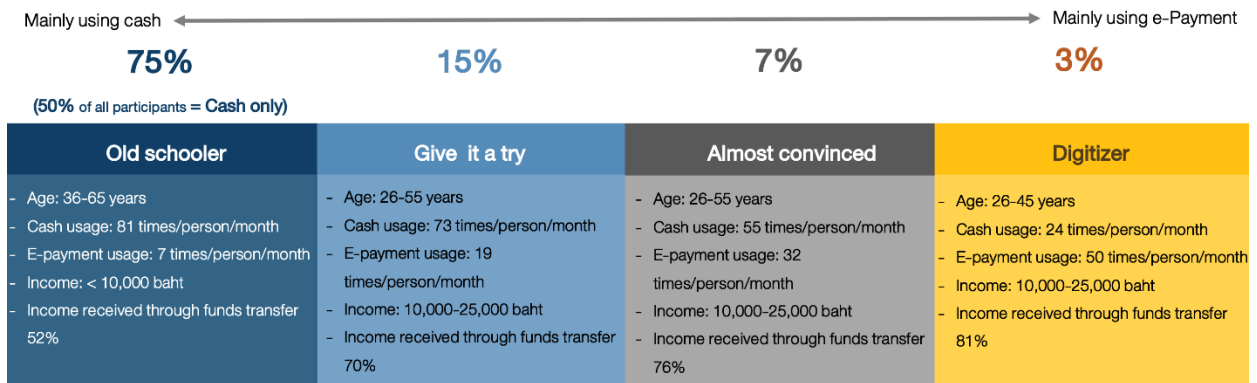
- Payment intention, which consists of injunctive norms, descriptive norms, personal norms, roles, feelings, perceived feelings, perceived control, and attitude (speed, ease of use/convenience);
- Personal characteristics, which include age, income, income receiving channels, and education; and
- Payment habits

Analysis of these key factors helps identify policy implications to promote the use of e-Payment through businesses and the public. Details are discussed in the following section.

2.2 Categorizing Consumers according to Their Payment Behaviors

Daily payment behaviors collected through payment diaries were analyzed and categorized participants according to their cash and e-Payment behaviors using machine learning (K-mean clustering). The results revealed 4 clusters, namely, "Old schooler," "Give it a try," "Almost convinced," and "Digitizer," as shown in Figure 8.

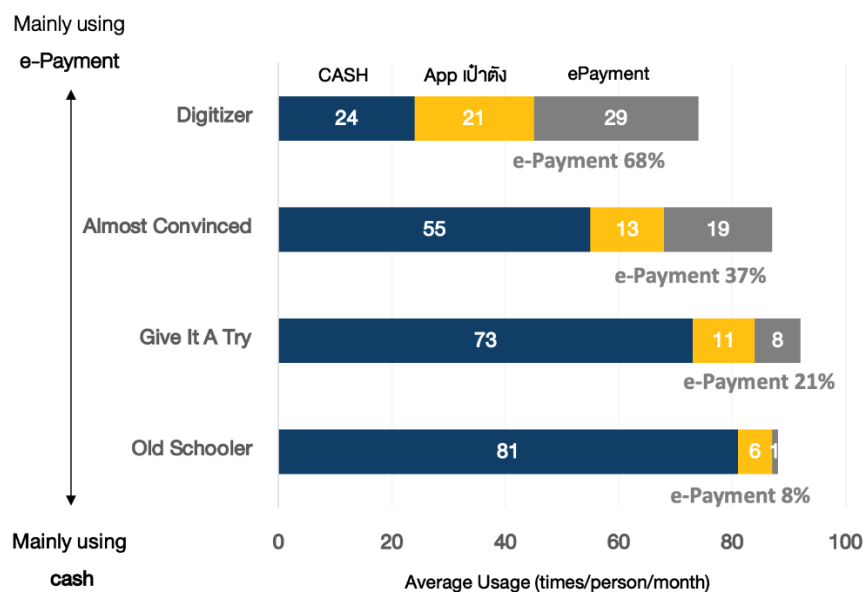
Figure 8: Clusters based on Daily Payment Behaviors



Each cluster had significantly different age ranges, incomes, and income receiving channels. These characteristics represent key factors influencing payment behavior. The results indicate that three clusters, i.e., Old schoolers, Give it a try, and Almost convinced, used cash as the primary payment instrument, and the proportion of those using cash payment as the only payment instrument was as high as 50%.

As for the Digitizer group, e-Payment was the main payment instrument for daily spending and accounted for 68% of total payments. The findings suggest that current e-Payment usage, which has grown at a much higher rate, is being driven by a small number of users. This observation, together with the recent advancement of Thai payment infrastructure to support the expansion of e-Payment usage, presents considerable opportunities for the growth of e-Payment in the future.

Figure 9: Payment Instrument Selection of each Cluster



3. Implications for Policy Implementation

The findings are beneficial in guiding the implementation of policies to promote the use of e-Payment and enhance the effectiveness of banknote management planning. Details are discussed below.

3.1 Implications for Promoting e-Payment Usage

consist of 2 main parts:

3.1.1 Implications for promoting the use of e-Payment through businesses

1) Promoting through employers: As income-receiving channels influenced the public's payment behaviors, participants who received wages and salaries through electronic channels tended to use e-Payment channels more than those who received wages and salaries in cash. Thus, encouraging employers to make salary payments through electronic channels would help promote e-Payment usage among employees.

2) Promoting through stores: Participants' perceptions of merchants' preferred payment channels (injunctive norms) influenced their payment behaviors. Participants who usually use cash believe that merchants generally prefer receiving cash. In contrast, participants who usually use e-Payments presume that merchants prefer to receive payments electronically. Promoting more merchants to accept e-Payments will help encourage the public to shift their payment behaviors at the point of sale.

3.1.2 Implications for promoting the public e-Payment usage

can be divided into 3 phases:

1) Short-term: Injunctive norms, personal norms, and perceived control influenced individual payment behavior more easily and quickly than other variables. Encouraging more merchants to accept e-Payments would therefore help shape the public perception that e-Payments are easy, convenient, and will not hinder their usage.

2) Mid-term: This phase should focus on changing an individual's perception of his or her acquaintances. Once people alter their perceptions and behaviors as a result of changes in short-term variables, such changes will influence descriptive norms and role variables, suggesting that an individual will begin to observe consistent changes in their acquaintances' behaviors.

3) Long-term: The alteration of attitude and feelings takes the longest to affect the public's attitudes and payment behaviors. The process requires consistent and repetitive usage over time to form a new habit or familiarity with e-Payments usage.

In addition, promoting e-Payments should be done through communication that fosters the public perception that e-Payments are fast, easy to use, and can be done anywhere and at any time to induce changes in individuals' payment behaviors. Simultaneously, payment systems service providers should be encouraged to focus on e-Payment development to satisfy consumers' needs.

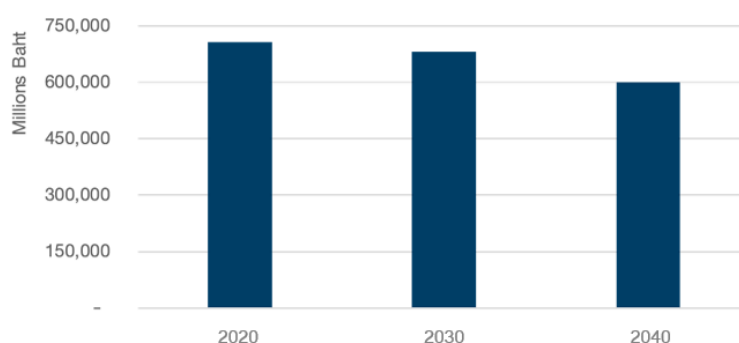
Furthermore, it is essential to collaborate with the government sector on launching policies or programs that constantly stimulate public e-Payment usage, especially once the current government's stimulus programs come to an end.

3.2 Policy Implications on Banknote Production and Management

3.2.1 Banknote demand projection

The analysis identified the Digitizer group as a younger generation that prefers e-Payment as the main payment instrument. Cash payment data categorized by age ranges show that different payment behaviors, together with the estimates of the number of Thai populations in each age range by the Institute for Population and Social Research, Mahidol University, make it possible to estimate future cash payments. The results suggest that cash payments will continue to trend downwards in the long term and will be replaced by e-Payments, which increase incessantly. It is forecast that, compared to 2020, the value of cash usage will decrease by 4%, or 25,025 million baht, by 2030 and by 15%, or 108,164 million baht, by 2040. Note that the forecast excluded other factors such as inflation rate and changing public behaviors due to policy promotions or developments that improved the public's access to e-Payment.

Figure 10: Estimated Value of Public Cash Payment during 2020-2040



3.2.2 Effective respond to banknotes demand

According to the survey, the use of banknotes still accounted for a high proportion of 87% of total transactions. However, the use of e-Payment instruments promoted by the government, such as the Pao Tang application, which is registered by more than 60% of the eligible population, indicates that the Thai public is ready for and has access to e-Payment. Hence, the role of banknotes in payments will be increasingly substituted by e-Payments.

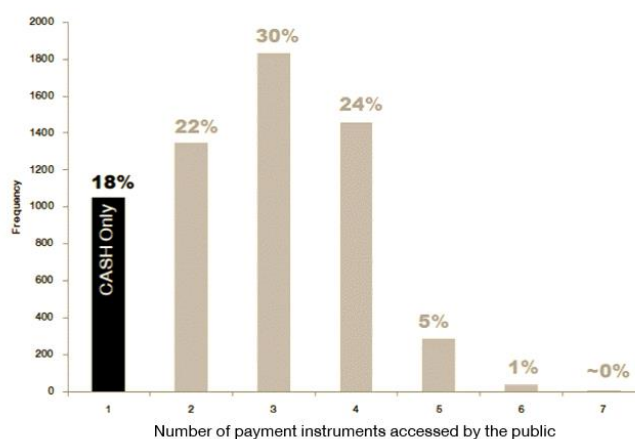
However, banknotes still serve as a store of value, leading them to have an extensive circulation period before returning to the BOT for sorting, quality inspection, and destruction if they are unfit for circulation. As for banknote production, the BOT aims to improve the durability of banknotes such that, even with an extended circulation period, they are still

clean and pleasant to use. The increased durability will help reduce the production costs of new banknotes. In terms of banknote distribution, the BOT has pushed for a Consolidated Cash Center as an operation center for sorting and distributing banknotes in response to the decrease in the volume of banknote transactions. The center will help reduce the costs of Thailand's banknote management, both logistic costs, holding costs, and operation costs.

3.2.3 Reducing cash dependency in certain segment

Due to social inequality in Thailand, certain segments of the population have trouble accessing many payment instruments. According to the survey results, 18% of the participants only have access to cash as their means of payment, as shown in Figure 11.

Figure 11: Frequency of payment instruments accessed by the public



Given the characteristics of the underprivileged groups facing difficulties in accessing alternative payment channels, the results indicate that key influential factors were residential area and age. Most of these underprivileged groups live in the Northeastern region and are elderly people, as shown in Figure 12.

Figure 12: Proportion of underprivileged groups' access to alternative payment instruments by region and age range

	Residential area						
	North	Northeastern	Central	West	South	BKK and its vicinities	
Age							
18 – 25	0.5%	6.5%	0.3%	0.5%	0.3%	1.3%	9.3%
26 – 35	0.5%	8.3%	0.3%	0.6%	1.3%	0.8%	11.7%
36 – 45	1.4%	8.7%	1.4%	1.0%	0.7%	1.6%	14.9%
46 – 55	1.6%	9.4%	2.2%	1.5%	0.4%	2.6%	17.6%
56 – 65	4.6%	8.2%	3.3%	1.1%	0.7%	2.3%	20.2%
>65	5.5%	7.4%	5.6%	2.2%	2.3%	3.3%	26.3%
	14.1%	48.4%	13.1%	6.9%	5.6%	11.9%	

Therefore, the BOT should promote access to various means of payment for those in the Northeast region. At the same time, the BOT should ensure sufficient cash availability given the current situation where commercial banks are gradually reducing the number of branches.



References

- Crujisen, C. and Horst, F., 2019. Cash or Card? Unravelling the Role of Socio-Psychological Factors. *De Economist*, 167(2), pp.145-175.
- Bagnall, J., Bounie, D., Huynh, K., Kosse, A., Schmidt, T., Schuh, S. and Stix, H., 2014. Consumer Cash Usage: A Cross-Country Comparison with Payment Diary Survey Data. *SSRN Electronic Journal*,.
- Khan, J., Belk, R. and Craig-Lees, M., 2015. Measuring consumer perceptions of payment mode. *Journal of Economic Psychology*, 47, pp.34-49.
- Schreft, S., 2006. How and Why Do Consumers Choose Their Payment Methods?. *SSRN Electronic Journal*,.
- Dahlberg, T. and Oorni, A., 2007. Understanding Changes in Consumer Payment Habits - Do Mobile Payments and Electronic Invoices Attract Consumers?. *2007 40th Annual Hawaii International Conference on System Sciences (HICSS'07)*,.
- Crowe, M., Schuh, S. and Stavins, J., 2006. Consumer Behavior and Payment Choice: a Conference Summary. *SSRN Electronic Journal*,.
- Jonker, N., Crujisen, C., Bijlsma, M., and Bolt, W., 2020. Pandemic payment patterns. DNB Working Papers 701, Netherlands Central Bank, Research Department.
- Khan, J. (2011). Cash or card: consumer perceptions of payment modes. PhD thesis, Auckland University of Technology, Auckland.



BANK OF THAILAND

Payment Systems Policy Department

273 Samsen Road, Watsamphraya,
Phra Nakhon District, Bangkok 10200
Tel: 0-2283-5353

Banknote Management Group

18 Moo 2 Boromarajonani Road,
Nakhon Chai Si, Nakhon Pathom 73120
Tel: 0-2356-8687

**Puey Ungphakorn Institute for
Economic Research**

273 Samsen Road, Watsamphraya,
Phra Nakhon District, Bangkok 10200
Tel: 0-2283-6066