The Relationship of Technology and Financial Inclusion in three Southeast Asian Markets

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Dissertation written under the supervision of professor Carlos Azevedo

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Abstract EN

In this dissertation, the author analyses the relationship between technology and financial inclusion within three nascent markets in ASEAN. The markets studied were Cambodia, Laos, and Vietnam. These markets were chosen as they are lagging the other ASEAN countries in the development of FinTech and adaption to formal banking. These three markets generally have smaller populations, and a majority of them live in rural areas, which may have an impact on the adoption of new technology and services. The ratio of rural population was therefore represented in the sample taken. The data was collected using a quantitative in-person survey asking a sample of individuals from the relevant markets about their access and habits regarding technology, banking, and handling of money. 147 individuals took part in the survey and a logistics model was used to analyse the data collected through convenience sampling. The data collected revealed that most individuals have regular access to modern technologies like smartphones and the internet and that, self-reportedly, these technologies are used daily to perform bank services like payments and peer-to-peer money transfers. The survey mainly delivered binary data. The findings are relevant as they show the market maturity and usage of services provided by the FinTech-sector. Previously, most data collected regarding markets analyses the supply-side, and data collected from the demand-side are for economic policy rather than market analysis. Future research could be collecting the data over time to see the trends and impact.

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Abstract PT

Na nesta dissertação a autora analisa a relação entre tecnologia e inclusão financeira no Camboja, Laos e Vietnã. Esses países foram escolhidos por estarem atrasados na adoção de tecnologia financeira (FinTech) e no uso do sistema bancário formal. Como grande parte da população vive em áreas rurais, a amostra considerou essa proporção para avaliar o impacto na adoção de novas tecnologias. Os dados foram coletados por meio de uma pesquisa quantitativa presencial com 147 indivíduos, abordando acesso e hábitos relacionados à tecnologia e serviços bancários. A análise foi feita com um modelo logístico, utilizando amostragem por conveniência. Os resultados mostram que a maioria tem acesso regular a smartphones e internet e usa essas tecnologias diariamente para serviços bancários, como pagamentos e transferências. A pesquisa gerou, principalmente, dados binários.Esses achados são relevantes, pois indicam a maturidade do mercado e o uso de serviços FinTech. Tradicionalmente, os dados coletados sobre esses mercados focam no lado da oferta, enquanto informações sobre a demanda são voltadas para políticas econômicas e não para análise de mercado. Pesquisas futuras podem acompanhar a evolução desses fatores ao longo do tempo.

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1. Introduction

From 2022 to 2023, I led a team of sales developers from an office in Kuala Lumpur, Malaysia, selling technology to banks across the Asia Pacific region. I noticed odd patterns throughout the months in the Cambodia, Laos, and Vietnam markets. Curiosity took me on a weekend trip to Phnom Penh, Cambodia, and I realised I only used my debit card to take out money in the ATM. A thought to explore the adoption of bank accounts crossed my mind.

After the time I have spent in Southeast Asia, the local people's kindness, innovativeness, and adaptability never fail to amaze me. I therefore wanted to explore how digitalisation in the banking sector has changed financial inclusion in the market.

For this dissertation, I returned to Southeast Asia and spent time in and gathering data from the three markets that had captured my curiosity: Cambodia, Laos, and Vietnam. As I have spent 10-14 days in each country to gather data, I now have a clearer picture of the market and the habits of the people and how their adaption and usage of technology in everyday finance has, in some ways, surpassed that of some markets in Europe. This research aims to find the relationship between technology and the generation of financial inclusion by enabling the demand side of the market through new digital tools.

The research problem that this study aims to solve is understanding if technology plays a role in financial inclusion in the three early-stage markets of Cambodia, Laos, and Vietnam. In extension, if there is adaptation of technology in general among the populations and furthermore if the population are using technology to access financial services. This thesis's findings shed light on the market landscape from a demand perspective that is yet rare and complex to find in today's landscape.

The research question for this paper is therefore "What is the relationship between technology and financial inclusion in the three early-stage markets of Cambodia, Laos, and Vietnam from the experience of the consumers?"

The Organisation of this complex topic starts with a literature review and explanations of the various concepts relevant to the topic. The methodology used was to gather quantitative data through an in-person survey. The data was then analysed using three logit models, measuring the use of financial services from banks for loans, savings, and receiving income. As a vast majority of the sample already had access to bank accounts, the focus turned to if and how the bank accounts are used. The results show that there is no significant relationship between

variables like internet use, smartphone ownership and usage of bank services. However, there is a significant impact showing a positive correlation between the level of education and usage of bank services.

2. Literature Review

2.1 Introduction to Financial Inclusion

2.1.1. Definition of Financial Inclusion

There are multiple definitions of "Financial Inclusion"; one is the access the world population has to formal financial services (World Bank Group, 2022). Formal financial services include services provided by official banks; "bank" and "formal financial institute" will be used interchangeably in this text. A "financially included person" is, therefore, someone with access to bank services, typically through a bank account. A person who is financially excluded is someone who does not have access to these services. The World Bank also describes in the same article that financial inclusion plays a key role in reducing poverty and enabling economic growth for the market and the individuals within it.

The history of the concept of financial inclusion is very recent. In one of the first articles that mentioned it (Beck, 2008), the author discusses financial access and inclusion through data collected across 99 countries regarding the number of bank branches, ATMs, bank deposits and loans. The paper goes further into barriers like the monetary cost and how long it takes to open bank accounts in different countries. Furthermore, Kochhar (2009) describes it as part of inclusive growth. The process involves engaging the poorer and weaker segments of society in the organised financial system. An example of how this is executed is through the delivery of credit and financial services at a (for the specific segment) affordable cost; affordability of bank services is also an important pillar to building Financial Inclusion in the formal financial sector (Chang, 2016). Some argue that banking services are a public good and should be available to the entire population without discrimination.

Furthermore, Financial inclusion depends on the accessibility of financial services like payments, transactions, savings, lending, etc. (Barajas, 2022). The ease of access and availability of bank branches and ATMs, as well as lower costs and higher quality of services, all impact the perceived accessibility. Organisations can create access or increase accessibility by introducing digital platforms and tools. Platforms and tools allow the population to be financially excluded due to traditional banking barriers, like geographic distance to bank branches or lack of funds to buy card machines (Gupta, 2022). Gupta further argues that the digitalisation of banks plays a key role in financial inclusion. The innovation

and distribution of alternative banking channels have also financially included a segment of the poorest population in developing and frontier markets.

As visible above, multiple definitions agree that access to formal financial services by a population is Financial Inclusion. However, as the concept tends to be used in economics instead of business, it is focused on policy rather than the pushes and pulls of the market.

2.1.2. Evolution of Banking and the Role of Technology

Pradhan et al. (2021) argue that there are two main pillars to economic growth: the development of the formal financial sector and advances in the information and communication technology sector. Access to formal financial services has traditionally been through branches, ATMs, etc., which are costly investments for the banks, specifically in rural communities. To bridge this gap, banks in countries like India have used information and communication technology infrastructure to reach the unbanked population through digital banking with access to mobile phones and the Internet.

One major step in the evolution of banking is mobile banking. Mobile banking uses a mobile device like a smartphone to enable bank customers to access their accounts and perform online banking activities (Wazid et al., 2019). Depending on the bank, people can transfer money, pay bills, monitor their accounts, etc. Mobile banking has already supported financial inclusion in African countries and India (Prakash et al., 2014; Akter et al., 2021). Noticeably, it has enabled financial inclusion in rural communities that otherwise are hard to reach.

Ownership of smartphones is frequent, and accessing bank services through your phone is more convenient than having to travel to an ATM or Bank Office for the same services Siano et al., 2020). Siano also argues that having access to banking services through your phone spreads passive financial literacy and generates a greater understanding of personal finances. Having visibility of your account and the money flow can also encourage trust in the system.

According to Kim et al. (2018), mobile banking has been particularly popular among unbanked populations as it has broken down barriers like time constraints and geographic distance. Digital banking and mobile banking generate financial inclusion due to ease of access and convenience. The advantage of mobile banking is that it reaches unbanked people in remote areas where traditional banking infrastructure is not present and is too costly to establish (Uchenna, 2024).

Financial innovation and innovation within the financial sector may generate growth and risks (Beck et al., 2016). Innovation fragility exists in the banking sector, especially in the context of increasing risks and aggressive risk-taking, which is often believed to generate more aggressive growth. However, economic growth has a net positive outcome compared to the loss that the risk may generate. This study was done on a global level, and this thesis will limit the geographic scope to three countries: Cambodia, Laos, and Vietnam, member countries of the ASEAN region.

From an operational point of view, money flows more transparently, and business can be done through smooth transactions instead of cash (Pradnyawati & Darma 2021). The potential market for business also grows, as people who are financially included can buy things through the Internet that they would not be able to purchase without a bank account. With technology, digital and mobile banking can break down barriers that previously excluded people from using bank services. The following section will explain more about barriers, financial exclusion, and how a financially excluded person can become financially included.

2.2. Financial Exclusion and Barriers to Inclusion

2.2.1. The difference between Unbanked, Financially Excluded, and Out-of-Banking

The population that is not financially included can be called either "unbanked" or "financially excluded." The difference between the terms is that financially excluded defines the people who do not have access to formal financial services (Collard et al., 2001). Unbanked people are financially excluded but not out of choice (Falcettoni et al., 2024). Hence, the unbanked are a subgroup of the financially excluded.

Another subgroup of the financially excluded is the out-of-banking people; they are financially excluded and have no desire to be financially included in the formal banking system (Falcettoni et al., 2024).

Unlike the financially excluded, bankable people are individuals who qualify or already use a fraction of the services of a formal financial institution (Chang, 2016). Bankable people are previously financially excluded people who are in the process of reaching financial inclusion.

2.2.2. Barriers to Inclusion

A barrier many unbanked people face, according to Allen's article (Allen et al., 2016), is that banks require documents as a tool for risk mitigation that many people in this segment do not possess. Some people lack documents such as proof of employment or even birth certificates. Another barrier that prevents financially excluded people from even applying for access to formal financial services is a lack of trust in the financial institutes (Allen et al., 2016). A costly way of gaining trust and familiarity is by bank branch penetration, which is done by establishing physical bank offices. Another way to gain trust is by launching programmes and training for financial literacy hosted by financial institutes. Generally, lower banking costs, stronger legal rights and political stability, and more excellent proximity to branches all have positive relationships with financial inclusion.

Morgan, P.J., & Trinh, L.Q. (2019) investigate Laos's financial literacy and compare it with Cambodia and Vietnam. They detect that all three countries have lower financial literacy than the world average. Low financial literacy may be an additional barrier to inclusion. Morgan & Trinh observed that the population with lower financial literacy was also less educated and less likely to be financially included.

2.3. Digital Banking and Financial Inclusion

2.3.1. The Role of FinTech

FinTech is the commonly used name for technology developed and used for and within the financial sector. This technology creates numerous incremental and disruptive innovations like digital banking, mobile payments, peer-to-peer lending, etc. (Schueffel, 2017). The term FinTech has been used inconsistently and ambiguously in various contexts, and no efforts have been made to find a universal definition. Hence, this thesis will use the term to represent technology used to perform financial services.

Singh and Sharma (2023) argue that FinTech may be the tool to help unbanked populations overcome restrictions to formal financial services. FinTech and its innovation have already improved financial inclusion worldwide through mobile banking, peer-to-peer lending,

microfinance, blockchain-based DeFi, and Bitcoin, to mention a few (Singh & Sharma, 2023). M-Pesa and NuBank are also examples of how FinTech brings financial inclusion.

According to Shi et al. (2023), in the 2010s, Southeast Asia saw high-speed growth trends in the FinTech sector. The ASEAN FinTech Census 2018 displayed that the investment streams to the industry were mainly granted to payments, investment tech, Insurtech, consumer finance, and alternative lending. Southeast Asia is generally considered a favourable region for FinTech growth and investments. However, the maturity of the FinTech markets in the region varies, from the ripe Singapore to the maturing of Indonesia and the Philippines to the nascent stage of Cambodia (Shi et al. 2023; Kam Loon Loo, 2019).

Mobile wallets are already common practice in Singapore, Indonesia, and the Philippines (Yong-Zheng Huong, 2020). Vietnamese banks have seen a rise in mobile payments. Alternative lending is being adopted in Indonesia. In Thailand, investments in FinTech have focused on Robo-advisors. Thailand and Malaysia have furthered their adoption of new financial technology, and the local markets have invested in them. Uncertainty regarding innovations is causing the countries of Brunei, Cambodia, Laos, and Myanmar to lag in adopting new FinTech.

2.3.2. ICT Infrastructure and Digital Banking

It is essential to have a well-structured information technology and communications (ITC) infrastructure in place as it enables the technology that generates financial inclusion (Goldfinch, 2024). For example, the integration of ICT enables the development of digital payments, which cater to underserved market segments.

Although mobile-based financial services are growing, their economic sustainability is still unsecured. Kim et al. (2018) argue that ITC and its infrastructure, skills, and policy development are needed to see an impact on financial inclusion through mobile-based financial services.

In Cambodia, ICT development has enabled the National Bank to launch a blockchain-based peer-to-peer payment platform called the Bakong Project (Ueda & Hay, 2024).

2.4. Geographic Scope: Cambodia, Laos, and Vietnam

2.4.1. Digital Readiness and Adoption: Vietnam, Cambodia, and Laos

In Vietnam, a visible market exists for mobile and digital payments (Phan, Tran, Hoang, & Dang, (2020). As the country is experiencing a growing middle class and increased usage and penetration of mobile phones, the infrastructure allows digital payments to proliferate with players like MoMo, ZaloPay, and VNPay. As the Vietnamese FinTech market has excellent growth potential, domestic and foreign investments have contributed to its development in recent years (Nguyễn, 2020). Furthermore, the government has supported the industry by adapting policies to enable and foster growth. As Vietnam has a tremendous unbanked population and the size of the number is considered a problem, there are hopes that a more significant share of the population will have access to formal financial services through mobile payments and Internet banking.

Based on empirical studies performed in the Vietnamese market (Morgan, 2020), there is a positive correlation between the adoption of FinTech services and higher income and education. There is also a significant negative relationship between age and FinTech adoption. Furthermore, there is a stark difference between the urban and rural populations, as people living in Hanoi and Ho Chi Minh City (the two largest cities in the country) are more likely to be aware of and adopt FinTech services.

The Cambodian economy relies heavily on the textile industry, agriculture, and tourism; the country's financial system is still developing, and primary actors include the central bank and other commercial banks (Shi et al., 2023). Despite this state, Cambodia has seen a recent shift in their financial landscape, as financial inclusion and banking penetration have seen positive growth. Some main actors that have contributed are ACLEDA Bank, a digital bank offering services such as mobile banking and the National Bank of Cambodia, which launched a blockchain-based peer-to-peer payment and money transfer platform called the Bakong project.

In Laos, the digitalisation of the banking sector is at its very early stages; the services currently offered are mobile "top-ups" and utility bill payments performed through an account at a formal financial institute (Morgan, 2019). The only actors looking to invest in tools that digitise financial services are government-owned banks looking to the most primitive of digital banking. Despite this, or maybe because the market is in this state, the

government has created policies to support and facilitate the establishment of FinTech start-ups. The current state of the information and communication technology accessed by the general population may also impact the perceived need for FinTech and digital banking.

Kam Loon Loo (2019) and Chheang & Wong (2014) argue that the top three ASEAN countries with the best markets to grow financial inclusion are Vietnam, Laos, and Cambodia. They have all had steady growth for a long time. These three countries are emerging markets in ASEAN and are likely to need external help to increase equality through financial inclusion. All three countries rely significantly on their agriculture sector and have high rural populations. Generally, rural populations tend to suffer more from financial exclusion (Hon, 2012).

Analysing the impact of technology on these three markets and the financial inclusion, it enables will generate a better understanding of its impact. Investments in the digitalisation of banking and FinTech products can then be put more accurately where they make an impact, and more financial inclusion can be generated in other markets in other regions. For policymakers, FinTech's impact on financial inclusion is a moral responsibility that can empower underprivileged groups (Singh & Sharma, 2023). When businesses collaborate with policymakers, integrating sustainable finance, the industry plays a key role in creating a framework that supports innovation and an accessible market.

2.5. Literature Gap and the Study's Objectives

2.5.1. Identifying the Literature Gap

The literature gap has three dimensions: First, the topics of FinTech, digital banking, and Financial Inclusion are all relatively new. The concept of financial inclusion has only existed since the 2000s (Beck et al., 2008), and FinTech originated in the 1990s (Schueffel, 2017), so the intersection between the two is even younger.

The second dimension is that data from the demand side of digital banking and financial inclusion from Cambodia, Laos, and Vietnam is scarce. Rural populations are specifically underrepresented. The lack of data on this population is often blamed on being hard to access due to geographical distance and language barriers. The current data on this population is gathered by the World Bank (World Bank, 2024); however, the data is collected to be used for policy adaptation and economic research. This leaves out gaps of interest when researching

the market from a business standpoint. As this study gathers quantitative data from a market segment that lacks much digital infrastructure and has language and geographic barriers, it aims to fill the existing knowledge gap.

The third dimension is that the geographic scope that is most commonly investigated Financial Inclusion, digital banking, or the intersection of the two, is either Sub Sharan Africa or India (Kochhar, 2009; Nandru et al., 2016; Myoyella et al., 2020; Pradhan et al., 2021; Kim et al., 2018). The publications that mention Cambodia, Laos, and Vietnam are typically papers that analyse FinTech companies and the digitalisation of finance in all of ASEAN, which brings less nuance to the nascent markets and a rather overarching view of the vast spans of development that is led by Singapore ((Yong-Zheng Huong, 2020; Shi et al., 2023; Kam Loon Loo 2019).

2.5.2. Study Objectives and Scope

This thesis aims to fill the literature gap to gather data from a population that has yet to be represented from a market perspective. Data from this segment has previously been collected with the intent of policies in mind rather than businesses (World Bank, 2024; Morgan et al., 2019). Furthermore, there are currently few articles exploring the intersection of FinTech and Financial Inclusion in ASEAN, and those that do exist cover the vast differences between all the nations included and fail to capture the nuances of the Cambodian, Laotian, and Vietnamese markets (Shi et al. 2023; Kam Loon Loo, 2019).

Hence, this study will cover data gathered from the demand side of the market to answer business-oriented research questions, with a focus on the three early-stage FinTech markets of Cambodia, Laos, and Vietnam.

Furthermore, based on the existing literature, this study aims to answer if the following hypotheses hold true:

Hypothesis 1: A majority regional financial inclusion in the form of bank account access

Hypothesis 2: The majority of the regional population has access to modern technology

Hypothesis 3: Technology access has a significant relationship with the usage of various formal financial services

Hypothesis 4: Technology is one of the main drivers of opening bank accounts from the consumer's perspective

3. Methodology

3.1. Introduction

The identified gap is an in-depth study of the demand side of formal financial inclusion in Cambodia, Laos, and Vietnam. Kam Loon Loo (2019) and Chheang & Wong (2014) state that Vietnam, Laos, and Cambodia are the top three ASEAN countries with the best markets to grow financial inclusion. Furthermore, the authors state that all three countries rely significantly on their agriculture sector and have high rural populations (Chheang & Wong, 2014). Rural populations tend to be financially excluded to a greater extent than their urban counterparts (Hon, 2012). There is a current gap in the literature as data from specifically the rural population in this region is difficult to extract due to language and infrastructure barriers (Ismail & Ariffin, 2021). The existing literature tends to focus on the success stories of fast economic growth in countries with large populations, which leaves the three countries unexplored (Allen, 2016; Kam Koon Loo, 2019; and Imam, 2022).

This study aims to find the relationship between digitalisation and the formal financial banking sector becoming more accessible, generating financial inclusion in Cambodia, Laos, and Vietnam. Therefore, the research builds on identifying the barriers and drivers to access formal banking services among the populations of these countries. These findings will help fill the current literature gap and give a more nuanced understanding of the current landscape of the market in the region of interest.

The beneficiaries are mainly intended to be the population currently financially excluded due to the traditional barriers to formal banking. Potential investors, FinTech firms considering entering or breaking through to this population, and policymakers will also benefit from filling this gap in the literature.

3.2. Data Collection Strategy

For this quantitative study, data was gathered by surveying a sample of people in Cambodia, Laos, and Vietnam to understand their current banking habits, the barriers they are facing, and the infrastructure in place. The data was collected in November 2024 and carried out by approaching local people willing to participate in a face-to-face survey. This approach was chosen as human interaction fosters higher response rates and allows the interviewer to clarify questions and thereby reduce confusion (Neuman, 2012). This method has the

challenges of demanding higher costs and more time. Neuman also mentions the increased risk of interviewer bias.

One of the hurdles in conducting the survey was the language barriers, specifically in low-income and rural areas. Hence, a translator was hired in each country to support reaching the non-English speakers. Kirkpatrick and Teijlingen (2009) discussed the importance of certain elements to be considered when interviewing a population that does not speak the same language as the researcher. First, it is important to factor in that the exact words do not exist in different languages, and even if they do, they may carry different meanings. Hence, it is important to focus on the words' meaning rather than the words themselves. The surveys were carried out verbally and face-to-face to understand when the participant was unsure about any concepts mentioned, and descriptions and examples were offered when needed. While being mindful not to make the participant lose face when there was something they did not understand (Nhung, 2014). This is part of the next element brought up by Kirkpatrick and Teijlingen: the importance of the researcher understanding key aspects of the participants' culture. One aspect of the local culture is the significance of school and education; by introducing the survey as part of a school project, the participants could place the context and value of it. Another cultural aspect is that these countries score high in collectivism in Hofstede's cultural dimensions (Hofstede, 2011); people from cultures like this tend to see themselves as part of a group or collective. To accommodate this, to close the survey, a short description of how their answers were part of a bigger, more significant study and how their answers will help create an understanding of the current landscape was given. The final finding of Kirkpatrick and Teijlingen was that the researcher and the translator need to have a close relationship and thorough understanding of each other's interpretation of the questions and answers, as well as their purpose and value. Therefore, the researcher discussed the questions, variables used, what the study is about, why each variable is relevant, and the research as a whole with each translator.

The sample represents the population in terms of the proportion of people that live in urban versus rural areas. The aim is to have 50 individuals from each country participate, and a total of 150 participants. With the face-to-face survey, the sample had to be physically accessed, generating the opportunity of controlling the number of participants and ensuring both urban and rural populations were reached. Rural, low-income, and low-education individuals are less likely to participate in a non-face-to-face survey or interview (Neuman, 2012) and since that is a segment important to this study, this method was chosen.

The sample was not entirely random as the participants, due to geographic and language barriers, were hard to reach; there was a convenience sampling, and therefore, it is not representative of the actual population in factors like gender, age, and income level. Etikan, I., Musa, S.A., & Alkassim, R.S. (2016) state that convenience sampling has multiple limitations, one of which is that subjectivity may occur when choosing the sample. However, it is useful when randomisation is impossible for reasons like limitation of resources like time and workforce, which is the case for this study.

Defining urban and rural environments in Asia is quite complex (Hugo, 2019) as a massive shift in population, infrastructure, and socio-economic conditions over the past decades. Furthermore, there is a great variety in each Asian country, and what can be considered an urban environment in one country may not qualify in another. However, we know that the living conditions in urban and rural environments are very different. To ensure that an urban population is represented in each of the three countries, the participants selected to represent an urban population were living and working in the capital city of each country.

The participants representing the rural environment are individuals who live and work in a randomly selected rural area in the country, either in a village or on a farm. In Cambodia, the municipality of Battambang was randomly selected; in Laos, the Luang Prabang province; and in Vietnam, the Quang Nam province.

As the study is inductive, the goal is to develop a theory from the participants' answers. Quantitative studies taking an inductive approach can be beneficial (Faems, 2020). Other approaches, like stratified sampling, are not feasible due to resource limitations and limited access to the population.

Furthermore, each participant was told before starting the survey what the purpose of the survey was, what their data is used for, and that they are anonymous. If they wanted to quit at any point or not answer any of the questions, they were allowed to. Participants were also given the opportunity to go through the questions either by reading or listening before they decided whether they wanted to participate. Finally, the survey took place in person and with a translator present if needed to minimise communication misunderstandings and break through the language barrier. The questions in the survey were mainly asking for facts like if they have a bank account, if they have access to the internet, if they have a smartphone, how old they are, etc. This is to combat the potential skewness caused by using a translator and

asking questions verbally. Questions about preferences and perceptions are avoided as the answers can vary depending on the context and how they are asked (Hufnagel,1994).

3.3. Survey Design & Data Quality

3.3.1. Previous Literature

Below are the different variables commonly used in papers within the intersection of financial inclusion and digitalisation. The literature (Allen, 2016; Kam Koon Loo, 2019; Imam, 2022; Falcettoni, 2024; Barajas) that possess the most in-depth analysis of the variables relevant to analysing the relationship between financial inclusion and technology; the variables that these authors include can be put into three categories: Personal and Demographic Factors, Technology Access, and Use of Financial Services.

Personal and Demographic Factors

Variables include gender, whether the person lives in rural or urban areas, what country they are from, their last completed education, age, and whether they are employed, unemployed, or a house spouse.

Technology Access

If the person uses the internet, and if they access it through Wi-Fi or mobile data.

Use of Financial Services

One consistent question is whether a person owns a bank account or microloan account or is fully financially excluded from financial services; variables about the usage itself, like loans, savings, usage of ATMs or ATM access; whether the person receives salary in cash or their bank account; the number of bank branches per 1000 people and how accessible the local people find the bank branches. For those without bank accounts, barriers like the cost of opening and maintaining them or why they do not have one exist.

3.3.2. Survey Design

The survey design was greatly inspired by articles previously written about technology and financial inclusion (Allen, 2016; Kam Koon Loo, 2019; Imam, 2022; Falcettoni, 2024; Barajas). The questions used in these articles are either nominal or binary yes or no questions,

as these authors use a quantitative approach. Open-ended questions are difficult to analyse using the tools that interpret quantitative data (O'Cathain & Thomas, 2004).

The only open-ended question used in the survey for this study was to ask the driver of opening a bank account or identify the main barrier that keeps the individual from opening an account. The choice to include one open ended question was to capture data that the participants believe is important, but the researcher may have been unaware of, and was therefore missing in the closed questions (O'Cathain & Thomas, 2004).

The number of questions asked was considered when choosing the variables to include to avoid survey fatigue; only a limited number of variables were retrieved from the participants. The length of a survey has a positive relationship with drop-out rates and a negative relationship with the accuracy of responses (Jeong, Aggarwal, Robinson, Kumar, Spearot, and Park, 2022). Although more questions could be relevant to understand better the role of technology and banking in the average person's life, the priority is to receive complete and accurate answers from as many participants as possible.

As the study was carried out in Asian countries, the questions were asked in a way to avoid the participant risking "losing face." Losing face is a cultural phenomenon in Asian cultures where someone is put in an embarrassing situation (Nhung, 2014). Questions like income level, what class the person belongs to, the amount of savings, and the reason for loaning money were therefore excluded. The question about income is formatted only to ask *how* the participant receives their income.

The last question asked was about the driver of what made the person open a bank account or the barrier of what keeps them from opening one. Finalising the survey this way was to further investigate the reason why a person does not have a bank account, which has previously been studied (Allen, 2016; Falcettoni, 2024; Imam, 2022; and Barajas, 2021), and to further the understanding of why a person has a bank account. This question is open-ended instead of giving options, to let the individuals speak freely to prevent previous literature or assumptions from shutting out unexpected data. Making this qualitative-oriented question on conducting qualitative grounded theory research (Gioia, Corley, and Hamilton, 2012).

3.3.3. Data Quality

A pilot survey was performed on a person from the region to see if the design was appropriate. Performing a pilot survey, specifically for novice researchers, helps prepare and inform them before starting the official data collection (Malmqvist, Hellberg, Möllås, Rose, & Shevlin, 2019). The pilot survey was done to see whether the language used was appropriate, that the intended questions were understood, and to consider any cultural misunderstanding that could cause a bias. The pilot survey also revised the order of the questions. No adjustments were needed. However, suppose the survey had been tested by a person from each country from both urban and rural areas. In that case, more adjustments may have been discovered that would have captured a more accurate depiction of reality.

3.4. Variables & Data Analysis

3.4.1. Variables

The 12 variables listed below were selected for the data analysis. Based on the available literature, these factors can help us understand financial inclusion through digitalisation. These variables include specifications about the person, current market conditions, the person's financial habits, and the potential accessibility they have to bank services.

Previous literature has shown a clear negative relationship between age and the adoption of new technology. Rural populations also have less access to technology infrastructure and tools (Allen, 2016; Kam Koon Loo, 2019; Imam, 2022).

3.4.2. Personal and Demographic Factors

Rural – A dummy variable to show if the person lives in a rural environment or not (urban environment).

Age – A numeric variable representing the age of the respondent.

Education – A numeric variable for years of education, from primary school to highest completed grade.

Country – Categorical variable showing the country in which the respondent lives.

3.4.3. Technology Access

Phone – A dummy variable if the person owns a smartphone or not.

Internet – A dummy variable if the person regularly uses the Internet or not.

3.4.4. Use of Financial Services

Lending – A dummy variable for whether the respondent uses the loan services of a formal financial institute or not. If the respondent states that they loan money from friends or family, this value is zero.

Savings – A dummy variable for whether the respondent uses the savings services of a formal financial institute or not. If the respondent states that they save money in cash, this value is zero.

ATM – A dummy variable about perceived usage of ATMs. If the respondent says that they regularly use ATMs, the value takes one. Only respondents with bank accounts answer this question.

Bank_office – A dummy variable about the perceived usage of the local bank offices. If the respondent says that they regularly go to a local bank office, the value takes one. Only respondents with bank accounts answer this question.

Account – Dummy variable if the respondent has access to a bank account or not.

Income—This is a dummy variable showing whether the respondent receives their income through a formal financial institution (bank transfer or by scanning a QR code) or not (through cash).

Reason_Account – Open-ended qualitative-oriented question disclosing what factors made the person open a bank account or what factors are keeping them from opening one.

3.4.5. Method of Analysis

The variables above will be analysed through R by finding patterns among technology use, account ownership, and use of financial services like loans and savings. A logistic approach will then be applied to test the hypothesis of the interaction between technology and

traditional banking barriers further. The logistic approach is the most suitable for this study as it can handle binary outcomes accurately (Opic, 2020; Wilson, 2015), like account ownership and internet access. Robustness tests like goodness of fit, VIF-test, Cook's distance, and Sensitivity analysis will be performed to test the validity of the models.

The robustness tests were chosen because goodness of fit measures how well the variables explain the model. The VIF test shows whether there is multicollinearity in the model, and Cook's distance analyses the randomness of the sample. The sensitivity analysis assesses the stability and reability of the model.

To understand the usage of some of the more common financial services, three dependent variables—*loans, savings*, and *income*—are used, and the independent variables used are *Rural, Education, Phone, Internet, Age,* and Age^2.

3.5. Process

3.5.1. Overview of Research Workflow

Below, explains step-by-step the design, execution, analysis, and interpretation of the data and the data collection.

1. Research and choose relevant variables: Find commonly used and relevant variables in the literature. Organise what variables are relevant to this particular research question.
2. Design the survey to minimise bias and maximise correct answers: Create a study with a suitable order, design, and flow to ask the population of interest. Carefully phrase the questions to be neutral and asked in a way that promotes the truths being told.
3. Collect the data: Gather 150 responses from the population of interest, being mindful to reach a diverse group of respondents.
4. Organise data: Put all collected data in an Excel file and prepare it so it is clean and readable by a program like R.
5. Analyse data: Use the R programming language to analyse the data and interpret the results. Analyse how well the data collected aligns with the study's objective.
6. Formulate a theory: Based on the results of the data analysis, formulate a hypothesis and what variables explain (or prove) this theory.

7. Present theory**:** The present theory and what it shows us, as well as what it does not show us, give way to suggested future research. The theory and results will also be compared with findings from previous literature on the topic to define whether they align with what has been discovered previously.
8. Potential applications of results**:** The results and theory generated by this study may potentially grant recommendations for policymakers, financial institutions, FinTechs active in the region, and foreign and domestic investors.

3.5.2. Timeline and Milestones

The survey was created and edited from the 14th to the 28th of October, 2024.

On the 29th of October 2024, the survey was piloted.

A survey was conducted in Cambodia from November 1st to November 10th, 2024.

A survey was performed in Laos from November 11th to November 21st, 2024.

The survey was performed in Vietnam from November 21st to December 1st, 2024.

3.5.3. Challenges and Adjustments

A challenge in Laos was the poor infrastructure and expensive transportation costs, which reduced the geographic area in which data was gathered. Therefore, fewer farmers and people living remotely were surveyed compared to Cambodia and Vietnam, where the roads and transportation costs were cheaper.

An adjustment was made in gathering the first few data points as one participant explained that they do not get paid through cash or bank transactions but through customers scanning a QR code connected to their bank account. Hence, a QR code was added as an alternative to bank transactions and cash in that variable when asking how the person receives their income. Another adjustment was that participants compared the ease of access to the ATM machines and Bank Office to mobile banking instead of comparing the distance to the closest ATMs/bank office and their need for the services it provides. An adjustment was therefore made in the research to accommodate for the perceived convenience.

4. Results

50 responses were collected from Cambodia during the period November 1st to November 10th, 2024. Phnom Penh and Krong Battambang.

47 responses were collected from Laos during the period November 11th to November 21st, 2024. Vientiane and Luang Prabang.

50 responses were collected from Vietnam during the period November 21st to December 1st, 2024. Hanoi and Quang Nam province. As the data collection was performed in person, there is no missing data.

4.1. Access to Technology & Financial Services

The table below shows an overview of Smartphone ownership, Internet Usage, and Bank Account Access across each country's sample. Noticeably, 96-100% of the sample in each country owns a smartphone and uses the internet regularly. Access to a bank account is less prevalent but still at an 80.9-86% frequency. Signifying that *Hypothesis 1: A majority regional financial inclusion in the form of bank account access* and *Hypothesis 2: The majority of the regional population has access to modern technology* holds true.

Metric	Cambodia	Laos	Vietnam
<chr>	<dbl>	<dbl>	<dbl>
Smartphone ownership	96%	100%	98%
Internet Usage	98%	100%	98%
Bank Account Access	82%	80.9%	86%

Below is a table that showcases the population without a phone, with a cellular phone, or a smartphone and the percentage of each category that has access to a bank account or not. 100% of the population that does not own a phone does not own a bank account either, or

100% of the observations that own a cellular phone (old phone) have a bank account. Furthermore, 84% of the observations that own a smartphone have a bank account.

Phone type	No Bank account	Has Bank Account
<chr>	<dbl>	<dbl>
No Phone	100%	0%
Cellular Phone / Old phone	0%	100%
Smartphone	16%	84%

Potential skewness is due to the high usage of mobile banking, which provides the same services, and therefore, the comparison of how far away the machine or office is compared to the alternative, which is now mobile banking.

4.2. Usage of Digital Payment through Smartphones

Many participants use a digital payment method that utilises QR codes connected to the user's bank account (see appendix). These codes are scanned using smartphones. The appendix includes pictures of QR codes found in rural and urban areas in Cambodia, Laos, and Vietnam. Throughout the surveys, QR codes were mentioned as a driver to open a bank account (see 4.7 Barriers & Drivers of opening a bank account); they were also mentioned as a means to receive income.

4.3. Perceived distance to ATM-Machines & Bank Offices

According to the literature (Allen et al., 2016; Kam Koon Loo, 2019), ATM machines and bank offices are important for fostering financial access and inclusion. Before mobile

banking, ATMs and bank offices were important access points to formal financial services. The sample shows that these services are not very common, indicating an alternative access point to these services. As smartphones and the internet are prevalent in the region (as visible above), and the individuals mention using services that mobile banking provides (scanning QR-codes to make payments, peer-to-peer payments, etc.), a guess can be made that the traditional access points of ATM-machines and bank offices have been replaced by mobile banking. However, no formal data was collected regarding what the population uses instead of ATMs and bank offices and the benefits and detriments of each access point.

	Regularly use ATM-machines	Regularly goes to the Bank Office.
<chr>	<dbl>	<dbl>
Yes	59.83%	51.63%
No	40.16%	48.36%

4.4. Econometrics Model & Robustness Tests

4.4.1. Logistic Model

The model aims to test *Hypothesis 3: Technology access has a significant relationship with the usage of various formal financial services*. This is done by using the three dummy variables for using financial services (Loans, Savings, and Income) as dependent variables in the logistics model and testing if any of the following independent variables explains them. The logit model was chosen as logit or probit are more suitable for binary datasets in comparison to an OLS model (Opic, 2020); the nature of this study is binary as the questions researched are mainly yes/no, 0/1. Furthermore, the logit model can often be preferred to the probit model as it has a simpler interpretation (Peng, Lee, & Ingersoll, 2002).

The logistics model below tests if the independent variables of the old phone, smartphone, internet, rural, age, age^2, and education significantly impact whether the observation uses a formal financial service for their loans, savings, or income. The three logistic models are used to investigate the usage of formal financial services using three different dependent variables. The first model showcases whether a person uses the bank's service to save money, the

second model showcases whether a person uses the bank's service to loan money (labelled "loans"), and the third model showcases whether the person uses the bank's services to receive salary (labelled "income").

The Descriptive Statistics below show general information about the data, such as mean, standard deviation, minimum value, median, and maximum value of each variable included in the logit model.

Descriptive Statistics

==========

Statistic N Mean St. Dev. Min Median Max

ID 147 75.31 43.84 1 74 150

Female 147 0.52 0.50 0 1 1

Rural 147 0.61 0.49 0 1 1

Age 147 31.14 10.74 15 29 62

Age^2 147 1,083.98 776.17 225 841 3,844

Education 147 10.94 4.47 0 12 23

Loans 147 0.13 0.34 0 0 1

Savings 147 0.48 0.50 0 0 1

Income 147 0.63 0.49 0 1 1

Phone 147 0.98 0.14 0 1 1

Internet 147 0.99 0.12 0 1 1

According to (Park, Lipka, and Eck (2021), the logistics regression model is optimal for analysing binary data. Generally, a one is interpreted as "success" and a zero as "failure".

Furthermore, when using Logistic Models, the dataset must be big enough, as there is a risk of "overfitting" with a smaller dataset (Zaidi, Abdelhamid, Al Luhayb, Asamh Saleh M., 2023). The model is also sensitive to multicollinearity between predictors and requires mutual observation independence.

The Descriptive Statistics below shows general information about the data such as mean, standard deviation, minimum value, median, and maximum value.

==========

	Loans	Savings	Income
(Intercept)	-36.29	-32.23	-33.42
	(3622.80)	(2154.93)	(2164.66)
old phone	33.56	-1.2	-1.41
	(4713.14)	(2842.48)	(2846.17)
Smartphone	14.75	15.39	15.84
	(2561.71)	(1523.76)	(1530.65)
Internet	13.91	14.27	13.92
	(2561.71)	(1523.76)	(1530.65)
Rural	0.48	-0.17	-0.82
	(0.66)	(0.39)	(0.45)
Age	0.31	0.08	0.19
	(0.18)	(0.10)	(0.11)
Age^2	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)
Education	-0.03	0.13 **	0.16 ***
	(0.06)	(0.04)	(0.05)

AIC	116.74	200.46	175.88
BIC	140.67	224.39	199.81
Log Likelihood	-50.37	-92.23	-79.94
Deviance	100.74	184.46	159.88
Num. obs.	147	147	147

==========

*** p < 0.001; ** p < 0.01; * p < 0.05

To examine the relationship between technology and financial inclusion, three logistic regression models were estimated, each corresponding to a distinct dependent variable: (1) whether an individual uses a bank's services for savings, (2) whether an individual takes out loans from a bank, and (3) whether an individual receives their income through a formal financial institution. The models assess the impact of key independent variables, including access to technology (old phone, smartphone, and internet), rural residency, age (including a squared term for non-linearity), and education.

Loans Model

The results for the loans model indicate that none of the independent variables are statistically significant. While the coefficients for old phones (33.56) and smartphones (14.75) are notably large, their standard errors are also exceptionally high, suggesting issues related to numerical instability. Similarly, the internet variable (13.91) exhibits a large coefficient but lacks statistical significance. The control variables, including rural residency (0.48), age (0.31), and education (-0.03), fail to reach conventional significance thresholds.

These findings suggest potential quasi-separation issues within the dataset, where certain independent variables may perfectly predict outcomes, leading to extreme coefficient values and inflated standard errors. This issue is further reflected in the relatively poor model fit, with an AIC of 116.74 and log-likelihood of -50.37, indicating limited explanatory power. The lack of significant results suggests that the factors considered in this study, particularly access to technology, do not meaningfully predict whether individuals take out loans from formal financial institutions.

Savings Model

The savings model provides more stable results, with education (0.13, $p < 0.01$) emerging as a significant predictor of an individual's likelihood of using a bank's services for savings. This suggests that individuals with higher levels of education are more inclined to save money through formal financial institutions. The coefficients for smartphone (15.39) and internet (14.27) remain prominent, but their lack of statistical significance prevents definitive conclusions about their role in financial inclusion. Rural residency (-0.17) and age (0.08) also exhibit small and statistically insignificant effects.

The relatively improved model fit (AIC = 200.46, Log-Likelihood = -92.23) suggests that the savings model provides a more reliable explanation of financial inclusion than the loans model. However, the insignificance of technology-related variables indicates that access to digital devices and the internet may not be a primary driver of formal savings behaviour.

Income Model

Like the savings model, the income model also identifies education (0.16, $p < 0.001$) as a significant predictor of financial service usage. This suggests that higher education levels are associated with an increased likelihood of receiving salary payments through formal financial institutions. Conversely, rural residency (-0.82), age (0.19), and technology-related variables (smartphone = 15.84, internet = 13.92) do not show statistically significant effects.

The income model exhibits relatively strong model fit metrics (AIC = 175.88, Log-Likelihood = -79.94), reinforcing that education plays a central role in determining formal financial service adoption. However, as in the savings model, the results do not provide evidence that access to technology significantly influences financial inclusion in this context.

General

The logistic regression analysis findings underscore education's critical role in promoting financial inclusion, particularly regarding savings and income receipt through formal financial institutions. Across both the savings and income models, higher education levels are consistently associated with greater usage of banking services. This aligns with previous research suggesting that financial literacy and familiarity with banking systems are key determinants of financial service adoption.

However, the results do not provide evidence that technology access alone is a sufficient driver of financial inclusion. Despite the presence of mobile phones and internet access,

individuals in Cambodia, Laos, and Vietnam do not appear to be significantly more likely to use banks for savings, loans, or salary payments. This suggests that while digital infrastructure is an important enabler, other factors—such as trust in financial institutions, financial literacy, and regulatory environments—may play a more substantial role in determining whether individuals engage with formal financial services.

Additionally, the lack of significance for rural residency challenges the assumption that geographic barriers alone are the primary obstacles to financial inclusion. While rural populations may face logistical challenges in accessing physical bank branches, their likelihood of utilising banking services does not appear significantly different from that of urban residents in this study.

4.4.2. Goodness of Fit

The Goodness of Fit test originates from Karl Pearson's analysis of whether observed data fits the theoretical distribution (Pearson, 1900). For logistics models, McFadden created the 'pseudo R^2', or 'McFadden's R^2' (McFadden, 1987). Since it is based on likelihoods, it accounts for the probability structure of discrete choice models but does not have the same interpretation as variance-explained in OLS regression.

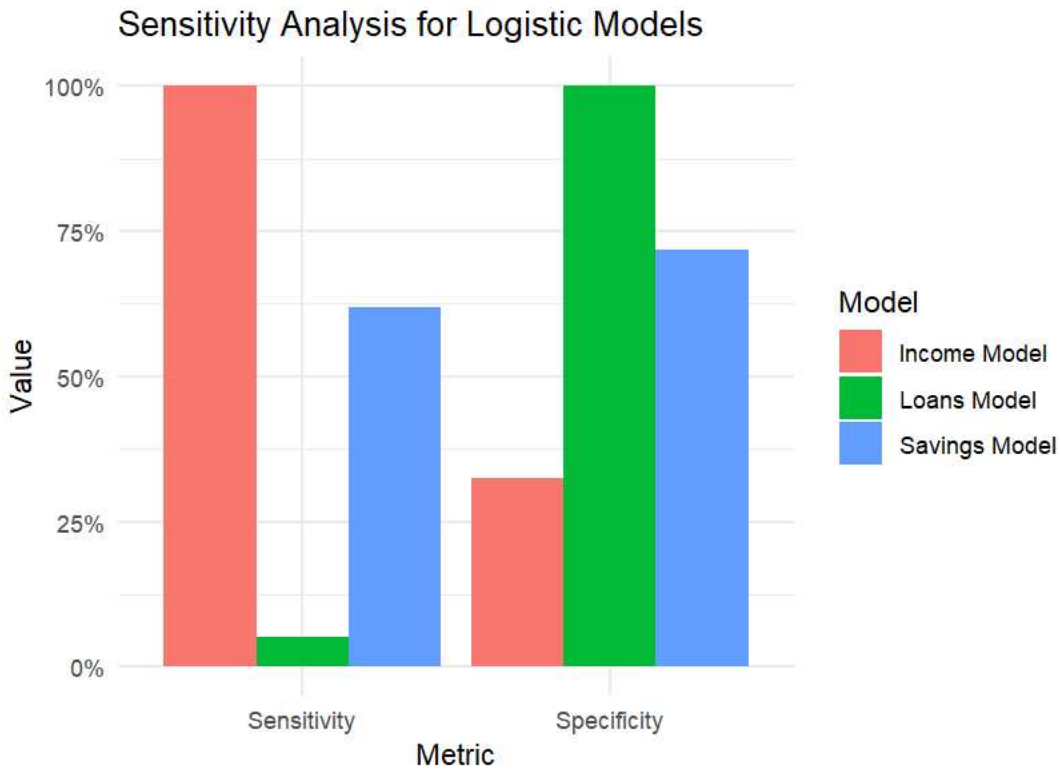
Model	**McFadden's R^2**	**Fit Interpretation**
Loans	0.1099	Moderate fit
Savings	0.0941	Weak to moderate fit
Income	0.1774	Acceptable fit

The goodness of fit test using McFadden's R^2 revealed that the models have varying levels of explanatory power. The loans model ($R^2 = 0.1099$) suggests a moderate fit, meaning the independent variables explain some variation in bank loan usage but leave much unexplained. The savings model ($R^2 = 0.0941$) shows a weak to moderate fit, implying that additional factors, such as financial literacy or trust in banks, may be influential. The income model ($R^2 = 0.1774$) demonstrates the best fit, suggesting that education, technology use, and demographic factors predict receiving income through a bank more effectively. However, the relatively low R^2 values across all models indicate that financial inclusion is shaped by factors beyond those included in the analysis. This highlights the need for a holistic approach

to financial inclusion, integrating technology access with financial education and institutional trust-building.

4.4.3. Sensitivity Analysis

Sensitivity analysis evaluates how variations in model inputs influence outputs, identifying critical factors affecting model behaviour. Saltelli, Tarantola, and Chan (1999) introduced a model-independent method for global sensitivity analysis using the Fourier Amplitude Sensitivity Test (FAST), enabling the assessment of each input factor's total contribution to output variance. Hussain (2008) applied global sensitivity analysis to logistic regression models, proposing a method to identify the most influential risk factors, thereby enhancing model reliability and interpretability.

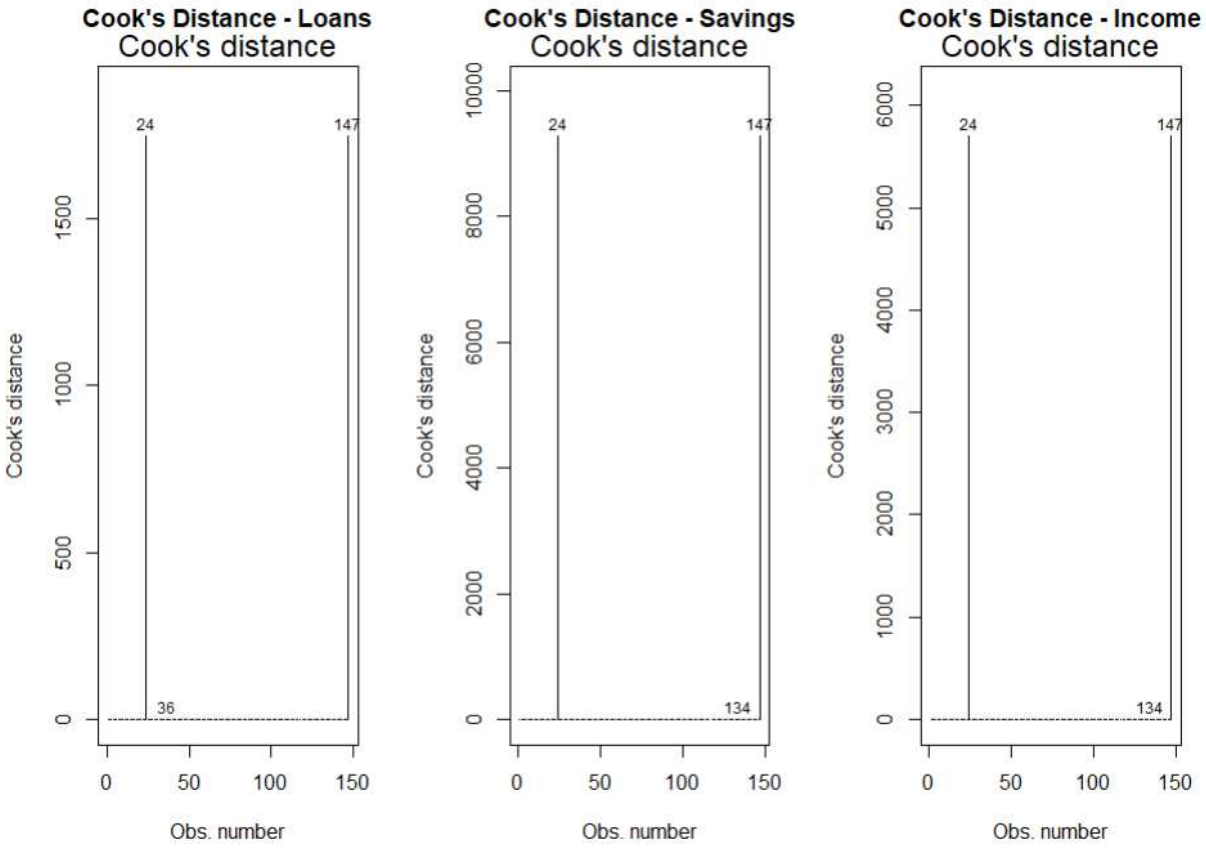


The sensitivity analysis showed significant differences in model performance across financial services. The income model has 100% sensitivity but only ~35% specificity, meaning it correctly identifies all individuals using banks for income but misclassifies many non-users. The loans model, in contrast, has ~5% sensitivity and 100% specificity, indicating it rarely detects actual loan users but correctly classifies non-users. The savings model performs more balanced, with ~62% sensitivity and ~72% specificity, suggesting it moderately captures both

users and non-users. These results indicate that while some models effectively predict financial service usage, others may suffer from misclassification, particularly in distinguishing actual loan users. This highlights the need to refine the models, possibly by incorporating additional predictors or adjusting classification thresholds.

4.4.4. Random Sample

Cook's distance is used to test the randomness of the sample. The tests measure the influence of the sample on the regression model (Wojnowicz, M.T., Cruz, B., Zhao, X., Wallace, B., Wolff, M., Luan, J., & Crable, C. 2016). An observation is considered influential if removing it significantly changes the regression coefficient, and thereby, one or a few observations do not have a proportionate impact on the model (Cook, 1977).

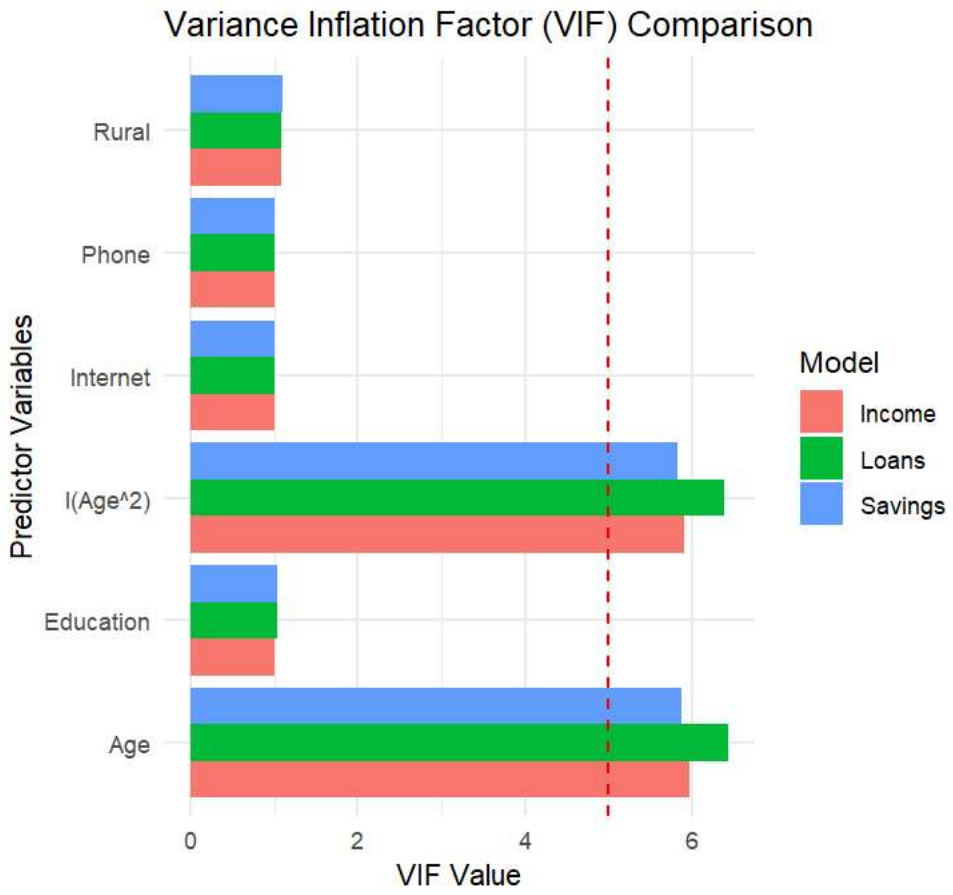


Cook's distance indicates that observations 24 and 147 are influential points across all three models. In the savings and income models, these observations have an extremely high Cook's distance of 134, indicating that they strongly influence the regression results. In the loans

model, Cook's distance is lower at 36, but it is still suggested that these observations significantly impact the model estimates. Such high values suggest potential outliers or highly leveraged points disproportionately affecting the estimated coefficients. This calls for a closer examination of these observations to determine whether they represent data entry errors, unusual but valid cases, or require model adjustments, such as robust regression techniques or sensitivity testing with and without these data points.

4.4.5. No Perfect Collinearity

Perfect collinearity indicates that two or more predictor variables are too highly correlated, which can result in unstable estimates and inaccurate variance (Midi et al., 2010). The Variance Inflation Factor (VIF) test measures the inflation of regression coefficients due to multicollinearity (Kyriazos & Poga, 2023) and is, therefore, a suitable robustness test for reviewing any perfect collinearity.



The VIF test suggests that multicollinearity is primarily an issue for age and age^2, as they exceed the threshold of VIF > 5. This is expected since age, and its squared term are

mathematically related, leading to high collinearity. However, the remaining variables have low VIF values, indicating that multicollinearity is not a significant concern for them. While the presence of multicollinearity does not bias the coefficients, it can increase their standard errors, making statistical significance harder to detect. Potential solutions include centring the age variable before squaring it or removing one of the correlated terms if the quadratic effect is not crucial for the analysis.

4.5 Barriers & Drivers of opening bank account

Drivers of and barriers to financial inclusion and account ownership have been discussed in previous studies (Allen et al., 2016; Shailesh Rastogi, 2018), and the observations have identified overarching concepts. The drivers show what motivates individuals to open bank accounts, and the barriers show what stops them.

To understand the perceived barriers and drivers, each participant was asked the open-ended question of why they have or do not have a bank account. Below, the barriers or drivers are listed as most to least frequently mentioned. Among the population with access to an account at a formal financial institute, more than one driver was often listed. The number of times each barrier or driver was mentioned is written within the parenthesis.

4.5.1. Barriers

- Lack of funds (6)
- No perceived need (6)
- Lack of documents (4)
- Family member has one already (3)
- Does not know how to open a bank account (2)
- To avoid buying things online (1)
- Want a simple life (1)
- Phone is too old (1)
- Lack of trust in the bank (1)

Only 19% of the sample had no bank account, so data from only 19 people were gathered on why they did not have one. Most of the reasons stated can be found in previous literature (Allen, 2016; Imam, 2022; Falcettoni, 2024; Barajas), like missing documents, lack of funds,

lack of knowledge of how to open one, family members already having one, and lack of trust in the bank.

However, previous research (Allen, 2016; Imam, 2022; Falcettoni, 2024; Barajas) did not provide reasons for some mentioned factors, such as avoiding online purchases, wishing to live a simpler life, no perceived need to open one, and the person's phone being too old, other than explaining that some people do not wish to be financially included; they are the out-of-banking population.

4.5.2. Drivers

- To make payments easier or more convenient (28)
- To transfer money (24)
- To receive salary (17)
- To save money (14)
- To access QR-code payments (14)
- Other people use it, so I need one too (7)
- To avoid carrying cash (7)
- To store money (6)
- Security (4)
- To buy things online (3)
- To loan money (2)
- To access and use mobile banking (2)
- Covid (1)
- To Start own business (1)
- To pay expenses (1)
- It is cheap (1)
- A bank initiative for financial inclusion (1)

When asked why the individuals opened their bank accounts, the sample revealed multiple drivers. The most frequently mentioned factors were making payments easier or more convenient, transferring money, and receiving salary. Other less frequently mentioned factors were having access to QR-code transactions and buying things online. While expressed as different factors, these drivers are all the results of digital payments. This addresses

Hypothesis 4: Technology is one of the main drivers of opening bank accounts from the consumer's perspective.

Some individuals also claimed they started using it because people around them already used it. This driver indicates a social pressure to adapt to having bank accounts.

Another factor mentioned was the preference for storing money in the account instead of in cash and the preference not to carry around cash. This suggests that trust in the bank is higher than the alternative of living fully cash based.

5. Discussion

5.1. Interpretation of Findings

According to the results above, Cambodia, Laos, and Vietnam have leapt ahead regarding their payment technology. Scanning QR codes instead of paying with cash or card is common practice, as is mobile banking. The drivers of accessing financial services are the ease and convenience they bring through technology like transferring money, digital payments, and cross-border purchases.

5.2. Comparison with Literature

The predictions of Shi et al. (2023) and Kam Loon Loo (2019) that ASEAN has high growth potential within financial technology seem to correspond with the results from the survey as mentioning of peer-to-peer transfers and payments with QR codes were commonly cited as reasons to open bank accounts (see chapter 4.5.2. Drivers). However, the status Kam Loon Loo put on the countries as nascent in their FinTech development may have changed since 2019.

Morgan et al. (2019) describe the digitalisation of the banking sector in Laos is in the very early stages, and the digital banking available is in a very primitive stage. The data collected suggests that the development of digital banks has advanced during the 5 years between the publishing of Morgan's article and the data collection in 2024, as payment through QR-codes was frequent in the entire region, both according to the survey and the presence of QR-codes as a payment option in restaurants both in the urban Vientiene and the rural Luang Prabang (figure 2 and 3 in the appendix).

According to Hon (2012), rural populations tend to suffer more from financial exclusion; however, according to the collected data, there was no noticeable difference between the urban and rural populations regarding access to bank accounts. However, there was a significant impact on the level of education and usage of formal financial services.

5.3. Implications for practice

With these findings, we can see that smartphone penetration and regular internet use are absolute. Most of the sample have a bank account and access to formal financial services. Out of the financially excluded, we could guess that some are out-of-banking and do not want a bank account. There is also a high usage of digital payment, especially in rural areas.

This indicates a digitally mature demand market, not only in Vietnam but in Cambodia and Laos as well. This high penetration of financial inclusion and usage of digital banking implies that FinTech and digital banking are already present in the three markets, and there is a demand from the population to introduce more FinTech to these markets that ease the convenience for the population and enable them to access and use various financial services.

5.4. Limitations

5.4.1. Validity of Data

The size of the sample, with 47-50 data points per country, is small and can easily show a skewed result. Furthermore, the sample not being truly randomly selected, but rather chosen out of convenience. There may be a hidden factor regarding who is more willing to participate in this type of survey.

Another limitation is that all data was collected in one urban and one rural area per country. For a more nuanced and accurate representation, data would be collected in more varied environments and multiple urban and rural environments.

The usage of translators when conducting the survey with individuals who do not speak or feel comfortable using English may also skew the results. This as the translator is given room to interpret the questions as well as the answers. Going over the questions with the translator before conducting it to reduce the risk of misinterpretation between the researcher and the translator. The alternative of not using a translator and thereby excluding the population that does not speak English would have also skewed the results.

Furthermore, cultural differences that were not accounted for and misunderstandings caused by cultural distance can have skewed the result. An example of how culture can skew results is that having savings may be considered as a desired trait in some cultures, while needing to

loan money may be considered a negative trait. This can cause individuals to answer the survey in a “desired” way and to avoid losing face.

Finally, Cambodia, Laos, and Vietnam have subpopulations and minorities that live in communities, and different communities may be over- or under-represented in the data points. Some communities may also have habits or values that generate different aggregated result for this study.

5.4.2. Data Collection

The data was collected during a limited amount of time. With 10 days to perform the survey in each country. This made some sampling approaches, like stratified sampling, unfeasible to conduct.

Furthermore, the financing was limited as all costs came out of the pocket of the researcher and no support or grants were given to perform the survey.

Another limitation of collecting the data was the geographic distance and the limited infrastructure currently present in the three countries.

As the Covid-19 pandemic is still a relatively recent event that greatly impacted habits and usage of technology, and data containing the post-Covid-19 behaviour of the population is limited. Most research papers that inspired the writing of this thesis contained data collected before the pandemic, which gave skewed expectations of to what extent the population of interest used technology in their banking. This also resulted in not investigating some variables relevant to more mature markets, which, given the now collected data, would have been interesting to analyse.

The pandemic may have been a driver for the population to exchange money without touching it. This digitalisation of everyday purchases, in turn, generated a higher demand for vendors to accommodate customers who were not using cash. As more vendors opened bank accounts to offer QR-code scanning as a payment method, it generated a driver for more customers to use it.

5.4.3. Limitations of the Econometrics Model

The econometrics models lack some independent variables that could have identified significant trends. One example is a variable showing income level or socio-economic background. The reason this variable is excluded is to reduce the risk of the participants feeling insulted or at risk of "losing face". Lower-income or wages can have a taboo connotation. Another risk this variable brings is that it is self-reported, nothing is stopping the participant from lying, and there is a greater incentive for them to lie to avoid "losing face".

Another limitation of the models is that none of them score very well in all the robustness tests. This suggests that there are unknown variables that were not used that may explain the dependent variables more thoroughly.

5.5. Future Research

Further research that collects data from multiple points in time to observe the changes in the market over time rather than in a snapshot is suggested. Here, a Difference in Difference model could be used to analyse how different but statistically similar populations develop differently.

Something missing in the data was the lack of distinguishment between those employed by others and those who are self-employed; it would be interesting to do an in-depth study of the difference between the two and their perceived experience of the journey from cash-based to the high demand for QR codes.

Another variable that could be investigated further is mobile banking's use. The data show that it is widely used, and some participants state that they compare the ease of access and convenience of mobile banking with traditional ATM machines and bank offices.

6. Conclusion

This study explores the factors influencing financial inclusion in Cambodia, Laos, and Vietnam, focusing on bank account ownership and the role of technology. The data reveals that a majority of the population has access to formal financial services as well as modern technology like smartphones and the Internet, proving *Hypothesis 1: A majority regional financial inclusion in the form of bank account access* and *Hypothesis 2: The majority of the regional population has access to modern technology* to be accurate.

The logistic regression model reveals that education and age significantly affect the likelihood of a bank account. At the same time, rural residence and access to technology (smartphone ownership and internet use) also play notable roles. Education emerges as a critical driver, likely reflecting its influence on financial literacy and awareness. Meanwhile, age negatively correlates with account ownership, suggesting that younger populations are more likely to adopt formal financial services, potentially due to greater familiarity with technology. However, the model showed no significant relationship between access to technology and usage of formal financial services, this means that we cannot accept *Hypothesis 3: Technology access has a significant relationship with the usage of various formal financial services.*

A key finding is the increasing role of digital payment methods, particularly QR-code-based transactions, in driving financial inclusion. Many participants use QR-code payments, often linked to smartphones and bank accounts, to receive income or make transactions. This highlights the transformative potential of technology in fostering access to financial services, even in rural areas. Specifically, 26 participants mentioned receiving income through QR payments, and 11 cited QR capabilities as a reason for opening a bank account. This data shows a positive trend for *Hypothesis 4: Technology is one of the main drivers of opening bank accounts from the consumer's perspective.*

Barriers to account ownership include a lack of documentation, limited trust in banks, perceived lack of necessity, and technological limitations, such as outdated phones. Conversely, drivers include the need for convenient payments, money transfers, and access to savings and salary deposits. The findings underscore the dual role of technology as both an enabler and a barrier, depending on individual circumstances.

In conclusion, the results highlight the potential of technology, particularly mobile and digital payment systems, to overcome traditional barriers to financial inclusion. However, targeted efforts addressing trust, education, and access to modern technology are essential to maximise the benefits for underserved populations.

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8. Appendix

The figures in the appendix are photos taken by the researcher while collecting data and performing in-person surveys. The photos depict QR codes used for payments in restaurants, gas stations, hair salons, and roadside food stalls.

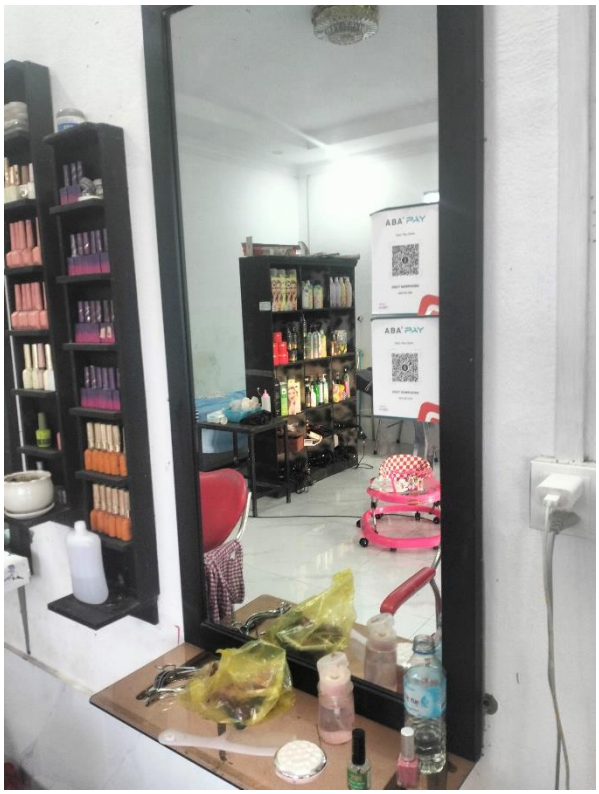

Figure 1: Picture of QR-codes from hair saloon on the side of the road outside of Battambang, Cambodia

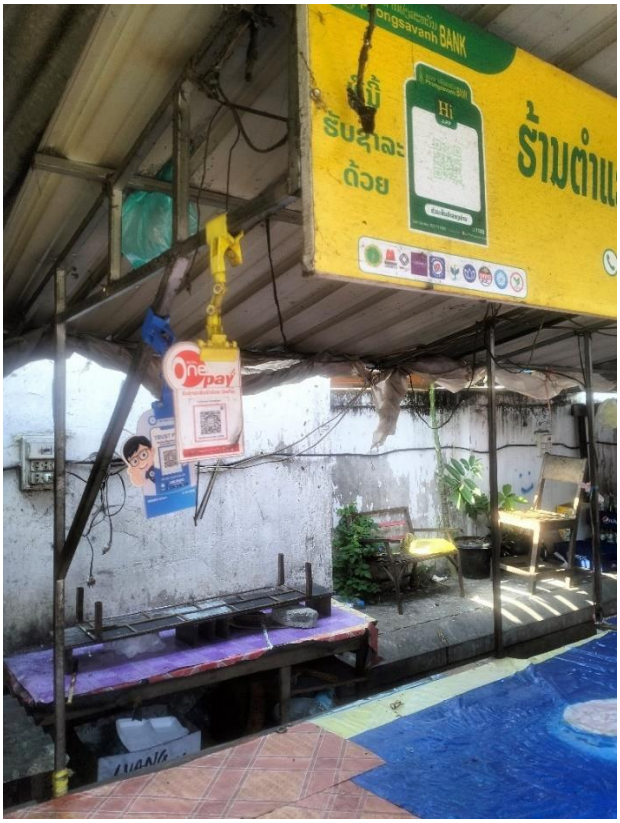

Figure 2: Picture of QR-codes from Food Stall in Luang Prabang, Laos

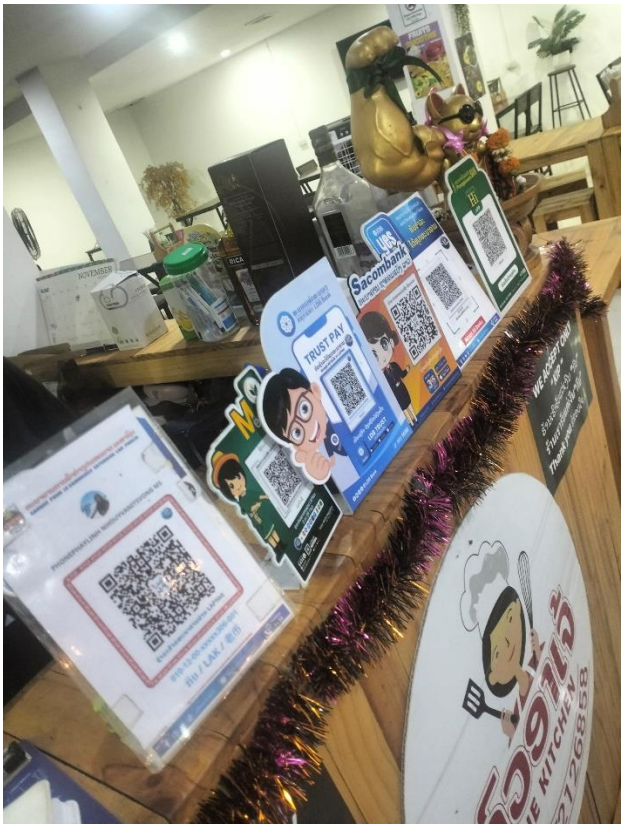

Figure 3:Picture of QR-codes from Restaurant in Vientiane, Laos

Figure 4: Picture of QR-code from gas station outside of Hoi An, Vietnam