Hungarian University of Agriculture and Life Sciences

Doctoral School of Economic and Regional Sciences

Understanding Digital Immigrants' Sustained Use of Mobile Payment in Post COVID- 19 Era

DOI: 10.54598/005160

Ph.D. Thesis

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GÖDÖLLŐ, HUNGARY
2024

Hungarian University of Agriculture and Life Sciences

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List of Abbreviations

M-Payment	Mobile Payment
E-Payment	Electronic Payment
M-Wallet	Mobile Wallet
E-Wallets	Electronic Wallet
FinTech	Financial Technology
TAM	Technology Acceptance Model
E-TAM	Extended Technology Acceptance Model
UTAUT	Unified Theory of Acceptance and Use of Technology
TRA	Theory of Reasonable Action
TPB	Theory of Planned Behaviour
ECM	Expectation CF Model
TCT	Technology Continuous Theory
HBM	Health Belief Model
DI	Digital Immigrants
DN	Digital Natives
SPSS	Statistical Package for the Social Sciences
AI	Artificial Intelligence
Millennials	Anyone born between 1981 and 1996
Generation Z	Anyone born from 1997 onward
Generation X	Anyone born between 1965 and 1980
Baby Boomers	Anyone born before 1965
GDP	Gross domestic product
PU	Perceived usefulness
PEU	Perceived ease of use
PHR	Perceived Health Risk
SE	Self efficacy
SN	Subjective Norms
CTA	Cues To Action
SF	Satisfaction
CF	Confirmation
ATT	Attitude
CN	Continuous Intention

CR	Composite Reliability
AVE	Average Variance Extracted
R^2	Coefficient of determination
F^2	Size Effect
Q^2	Predictive relevance
M	Mean
SD	Standard Deviation

1 CHAPTER ONE : INTRODUCTION

1.1 Research background

This study delves into the sustained use of mobile payment (M-Payment) among digital immigrants in Hungary in the post-COVID-19 era, with a particular emphasis on viewing M-Payment as a preventive health tool. Recognizing the potential of M-Payment to mitigate the risk of COVID-19 and other contact-based diseases, the research investigates the patterns and motivations behind the adoption and continuation of M-Payment practices. The study, conducted in 2022, surveyed 415 respondents who fall under the category of digital immigrants in Hungary. It specifically explores the impact of the COVID-19 pandemic on their decision to adopt M-Payment methods and seeks to comprehend their intentions to persist in using M-Payment in the post-COVID-19 landscape. By shedding light on these aspects, the research aims to contribute valuable insights into the evolving dynamics of M-Payment behaviour, especially among populations more accustomed to traditional forms of transaction.

Before COVID- 19, the Information and Communications Technology (ICT) industry multiplied and became a milestone for countries' economic development (Kang, 2018). The ICT sector's development was accompanied by widespread mobile phones and significant growth in the electronic market, changes in customer expectations, and availability of funding and support from regulators and governments (Horner and Cunnane, 2017). In light of that, the ICT paved the way for a paradigm shift in the financial sector (Gai et al., 2018).

Financial Technology (FinTech) industry has boomed during the last few years; it came to enable easy, safe, and high-quality online banking services (Kang, 2018). The Financial Stability Board (FSB) and The Basel Committee on Banking Supervision (BCBS) have agreed on the accurate and comprehensive definition of Fintech. They defined it as technological, financial innovation that offers new products, applications, and business models that could impact delivering the financial services and developing the financial industry (Thakor, 2020). Fintech innovation has changed the traditional banking services offered by banks and financial institutions (Abu Daqar et al., 2020). Fintech concentrates on understanding clients' needs and expectations and providing them with advanced financial services, including innovation in online payment, Blockchain, cryptocurrency, and other digitalized banking services.

M-Payment service, also known as a Mobile wallet (M-Wallet) or Mobile money (M-Money), is a payment service that directly links to financial institutions and Fintech payment service (Kang, 2018). M-Payment is an electronic payment instrument, which uses a mobile device to transfer the

fund between the payer and payee (Karthikeyan, 2012). M-Payments have changed the way people viewed mobile use. It is no longer limited to communication, entertainment, and internet searching. Direct contact and cash are no longer necessary to conduct transactions and exchange value. M-Payment reshaped the way customers and merchants do transactions. It made transactions simple, easy, and fast. Nonetheless, it allowed people to do transactions anywhere and at any time.

Although some scholars argue that Digital natives (Millennials, people born between 1980 and 2000, and Generation Z, people born after 2000) are the main drivers of the FinTech industry and have the greatest propensity to adopt technology in their daily activities (Abu Daqar et al., 2020). Others, however, refute the claim that Digital immigrants (Generation X, i.e., those born between 1965 and 1980, and baby boomers born before 1980) are not capable of adopting technology (Rondan-Cataluña et al., 2015; Walker Mark, 2019). Meanwhile, the Global Web Index Report has found a significant increase in smartphone usage among Generation X. They are a highly engaged audience for digital services. According to the report, the reason for this adaptation is that most members of Generation X are busy professionals with families and large purchasing power. In addition, Generation X's rigorous lifestyle and limited free time make the use of digital services a practical and efficient tool for their daily professional and business activities. Among baby boomers, the pandemic has increased technology adoption among older generations, but adoption was already on the rise before COVID- 19 forced many businesses to go online. According to 2019 data from the Pew research centre, 68 percent of baby boomers now own a smartphone, and 11 percent of them use their phone as their primary online access method (EMILY A. VOGELS, 2019).

COVID- 19 has negatively affected almost every aspect of human life because of its rapid spread worldwide. In response to that pandemic, people have adopted new ways of living their daily lives, and such radical changes and behaviours in daily life are expected to continue after the pandemic ends. COVID- 19 pandemic forced most countries to take drastic measures to ensure social distancing among people. Some countries even imposed full lockdowns to prevent the rapid spread of the virus. United Nations Development Programme (UNDP) mentioned that the pandemic's socio-economic impact is not less significant than the health aspect, calling decision-makers to move beyond forecasts and take response actions (UNDP, 2020). While the global real Gross Domestic Product (GDP) grew by 2.9 percent in 2019, a decrease of 4.5 percent is predicted in 2020 due to the impact of COVID- 19 (Statista, 2020). In the meantime, governments have adopted nonpharmaceutical interventions to slow the rapid spread of COVID- 19 (Seale et al., 2020). These

interventions are causing major imbalances in countries' economies and slowing global economic development (Carracedo et al., 2021).

The World Health Organization (WHO) announced that the COVID- 19 virus could be transmitted mainly through saliva droplets or contact with people and surfaces that carry the infection. The virus attacks people's respiratory system and may cause death for some people who suffer from health problems; also, its level of risk increases as the affected person is advanced in age (World Health Organization [WHO], 2020). Whereby cash, banknotes, and contacted payment tools could increase the disease's spread, the WHO encouraged consumers to use the digital contactless payment methods in their financial activities (Ather et al., 2020), (Auer et al., 2020). Fortunately, thanks to advances in information and communications technology, particularly the Internet. People around the world became more connected than ever during this pandemic. With the digitization of financial services and banking, it is now easier than ever to take security and preventive measures to contain the spread of COVID- 19 and save people's lives. During the pandemic, consumer preferences have shifted from traditional payment methods to digital M-Payment methods (Aji et al., 2020). Therefore, currently financial institutions are paying closer attention to new trends in consumer behaviour and focusing on novel M-Payment services to meet the changeable consumer needs.

Undoubtedly, the pandemic has prompted governments, including the Hungarian government, to issue measures and laws to ensure social distancing. On the other hand, Health experts said that the Coronavirus could live on surfaces like cash and banknotes for 2 to 4 days, which increased the fear of people getting infected with the virus (Pal and Bhadada, 2020). The Perceived risk of getting infected with the virus has impacted consumers' behaviour and views towards payment systems, banking, and daily tasks that require direct contact transactions (Deloitte, 2020). Additionally, medical studies have shown that older adults are more prone to develop worse disease outcomes and higher mortality rates if infected with the SARS-2 virus. Therefore, this generation segment is more likely to take precautionary measures to avoid infection (World Health Organization [WHO], 2020).

Recent studies have focused on the negative impact of COVID- 19 on the Tourism industry (Uğur and Akbıyık, 2020), Services industry (Javed, 2020), Supply chain (Baker McKenzie, 2020), and Insurance sector (Babuna et al., 2020). However, others indicated that the Fintech industry in general and digital payments specifically had shown remarkable growth during the pandemic (Belgavi, 2020; World Bank and CCAF, 2020). Moreover, the International Monetary Fund (IMF)

considered the Digital Financial Inclusion (DFI) a crucial factor in mitigating the socio-economic impact of the crisis (Sahay, R., von Allmen, U. E., Lahreche, A., Khera, P., Ogawa, S., Bazarbash, M., & Beaton, 2020). Nevertheless, there is still a need for more research that focuses on the relationships between diseases like COVID- 19 and the type of payment systems used by consumers. To the best of my knowledge, there is lack of research on digital immigrant' continuous intention to use M-Payment, especially after the pandemic COVID- 19 . Therefore, the significance of this study that it introduce a comprehensive integrated framework of three theories (Technology Continuous Theory (TCT), Theory of Planned Behaviour (TPB), and Protection Motivation Theory (PMT)) to understand the factors affect Digital Immigrants continued use of M-Payment systems in post COVID- 19 Pandemic.

1.2 Research problem

World health organization expected an increase in the frequency and coverage of the pandemics in the future, cause more damage to the global economy and lead to greater global morbidity and mortality (World Health Organization, 2022). Therefore, a global environment that facilitates preparedness and response to infectious threats must be created. Being better prepared for the next infectious threat requires a mindset shift and the adoption of approaches different to what we are used to. As the pandemics continue to unfold, its impact on the behaviour and expectations of consumers as well as businesses will become more apparent. For example, as people strive to avoid direct contact as much as possible, the use of M-Payment has increased as this has advantages over traditional payment methods from an infection prevention perspective. Given that it is unclear not only when the pandemic will end, but also whether previous behaviours will ever return, it is valuable to understand what factors influence consumers' intentions to continue using M-Payment. Not surprisingly, studies in the health sciences account for a large proportion of COVID- 19 publications (e.g., 88.23%) (Daragmeh et al., 2021). Many studies have been conducted in the fields of education (Rizun and Strzelecki, 2020), health environment (Rahi et al., 2021), Banking (Shahabi et al., 2020), and others have emphasized the importance of identifying the factors that influence the adoption of information systems (Al-Maroof et al., 2020).

The health threat posed by COVID- 19 has been considered in studies that examined the adoption of FinTech in the context of a pandemic (Nawayseh and K, 2020), (Puriwat and Tripopsakul, 2021). According to study of (Nawayseh and K, 2020), people's fear of the health risk of COVID-19 was greater than their fear of technology-related risks, making technology-related risks a lower trigger for FinTech adoption in Jordan. In addition, medical studies have shown that older adults

are more likely to have a worse disease course and higher mortality rate when infected with the SARS-2 virus. Therefore, Digital Natives, such as Generation X and baby boomers, are more likely to take precautions against infection. Consequently, it is critical to understand how COVID- 19 has led Digital Immigrants to continue using M-Payment as a means of health care.

Numerous studies have examined users' initial adoption of M-Payments during the COVID- 19 pandemic (e.g., (Flavian et al., 2020); (Naeem, 2020) (Laato et al., 2020); (Hanif and Lallie, 2021). Adoption is typically defined as a user's initial decision to use a new information technology (Hertel and Menrad, 2016). It is an important indicator of the success of M-Payment systems, but initial adoption can only determine the desired business outcome if it is followed by continuous usage (Bhattacherjee, 2001). The ultimate success of M-Payment systems depends on continuous usage by users, also known as user persistence (Bhattacherjee, 2001). This is currently under-researched. Several researchers have focused to have better understanding of factors affect users' adoption and continuation intentions of information systems (e.g., Bennett and Corrin, 2018; Yang et al., 2021; ;Zhou et al., 2021). Continuance intention is usually defined as a user's decision to continue using an information technology innovation after its initial adoption (Bhattacherjee, 2001). In context of this study, continuance intention is defined as the intention of M-Payment system users to continue using previously used payment system.

Each of the theories related to IT system adoption can make a unique contribution to understanding technology acceptance behaviour (Hubert et al., 2019). However, scholars claim that it is necessary to modify, combine, or extend different theories to understand initial and post-adoption behaviour of technologies (Veeramootoo et al., 2018) (Awa et al., 2017). (Puriwat and Tripopsakul, 2021) created a framework that includes the Health Belief Model (HBM) and the Expectation Confirmation Model (ECM) to represent users' intentions to continue using contactless payment technologies in Thailand during the COVID- 19 pandemic. They included two additional variables at COVID- 19 representing perceived health risks, namely perceived severity (P-SEV) and perceived vulnerability (P- SUS). Although the framework is useful for understanding continuation intention (CI), it does not account for other variables such as perceived ease of use (PEU), subjective norms (SN), and attitude (ATT).

In the context of the present study, COVID- 19 is considered a threat to the overall health of consumers in general and older adults in specific. In to the extent that consumers become aware of the severity of COVID- 19 ; and the possibility of becoming infected, they are more likely to make preventative health decisions. In addition, efficacy and the ability to adopt health-related

behaviours are considered factors that influence the adoption of one set of protective payment behaviours and the avoidance of another. In a related context, the WHO has recommended that consumers use contactless payment methods to manage their purchasing behaviour. On the grounds that contact-based payment methods such as cash and banknotes could be carriers of the virus (World Health Organization [WHO], 2020). Although it is still uncertain when this pandemic will end, and other contact based diseases might appear in the future. For the sake of the sustained use of M-Payment as a health preventive tool, Protection Motivation Theory (PMT) alone is not enough to determine the Digital Immigrants' continuous intention to use M-Payment. And since the continued adoption is influenced by the extent of utility, Satisfaction and Attitude towards the use of such payment methods. Therefore, this article integrates the PMT, which focuses on pre-emptive behaviour, with TPB and TCT to determine the Digital Immigrants' continuous intention to use M-Payment in post COVID- 19 era.

1.3 Research contribution and significance

One of the main goals of information systems researchers (IS) is to understand the adoption and retention of IS innovations by individual users (e.g., (Hubert et al., 2019) (Khayer and Bao, 2019) (Rahi et al., 2020)).

Adoption is broadly defined as a user's initial decision to use a new information technology innovation (Liao et al., 2009). Continuous intention to use an IS innovation is generally defined as a user's decision to continue using it after he/she use it for the first time (Bhattacherjee, 2001). M-Payment eliminate the need for cash and connect to the bank accounts through virtual platforms.

The study is beneficial mainly for multiple reasons. First, M-Payment systems became popular in developing countries such as Hungary, it uses electronic devices such as computers or smartphones to conduct online financial transactions (Kang, 2018). By 2020, 43% of Hungarians will use M-Payment for regular online purchases. At the same time, 26% of respondents use M-Payment solutions to transfer money to others on a regular basis. And by 2022, more than half of Hungarians have made M-Payment. Almost 20% of them use this payment method several times a day, and another 19% make transactions with smart devices once a day. Thus, as M-Payment adoption has increased in Hungary during the pandemic, continued usage and encouraging existing users to adopt new mobile features may be the primary focus of service providers at this time (Medve, 2022a).

Second, The significant increase of deaths caused by COVID- 19 makes it important to adopt new contactless behaviours. Thus, this research work sheds the light on the role of M-Payment as one of the contactless behaviours that should be adopted to reduce the risk of COVID- 19 pandemic (Daragmeh et al., 2021). During the pandemic, the World Health Organization (WHO) declared that consumers should avoid cash and contact-based payments as a source of infection and use M-Payments instead (Auer et al., 2020). Health experts said that the COVID- 19 virus can survive on the surface of cash and banknotes for four days (Pal and Bhadada, 2020). According to (Daqar et al., 2021), the introduction of digital financial services such as contactless/M-Payment could help prevent the spread and severity of COVID- 19 . This view allows policy makers to focus their efforts and decisions on promoting M-Payment rather than relying on contact-based payment methods (Daragmeh et al., 2021).

Third, medical studies have shown that older adults are more likely to have a worse disease course and higher mortality rate after infection with the SARS-2 virus. The death rate among Hungarians is increasing by age, and it significantly high among Digital Immigrants compared to Digital Natives. Digital Natives, individuals born before 1980, was selected in this study due to the fact First the average age of the population in Hungary was 43.3 years in 2020, and it is expected to reach 45.1 years by 2025, suggesting that Digital Immigrants may represent the age of Hungarian society (O'Neill, 2023, pp. 1950–2100). Therefore, this generation is more likely to take preventive measures to avoid infection (World Health Organization [WHO], 2020). Thus, M-Payment could be an alternative protective measure in the event of a pandemic. The current study examined M-Payment as means of reducing COVID- 19 and other contact based diseases risk among Digital Immigrants in Hungary.

Fourth, The scope of this study is limited to an empirical investigation of the factors influencing the initial adoption of M-Payment and the intention to continue using them among Digital Immigrants in Hungary. In Hungary, M-Payment adoption has increased since the beginning of the pandemic, but it is not clear if this is also true for Hungarian Digital Immigrants. but many users do not remain active. It is also important to know whether these users will remain active and continue to use M-Payment after the pandemic. So the increasing prevalence of M-Payment in Hungary fits well with this study to examine post-pandemic usage, and so M-Payment in Hungary became the research context.

Lastly, The model proposed for this study is a mixture of the TCT, TPB, and MPT constructs and addresses both continuous intention and initial adoption. The integration of constructs from these

three models is beneficial for three reasons. First, the TCT model focuses on ongoing use IS, which can help explain user behaviours that cannot be explained by initial acceptance theories such as the TAM. It also includes confirmation of expectations, i.e., initial acceptance IS. The TCT model has been validated as a reliable model to explain continuance intention of IS (Liao *et al.*, 2009). The constructs of this model were used in this study because it is a post-adoption study of M-Payment system users' continuance intention. However, the ECM model includes five predictors to explain continuation intention, namely confirmation, perceived ease of use, perceived usefulness, satisfaction, and attitude (Bhattacherjee, 2001). However, the intention of users of IS may also be influenced by other factors. Second, TPB is a well-known theory that explains human behaviour and technology intentions. This theory is also well explained and applied to study the acceptance and impact of new information systems such as M-Payment and banking. TPB added perceived behavioural control (self-efficacy) to the other predictors, attitude and subjective norms, in the TRA. The greater a person's perceived behavioural control, the more motivated he or she is to engage in a particular behaviour. Third, PMT is widely used in the technology acceptance literature (Fischer-Preßler *et al.*, 2022) (Nguyen and Tang, 2022), and was also used to predict prevention behaviour during the COVID- 19 pandemic (Liébana-Cabanillas *et al.*, 2020); (Ezati Rad *et al.*, 2021). Because the use of M-Payments has become inevitable during the pandemic, the study considers the perceived threat of COVID- 19 , including perceived susceptibility and perceived severity, as antecedents to confirm the expectation of M-Payment adoption. The study also considers perceived self-efficacy as a critical factor in determining future intent to use M-Payments.

Therefore, we believe that the proposed integrated model significantly interprets Digital Immigrants' continuous intention to use M-Payment systems in the post- COVID- 19 era. In addition, the model showed high validity in understanding the continuous intention to use a particular information system in times of crisis related to public health and lockdowns.

1.4 Research objectives

The purpose of this study is to examine the factors that influence Digital Immigrants' intention to continue use M-Payment in post- COVID- 19 era. We define the continuous intention in this research as the intention to continue using M-Payment systems that users have previously used. To achieve this goal, the following specific research objectives are developed:

1. Determine the impact of COVID- 19 on M-Payment adoption among Digital Immigrants.

2. Determine the level of M-Payment adoption among Digital Immigrants during the pandemic and identify their willing to continue use it.

3. Identify hypotheses about factors that influence users' intention to continue using M-Payment.

4. Validate hypotheses and identify interactions between factors influencing users' intention to continue using and their behaviour.

5. Create an appropriate model for continued M-Payment use in the context of COVID- 19 and other direct contact diseases that may emerge in the future.

The research objectives outlined above aim to contribute to our understanding of Digital Immigrants' continued utilization of M-Payment systems in the aftermath of the COVID-19 pandemic. By examining the impact of COVID-19 on M-Payment adoption, evaluating the level of adoption during the pandemic, and identifying factors influencing users' intention to persist in M-Payment usage, this study seeks to provide valuable insights into the evolving preferences and behaviours of Digital Immigrants in the realm of digital finance. Additionally, the validation of hypotheses and development of a robust model for continued M-Payment use will offer practical implications for policymakers, financial institutions, and M-Payment service providers seeking to adapt their strategies to meet the evolving needs and preferences of their target demographic amidst the backdrop of ongoing public health challenges.

1.5 Research questions

The COVID- 19 has led consumers to increasingly conduct their financial activities, including payments, through online channels. And due to the fact that older adults are the segment most affected by the health risk of COVID- 19 . this study seeks to ascertain the impact of the COVID-19 pandemic on the adoption of M-Payment systems among Digital Immigrants. By examining the extent to which the pandemic has influenced the uptake of digital payment solutions among this demographic group, the research aims to shed light on the evolving preferences and behaviours of older adults in response to the public health crisis.

Furthermore, the research endeavours to evaluate the level of M-Payment adoption among Digital immigrants during the pandemic and discern their willingness to continue utilizing these platforms. Through an exploration of the usage patterns and attitudes of older adults towards M-Payment

systems amidst the backdrop of COVID-19, the study seeks to elucidate the factors influencing their decision to persist in using digital payment solutions.

Additionally, the study aims to identify the determinants shaping Digital Immigrants' intention to continue using M-Payment systems, thereby contributing to a deeper understanding of the underlying factors driving their continued adoption of digital financial services. By examining the multifaceted influences on older adults' intentions to utilize M-Payment platforms, the research seeks to inform strategies aimed at promoting the sustained adoption of digital payment solutions within this demographic group. Lastly, the research seeks to explore the interactions between the various factors influencing Digital Immigrants' intention to continue using M-Payment systems and their actual behavioural outcomes. Through the development and validation of a comprehensive model, the study aims to ascertain the reliability of the proposed framework in capturing the nuanced dynamics shaping older adults' continued use of digital payment platforms amidst the COVID-19 pandemic and similar public health crises that may arise in the future.

Despite the heightened reliance on digital payment solutions among older adults, there remains a dearth of research exploring the continuity and behavioural intent of this service within this population. Thus, the following research questions have been formulated to address this gap in the literature and guide the subsequent investigation.

1. What is the impact of COVID- 19 on M-Payment adoption among DI?
2. What is the level of M-Payment adoption among Digital Immigrants during the pandemic, and identify their willing to continue use it?
3. What are the factors that influence Digital Immigrants' intention to continue using M-Payment systems?
4. What are the interactions between the factors influencing Digital Immigrants' intention to continue using and their behaviour.
5. Can the proposed model reliably measure the factors influencing Digital Immigrants' continued use of M-Payment systems in the context of the COVID- 19 pandemic or similar diseases that may occur in the future through direct contact?

1.6 Research methodology

The methodology chapter plays a pivotal role in this thesis, serving as a structured framework for investigating the factors influencing the initial adoption and sustained usage of M-Payment services among Digital Immigrants in the post-COVID-19 era. Employing a quantitative approach, the research methodology is meticulously crafted to facilitate a rigorous evaluation of diverse determinants contributing to the adoption and ongoing utilization of mobile payment technologies. Through the utilization of statistical analyses and empirical testing, the methodology endeavours to unravel the intricate interplay among demographic, technological, and behavioural factors shaping the attitudes and behaviours of older adults towards M-Payment services.

Moreover, the selected research methodology aims to deepen our comprehension of the adoption dynamics surrounding emerging mobile technologies and the underlying factors influencing users' intentions to maintain their usage beyond the pandemic period. Through a systematic examination of the predictors of M-Payment adoption and sustained usage among Digital Immigrants, the research methodology endeavours to generate invaluable insights into the evolving landscape of digital financial services amidst public health crises. By conducting a thorough quantitative analysis of the data, the methodology will facilitate the identification of pivotal drivers influencing older adults' decision-making processes concerning the adoption and continued utilization of M-Payment platforms, thereby laying the groundwork for the development of targeted interventions and strategies aimed at fostering widespread adoption of digital payment solutions within this demographic cohort. This study uses a quantitative research methodology to realise and achieve its objectives. The following research methods were used.

Expanding on the methodology employed, this work utilizes a quantitative data method to delve into the nuanced intricacies of M-Payment adoption among Digital Immigrants in Hungary. Data collection was executed through a meticulously designed questionnaire tailored to capture insights into the demographic, technological, and behavioural dimensions influencing the adoption and sustained usage of mobile payment services. By leveraging the Partial Least Squares Structural Equation Modelling (PLSSEM) technique, the analysis unfolds the intricate relationships between various determinants, providing a comprehensive understanding of the factors shaping older adults' attitudes and behaviours towards M-Payment platforms.

Furthermore, the adoption of PLSSEM underscores the commitment to robust statistical analyses, ensuring the validity and reliability of the research findings. This methodological choice aligns with the overarching objective of unraveling the adoption dynamics amidst the evolving landscape

of digital financial services, particularly in the wake of the COVID-19 pandemic. Through the application of advanced statistical techniques, the research methodology not only elucidates the drivers of M-Payment adoption but also sheds light on the underlying mechanisms influencing sustained usage, thereby paving the way for informed interventions and strategies aimed at catalysing widespread acceptance of digital payment solutions among Digital Immigrants in Hungary.

1.6.1 Questionnaire survey

The questionnaire survey section of this study was meticulously designed to ensure content validity, drawing upon insights from existing literature. Initially developed in English, the questionnaire underwent a rigorous translation process into Hungarian to ensure linguistic accuracy and cultural relevance. Following the development phase, a pre-test was conducted to assess the reliability and validity of the questionnaire items and scales. The pre-test findings affirmed the robustness of the questionnaire, validating its efficacy in capturing relevant constructs pertaining to the adoption and continued usage of M-Payment services among Digital Immigrants in Hungary. Through this iterative process, the questionnaire emerged as a well-structured instrument poised to yield meaningful insights into the research objectives.

In line with contemporary research practices and to maximize respondent reach, the study employs an online survey methodology. Online surveys offer unparalleled convenience, enabling respondents to participate at their leisure and from the comfort of their own environment. Leveraging the widespread use and effectiveness of online platforms, the questionnaire is disseminated to M-Payment users aged 40 and above across Hungary. Prior to participation, respondents are provided with a comprehensive explanation of the questionnaire's purpose and objectives, fostering transparency and engendering confidence in the research process. By harnessing the power of online surveys, this study aims to garner a diverse and representative sample of Digital Immigrants, facilitating a comprehensive analysis of factors influencing their adoption and sustained utilization of M-Payment services in the wake of the COVID-19 pandemic.

1.6.2 Partial least squares structural equation modelling (PLSSEM)

SEM is a technique that enables the simultaneous modelling of relationships between multiple dependent and independent constructs. PLS-SEM is often used to assess the reliability and validity of measurements and to validate the proposed research model. There are two main reasons for using this approach. First, PLS-SEM is particularly useful for prediction (Jr *et al.*, 2011). To achieve the research goal of predicting key factors, PLS-SEM is an appropriate statistical method

for testing structural equation models (Jr *et al.*, 2011). PLS-SEM seems to be the appropriate method for this study, which aims to identify predictors of Digital Immigrants' intention to continue using M-Payments in Hungary in the post- COVID- 19 era. Second, PLS-SEM is effective for complex structural equation models with numerous constructs (Hair *et al.*, 2017). The model in this study consists of nine complex constructs, making PLS-SEM the most appropriate method. PLS-SEM also works well for non-normal distributions and requires a smaller sample size (Jr *et al.*, 2011). Considering the above reasons, PLS-SEM is chosen for this study.

The application of PLS-SEM constitutes a fundamental statistical technique utilized for investigating the intricate relationships between variables within complex models. This method holds significant relevance within the realm of social science research owing to its capacity to effectively manage latent variables and small sample sizes. Through PLS-SEM, researchers are afforded the opportunity to scrutinize the interconnectedness among multiple constructs and delineate causal relationships within established theoretical frameworks.

Social science research inquiry frequently entails the formulation of theoretical models that encompass latent constructs not directly observable but inferred from discernible indicators. PLS-SEM serves as a potent analytical tool enabling researchers to evaluate the associations between latent variables and observable indicators, thereby furnishing insights into the underlying structures characterizing intricate phenomena. Consequently, PLS-SEM emerges as an indispensable instrument for probing complex social phenomena, including attitudes, behaviours, and organizational dynamics.

1.7 Structure of the research

The research is based on five-element framework, each of which corresponds to a chapter of this dissertation:

Chapter 1 presents the research context and key research gaps/problems that this study seeks to address. Based on this, the research purpose and scope, research questions, and research objectives are developed. In addition, the theoretical contributions of the study are discussed and the uniqueness of the new model based on TPB, TCT and PMT theories is demonstrated. This chapter confirms the need to investigate the intention of Hungarian Digital Immigrants to continue M-Payment to ensure the long-term viability of the service.

Chapter Two contains a detailed discussion of M-Payment and the literature review. This chapter consists of two sections. The first section focuses on the conceptual framework introduced to

clarify the research context. This section provides a clear understanding of the concept, types, and importance of M-Payment; the intergenerational acceptance of M-Payment; the status of M-Payment before and after COVID- 19 disease in Hungary and worldwide; and the preventive health role of M-Payment during the COVID- 19 pandemic and the importance of acceptance of such a service among Digital Immigrants. The second section addresses the theoretical framework of this study. Existing studies on the adoption of M-Payments and their continued use are discussed. At the same time, the theories used in information systems research and information systems continuity research are discussed and reviewed. The results of the reviews facilitate the development of the theoretical framework of this study and contribute to the formation of hypotheses. Based on the literature review, relevant models for this research are identified and serve as the basis for the new model used in this research. The development of all 17 hypotheses for this study is presented based on a review of established models that fit the M-Payment research discussed in this chapter. Thus, this chapter proposes a new integrated model that uses constructs from the TPB, TCT and PMT models and presents the rationale for integrating key constructs from these three models. In this study, 17 hypotheses are developed and presented. Testing these hypotheses contributes to the achievement of the research goal and objectives.

The research methodology is explained in detail in Chapter 3. In this chapter, the corresponding survey and scales are presented in accordance with the continuation intention model. A preliminary draft of the questionnaire is presented in this chapter. After revising the draft, the formal version of the questionnaire is prepared for the subsequent data collection. In this chapter, the sampling unit and sample size are also determined to ensure that the collection of the research data is feasible. The data collection and analysis procedures are then discussed.

Chapter four presents the data analysis and results. This chapter is devoted to the empirical investigation of the survey results. The sample data are first subjected to descriptive analysis, which reveals the basic characteristics of the data collected. Then, the sample data are analysed, particularly in terms of their reliability and validity. Finally, partial least squares structural equation modelling is applied to provide a path analysis of all variables included in the continuation intention model. On this basis, each hypothesis can be empirically tested individually.

Chapter five contains the discussion and results of the study. The hypotheses are discussed to reach conclusions regarding the most influential factors on continuance and behavioural intentions. In addition, this chapter discusses some previously undiscovered original and important findings and new results related to continuance intention. Based on the empirical findings of this study, a

number of recommendations are made for the future improvement of M-Payment services in Hungary. In particular, these aim to increase continuity intention and behavioural intention to experiment with new features. In addition, the final chapter discusses the contributions and limitations of the study to provide suggestions for future researchers who wish to conduct further relevant studies within the framework proposed by this study. The researcher also provides an overall conclusion and summary in this chapter. Finally, the appendices and references will be implied in chapter six.

2 CHAPTER TWO : REVIEW OF LITERATURE

2.1 M-Payment at glance

M-Payment, also known as M-Wallet or mobile money, is a revolutionary FinTech that has transformed the way people make transactions in the digital era. It allows users to conduct a wide range of financial activities using their mobile devices, such as smartphones or tablets, without the need for physical cash or credit cards. This convenient and secure method of payment has gained immense popularity worldwide, with millions of people adopting it as their preferred way to pay for goods and services. In this chapter, will give a glance about the evolution of money and payment industry, definition of M-Payment, M-Payment technologies, M-Payment ecosystem.

Mobile payments, often referred to as "m-payments," have fundamentally transformed the landscape of financial transactions within contemporary society. The proliferation of smartphones has facilitated the widespread adoption of mobile payment solutions on a global scale. These solutions offer a seamless and efficient alternative to conventional cash or card-based transactions, facilitating activities such as purchasing goods and services and transferring funds between individuals. At its essence, mobile payments entail the utilization of a smartphone or similar mobile device to initiate, authorize, and execute financial transactions. This is facilitated through a variety of modalities, encompassing Near Field Communication (NFC), QR codes, mobile wallets, and peer-to-peer payment applications. By simply tapping a screen or scanning a code, users can securely execute a diverse range of financial activities, including money transfers, bill payments, and online or in-person purchases, obviating the necessity for physical currency or traditional payment cards.

One of the principal advantages intrinsic to mobile payments lies in their inherent convenience and adaptability. Unlike conventional payment methodologies reliant on physical wallets or cards, mobile payment solutions empower users to conduct transactions directly from their smartphones, which often serve as indispensable components of their daily routines. Whether within retail

environments, dining establishments, or during international travel, users can expeditiously consummate transactions with minimal effort through their mobile devices. Moreover, mobile payments proffer augmented security features vis-a-vis traditional payment modalities. Numerous mobile payment platforms and applications integrate sophisticated encryption protocols and authentication mechanisms to safeguard users' financial data and pre-empt unauthorized access or fraudulent activities. Additionally, the adoption of biometric authentication methodologies, such as fingerprint or facial recognition, imbues an additional stratum of security, assuring users of the integrity of their transactional endeavours. As mobile payments continue to undergo iterative advancements and refinements, they stand poised to exert an increasingly prominent influence in shaping the trajectory of commercial activities and financial services on a global scale.

2.1.1 The evolution of money and payment Industry

A look at the history of means of payment, which is closely linked to the growth of the economy, helps to explain how M-Payment systems came into being. Thus, innovations of payment systems in the past contributed to economic progress, while developed markets required the expansion and modernization of payment mechanisms. Figure 1 shows the evolution of money throughout history.

Figure 1. Evolution of money

Source: Aim Institute of Economics

Barter was the first payment method to emerge and contribute to building an economic structure by allowing people to exchange things (Beniwal, 2020). Coins were introduced around the seventh century BC . This made it possible to do business with a single bidder and customer for a particular good or service without bartering. In the seventh century AD China introduced banknotes (Rogoff, 2016). Economic growth increased the demand for coins and made monetary transactions more

dangerous and expensive. Merchants began to use blank money orders that could be picked up in another city.

The check was another important achievement that changed the paradigm of means of payment. There is evidence that it was introduced in England around 1659 (Davies and Julian Hodge Bank, 2002). Since checks have no intrinsic value, this type of payment creates a degree of confidence in the transaction. As the financial institutions act as an intermediary to reimburse the retailer on behalf of the customer, the check is a document by which the retailer acknowledges receipt of the agreed amount.

After the check, the credit card was the next technological and conceptual advance in the history of payment instruments. In 1914, Western Union issued the first card in the United States (Lauer, 2020). In 1950, Diners Club introduced a card that could be used to make purchases at stores and restaurants. This marked the beginning of widespread acceptance of plastic money (Batiz-Lazo and Angel, 2018). In the 1960s and 1970s, Visa and MasterCard expanded their businesses worldwide (Kaynak *et al.*, 1995).

In the 1990s, the introduction of electronic commerce (e-commerce) provided consumers and businesses with a new method of conducting business transactions (Tian and Stewart, 2007). Since then, the e-commerce sector has expanded and developed significantly, offering immense benefits to customers and businesses around the world. It is clear that e-commerce has a bright future and that businesses will benefit greatly considering how much business is conducted online. The majority of e-commerce is due to the perspective of online business. It enables the online buying and selling of goods, the provision of various services and information over the Internet, and the rapid exchange of funds between parties. With the help of e-commerce, business payments now take the form of electronic money transfer and are referred to as E-Payments (Turban et al., 2015).

According to an article by (Dahlberg et al., 2006), M-Payments have been a popular topic for study since the late 1990s and early 2000s, when the Internet era began. Since then, hundreds of M-Payment systems have sprouted up around the world. A large number of services were unsuccessful during this time. In the EU, for example, most M-Payment systems were abandoned, while PayPal and Visa cards flourished. Google Wallet was introduced in 2011 and allowed users to store in stores, get discounts, and collect loyalty points (Ghag and Hegde, 2012). Later, Near Field Communication (NFC) technology was introduced worldwide, in conjunction with the growing market for smart mobile devices (Rahul et al., 2015). In a developing economy, the

adoption of cashless transactions correlates with the widespread adoption and low cost of mobile phones. E-commerce has also contributed to the proliferation of cashless transactions (Yang *et al.,* 2021).

In 2008, the digital currency Bitcoin made its debut, for which the term "cryptocurrency" was coined (Nakamoto, 2009). The currency relied on cryptography to manage creation and transactions, as opposed to a central authority (Meadows, 2019). The Bitcoin protocol and software are publicly available for any programmer in the world to study or create a modified version. However, the past no longer exists. It is the present and the future of means of payment.

2.1.2 M-Payment definition

Before COVID- 19, the Information and Communications Technology (ICT) industry multiplied and became a milestone for countries' economic development (Kang, 2018). The ICT sector's development was accompanied by widespread mobile phones and significant growth in the electronic market, changes in customer expectations, and availability of funding and support from regulators and governments (Julian, 2011). In light of that, the ICT paved the way for a paradigm shift in the financial sector (Gai et al., 2018).

Financial Technology (FinTech) industry has boomed during the last few years; it came to enable easy, safe, and high-quality online banking services (Kang, 2018). The Financial Stability Board (FSB) and The Basel Committee on Banking Supervision (BCBS) have agreed on the accurate and comprehensive definition of Fintech. They defined it as technological, financial innovation that offers new products, applications, and business models that could impact delivering the financial services and developing the financial industry (Thakor, 2020). Fintech innovation has changed the traditional banking services offered by banks and financial institutions (Abu Daqar et al., 2020). Fintech concentrates on understanding clients' needs and expectations and providing them with advanced financial services, including innovation in online payment, Blockchain, cryptocurrency, and other digitalized banking services.

M-Payment service, also known as a M-Wallet or mobile money, is a payment service that directly links to financial institutions and Fintech payment service (Kang, 2018). M-Payment is an E-Payment instrument, which uses a mobile device to transfer the fund between the payer and payee (Karthikeyan, 2012). M-Payments have changed the way people viewed mobile use. It is no longer limited to communication, entertainment, and internet searching. Direct contact and cash are no longer necessary to conduct transactions and exchange value. M-Payments reshaped the way

customers and merchants do transactions. It made transactions simple, easy, and fast. Nonetheless, it allowed people to do transactions anywhere and at any time.

The advent of the COVID-19 pandemic has accelerated the adoption of M-Payment services even further. With social distancing measures and an increased emphasis on contactless transactions, M-Payments have emerged as a vital tool in ensuring the continuity of economic activities while prioritizing public health and safety. As individuals and businesses alike seek ways to minimize physical interactions, the convenience and efficiency offered by M-Payment solutions have become indispensable. Moreover, the integration of M-Payment services within broader FinTech ecosystems underscores their role in driving financial inclusion and empowering underserved communities, aligning closely with the commitment to achieve diversity and accessibility in financial services.

2.1.3 M-Payment technologies in Hungary

In general, a M-Payment is a method of using a mobile device to make a transaction or transfer of funds in exchange for purchases (Karnouskos, 2004). M-Payments can be widely used to pay for purchases and bills. M-Payments often have access to stored debit or credit cards on the mobile device. The user typically selects a M-Payment, connects to a server via the mobile device to perform authentication and authorization, and then receives confirmation that the transaction is complete. Current M-Payment solutions and systems are based on the technological progress of smartphones, which enables the development of payment smart applications that can be used in various ways in payment transactions. M-Payments in Hungary were becoming increasingly popular, and there were several kinds of M-Payment methods available to consumers. Some of the common M-Payment options in Hungary included:

- **M-Payment Apps:** Several M-Payment applications allowed users to link their bank accounts or credit cards and make payments using their smartphones. Some of the popular M-Payment apps in Hungary were Pay Pass, Simple Pay, Google Pay, Apple Pay, Samsung Pay, Revolute, TransferWise, and OTPay.

- **M-Wallets:** In addition to the M-Payment apps, some Hungary-specific M-Payment apps might cater to local businesses and customers. Popular M-Wallet apps allow users to store credit/debit card information securely and make payments using their smartphones. Some well-known M-Wallets available in Hungary include: Vodafone wallet, MobilTárca, and Revolute.

- **Mobile Banking Apps:** Hungarian banks also offer their mobile banking apps, which often include M-Payment functionalities, enabling customers to make payments, transfer money, and manage their accounts. Here are some popular mobile banking apps in Hungary: OTP smart bank, MKB Mobil bank, Erste Mobile Pay, Raiffeisen Mobilbank, K&H mobile lkalmazás, CIB Bank Mobilalkalmazás, and Budapest Bank Mobilalkalmazás.

- **NFC payment** is One new technology that is gaining popularity is M-Payment systems based on near field communication.. the NFC technology was jointly developed by electronics giants Phillips and Sony. NFC payments are a subset of M-Payments. Using NFC technology, mobile devices with NFC tags, such as smartphones, can act as virtual wallets. Customers can pay simply by holding their phone up to an NFC-enabled payment terminal and letting it do the rest (Mohammed *et al.,* 2016). Most credit and debit cards, M-Wallets, M-Payment apps support NFC payments in Hungary. Add to that, Public Transportation Cards in major cities like Budapest ay also support NFC payments. Travelers can tap their NFC-enabled cards or smartphones at turnstiles or ticket machines to pay for their trips.

- **SMS Payments** is a prototype that allows customers to make E-Payments with their cell phones via SMS without modifying existing devices or buying new ones (Fong and Lai, 2005, p.). SMS payments allow cell phone users to pay for transactions, make deposits and transfer money securely and quickly. The service provider facilitates the transaction between the buyer and seller. To pay for a product or service via SMS, you must send a text message. This SMS is sent to M-Payment service providers. The mobile service provider charges the cost of the purchase to the monthly phone bill or deducts it from a prepaid balance (Roberts, 2018). Some examples of companies or services that offered SMS payment solutions in Hungary included: OTP Bank SMS payment service, Fortumo, Paymo, and Simple Pay.

- **QR Codes:** QR code payments have become increasingly popular worldwide, including Hungary. QR codes are a type of matrix barcode consisting of square grids made up of black squares on a high contrast background that can be scanned, processed and transmitted by an imaging device with the appropriate technology (Tiwari, 2016). QR code payments offer a convenient and secure way for customers to make payments using their smartphones or other mobile devices (de Luna et al., 2019). The process involves scanning a QR code

displayed at the merchant's point of sale or on a website, and the payment is then processed through a digital wallet or a mobile banking app (Sun et al., 2021).

- **Mobile carrier billing:** It is also known as direct carrier billing or M-Payment , is a payment method that allows users to make purchases or pay for digital content and services by charging the amount directly to their mobile phone bill (BEREC, 2021). It is a convenient way to pay for apps, games, music, videos, and other digital goods without the need for credit cards or bank accounts. Google Play Store, Apple Pay Store, Netflix, and Spotify are some examples of mobile carrier billing options in Hungary.

2.1.4 M-Payment ecosystem in Hungary

Several studies have explained how players are divided in M-Payment ecosystems. For example, (Ondrus and Pigneur, 2006) conducted a study on the different perspectives of M-Payments and classified the actors in the M-Payment ecosystem into three broad groups: Consumers, Merchants, and Service Providers. (Au and Kauffman, 2008) considered that M-Payment players can be divided into four broad groups: service providers, vendors or business intermediaries, end users , and government agencies and regulators. While, (Thoi, 2016) developed a taxonomy of nine key players for the M-Payments industry in Sweden. The major players in this study included the most recent major player, Internet giants, and trusted third parties.

The M-Payment ecosystem in Hungary was continuously evolving, with several players and services in the market. In the context of M-Payments, the consumer is defined as the end user of the platform, who can be both a **customer** and a **merchant**, while the producers (payment providers and banks) provide the exchange value of the platform.

The traditional payment system is dominated by **financial institutions (banks)**. Hungarian banks, such as OTP Bank, Erste Bank, and Raiffeisen Bank, offer M-Payment solutions for their customers. These solutions are usually integrated with their mobile banking applications. In order to provide financial services to their customers, banks have to bear the cost of cash processing while profiting from card payment transactions. This profit has led banks to develop payment-related applications or collaborate with other players (Karnouskos, 2004). Besides that several third-party companies provide M-Payment solutions. Some of these include **Fintech start-ups**. Hungary has been experiencing a growing fintech sector with several start-ups making their mark in the industry such as Transfer wise, Revolute, and Barion which offers secure and convenient payment methods for businesses and individuals in Hungary.

Many **Mobile Network Operators (MNOs)** around the world have been actively involved in M-Payment services. These operators collaborate with financial institutions and payment service providers to offer convenient and secure M-Payment solutions to their customers. Some well-known MNOs involved in M-Payment services in are Hungary Magyar Telekom, Vodafone Hungary, and Telenor Hungary are the major MNOs in Hungary. They have their M-Payment solutions, enabling subscribers to make payments using their mobile devices.

(Karnouskos, 2004) argues that **mobile device manufacturers** also play a key role in the M-Payments industry because they control and develop the technology used in mobile devices. For example, Samsung has integrated NFC and MST into its devices to enable payment with payment cards via a cell phone. Moreover, because they control the SIM cards and wireless communications, mobile network operators have influence over M-Payments (Karnouskos, 2004). The third-party provider, also known as a **software provider**, not only provides a service and tool for accepting M-Payments, but also enables merchants to receive a variety of payments through a single channel and accept multiple currencies.

In addition, **the regulator or government** is the actor that sets the rules for M-Payments, which can have a significant impact on M-Payment adoption in any country. Governments can encourage adoption by adopting policies that favour M-Payments, such as reducing transaction fees for the merchants that accept payments through mobile devices and POS terminals. In Hungary, The Hungarian National Bank oversees payment systems and electronic money institutions, ensuring that M-Payment services adhere to the necessary regulations and security standards. Figure 2 shows the major M-Payment players in Hungary.

In summary, the success of a particular payment platform depends not only on consumer or merchant adoption, but also on the coordination of all players in the M-Payment system (Apanasevic *et al.*, 2016).

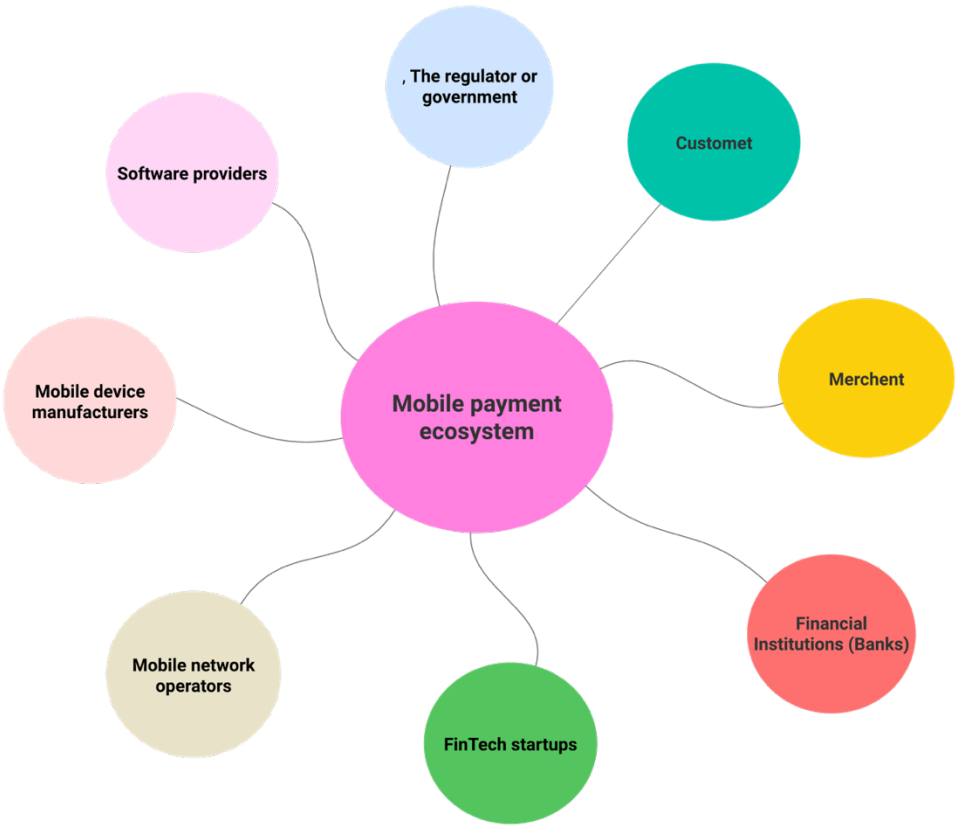

Figure 2. M-Payment ecosystem in Hungary

Source: Author's own construction

2.1.5 Generational differences in technology usage

A generation consists of people who were born around the same time and grew up in the same area. People in this "birth cohort" have similar characteristics, preferences, and values throughout their lives. Generations have similar characteristics, such as shopping, communication, and motivational preferences, because they experienced comparable trends at the same time of life and through comparable channels (e.g., TV, mobile, Internet, etc.). Generational analysis is currently an important sociological and academic discipline. In addition, companies must have an understanding of generations. If companies are not able to address, understand, communicate with, and develop products or services for the many generations, they will drift into irrelevance and finish. Several scholars studied the differences between generations and how to categorize the population by birth year (Rudolph *et al.*, 2021) (Campbell et al., 2015).

(McCrindle, 2018) developed a more recent classification that identified six generations that represent today's society: Silent Generation Traditionalists (born in 1945 and before), Baby Boomers (born between 1946 and 1964), Generation X (born between 1965 and 1979), Generation

Y (born between 1980 and 1994), Generation Z (born between 1995 and 2010), and Generation Alpha (born in 2010 and after).

Marc Prensky introduced the terms "digital native" and "digital immigrant" to define the two categories and explain why their differences pose so many challenges in education (Prensky, 2001). Digital Natives are the new generation of young people born into the digital age, while "DI" are those who learned to use computers as adults. In contrast to Digital Natives, who are generally considered tech-savvy, Digital Immigrants are assumed to have difficulty with information technology (Wang et al., 2012). Other scholars define them more precisely, (Akçayır et al., 2016) define Digital Natives as individuals who were born after 1980, grew up in an environment where they were surrounded by technology, and have different technological capabilities than members of the previous generation. While, (Bennett and Corrin, 2018) define Digital Immigrants are the generation born before 1980 and after has learned to use digital communication tools. They are considered less tech-savvy than Digital Natives, and it is argued that they will never reach the same level of technological skills and understanding.

The main difference is that Digital Natives use technology at a native level, while Digital Immigrants use it at a not-so-native level, making the two populations inherently different (Vodanovich *et al.*, 2010). In particular, Digital Natives have been found to use the new digital media culture more actively than passively than Digital Immigrants (Vodanovich *et al.*, 2010). This is related to the discovery by (Kirk et al. 2015) that Digital Natives prefer interactive stimuli over Digital Immigrants. In addition, Digital Natives are said to have different identities online because digital tools allow them to express themselves in new ways (Colbert *et al.*, 2016). This could have further implications for how Digital Natives relate and collaborate with each other as technology strongly shapes their identities (Colbert *et al.*, 2016). Recent studies have examined intergenerational differences in the use of information and communication technologies (Severt *et al.*, 2013), social networking (Tammisalo *et al.*, 2022), mobile commerce (Torres *et al.*, 2019), mobile shopping (Lissitsa and Kol, 2021), and mobile banking (Shams *et al.*, 2020). Recently, (Agardi and Alt, 2022) examined generational differences in M-Payment acceptance using generational cohort theory and technology acceptance. Results showed that social norms, perceived ease of use, and financial risk of NFC M-Payments had a greater impact on Digital Immigrants. When Digital Natives felt that M-Payments were compatible with their lifestyle, they were more likely to use them.

2.1.6 M-Payment and financial inclusion

One of the barriers to poverty reduction that is increasingly recognized is the lack of participation in formal financial systems (Omar and Inaba, 2020). Lack of access to financial services such as credit and savings can actually make it difficult for households to make investments, save money, and respond appropriately to shocks (Aker et al., 2013). According to (Omar and Inaba, 2020), developing countries with high levels of financial inclusion have significantly lower poverty rates. The term "financial inclusion" refers to all steps taken to enable all segments of the population to access formal financial services at prices that match their capabilities (Tay et al., 2022).

The technology behind M-Payment is gaining traction, especially in developing countries where a significant number of low-income households and microenterprises lack access to financial services (Lu, 2019). M-Payments make it easier for people to participate in the financial system and offer the opportunity for greater financial inclusion. The use of mobile financial services has grown rapidly in India and Africa over the past five years. In particular, the rapid adoption of mobile money has led to greater access to affordable financial services not only within national borders but also beyond, benefiting those who have fewer opportunities in life. Regulators face the challenge of supporting cross-border payments in a world that must also combat the rise of money laundering, terrorist financing, fraud, and other financial crimes. Despite the opportunities, rapidly evolving technology presents a challenge for regulators.

The COVID- 19 pandemic accelerated financial inclusion and led to a significant increase in digital payments that coincided with the global expansion of formal financial services. According to the Global Findex 2021 database, this expansion has created new economic opportunities while narrowing the gender gap in account management and strengthening the resilience of households to better withstand financial shocks. In 2021, 76% of adults worldwide owned an account in a bank or in any of mobile money provider, higher of 68% in 2017 and 51% in 2011 (Asli Demirgüç-Kunt *et al.*, 2021, p. 20). Interestingly, the increase in account ownership is spread evenly across a much larger number of countries. In previous Findex surveys over the past decade, much of the growth has been concentrated in China and India, but this year's survey found that the percentage of account ownership has increased significantly in 34 countries since 2017 (Asli Demirgüç-Kunt *et al.*, 2021, p. 20).

The integration of mobile payment (M-Payment) systems plays a pivotal role in advancing financial inclusion, particularly in regions where traditional banking infrastructure is limited. By leveraging mobile technology, M-Payments empower individuals and small businesses with

access to essential financial services, enabling them to save, invest, and manage funds more efficiently. This democratization of financial access not only stimulates economic growth but also fosters social development by providing marginalized communities with opportunities for financial empowerment. Moreover, the COVID-19 pandemic acted as a catalyst for the widespread adoption of digital payments, further amplifying the momentum towards financial inclusion. As the world grappled with the challenges posed by the pandemic, digital financial services emerged as a resilient solution, offering a safe and convenient alternative to traditional banking methods. The surge in digital payments observed during this period not only expanded access to formal financial services but also narrowed gender disparities in financial inclusion. This transformative shift underscores the indispensable role of technology in fostering inclusive economic development and building more resilient societies in the face of adversity.

2.2 M-Payment during COVID-19 era

During the COVID-19 era, M-payment systems witnessed a significant surge in adoption due to the changing consumer behavior induced by the pandemic. The impact of COVID-19 on consumer behavior was profound, with a noticeable shift towards contactless transactions and digital payments to minimize physical contact and reduce the risk of virus transmission (Aji et al., 2020)**.** This shift accelerated the adoption of M-payment solutions globally, as consumers sought safer and more convenient ways to conduct transactions.

M-payment played a crucial preventive role during the COVID-19 pandemic by reducing the need for physical cash handling and face-to-face interactions at payment terminals. The contactless nature of mobile payments helped mitigate health risks for both consumers and merchants, contributing to the overall efforts to curb the spread of the virus (Sahinaslan et al., 2021)**..** This preventive aspect highlighted the resilience and adaptability of M-payment systems in addressing unforeseen challenges and catering to evolving consumer preferences during crisis situations.

The status of M-payment both pre and post-COVID-19 pandemic exhibited notable changes worldwide. Before the pandemic, M-payment adoption was steadily increasing, driven by technological advancements and changing consumer preferences (Gai et al., 2018)**.** However, the onset of COVID-19 accelerated this trend, leading to a significant uptick in M-payment usage across various regions. Post-pandemic, M-payment systems became more ingrained in daily routines, with consumers relying on them for a wide range of transactions beyond just retail purchases.

In Hungary, the impact of COVID-19 on M-payment adoption followed a similar trajectory to global trends. Before the pandemic, Hungary had a relatively low adoption rate of digital payment methods compared to other European countries **(Kranjec, 2021).** However, the necessity for contactless transactions during the pandemic prompted a rapid uptake of M-payment solutions among Hungarian consumers and businesses. Post-COVID-19, M-payment usage continued to grow as consumers embraced the convenience and safety offered by M-payment platforms.

One notable aspect of M-payment adoption post-COVID-19 is its appeal to digital immigrants, referring to individuals who are less accustomed to using digital technologies. The pandemic served as a catalyst for this demographic group to overcome barriers to adopting mobile payment solutions, driven by the necessity for safer transaction methods. As digital immigrants recognized the convenience and benefits of M-payment, they became more willing to embrace and integrate these technologies into their daily lives, contributing to the broader expansion of mobile payment usage in the post-pandemic landscape

2.2.1 Impact of COVID-19 pandemic on consumer behaviour

COVID- 19 has shaken humanity in unprecedented ways, infecting hundreds of millions and putting millions out of work (Hensher, 2020). The loss of lives, jobs, and livelihoods are clearly defined impacts of the COVID- 19 virus, but the loss of everyday socio economic life over an extended period of time has lasting effects on people (Salami *et al.*, 2021). The lockdowns and self-isolations imposed by the novel coronavirus COVID- 19 has increased psychological stress and led to behavioural changes (Crosta *et al.*, 2021). Under the constant fear of infection and movement restrictions, people become more health conscious and change their lifestyle and consumption patterns (Sánchez-Sánchez *et al.*, 2020). According to preliminary studies, the nature and magnitude of the impact of COVID-19 vary by age, socioeconomic status, and other demographic factors (Pullano et al., 2020, p. 19).

As a result of the social, economic, and psychological impacts of COVID- 19, people have changed their purchasing habits (Salami et al., 2021). (Kirk and Rifkin, 2020) argue that consumers interact, adapt, and adjust to environmental stresses such as the COVID- 19 pandemic. (Pantano et al., 2020) (Laato et al., 2020) discussed that consumers engaged in a number of unusual behaviours during the pandemic that compelled them to spend more on necessities and less on non-essentials. In addition, consumers were observed to switch brands and products, and become more health and hygiene conscious. Market research on the impact of COVID- 19 on consumers has also revealed an increase in spending on food and health and hygiene products (Sehgal *et al.,*

2021). These changes have led researchers to examine consumer behaviour during the pandemic and its causes. The COVID- 19 -induced behaviours that have been studied include consumption shifts (Pakravan-Charvadeh et al., 2021) (Keane and Neal 2021, p. 19), hoarding, and panic buying (Keane and Neal, 2021, p. 19) (Billore and Anisimova, 2021) (Prentice et al., 2021), impulse buying (Naeem, 2020, p. 1), product substitution and brand preferences (Knowles et al., 2020).

2.2.2 The preventive role of M-Payment

Every nation on earth has been affected by the COVID- 19 epidemic. COVID- 19 originated in China and is now widespread worldwide. Social isolation and hand washing are two techniques for preventing the spread of this virus. The world has been suffering lockdown despite the fact that we need buy and pay for daily necessities. However, the cash transfer procedure necessitates manual exchange, which raises the risk of COVID- 19 transmission.

According to health experts, transmission to humans occurs mainly through droplets from the breath, mouth, or nose when an infected person coughs, sneezes, or exhales (Zhou, Ayeh, et al., 2021). As long as the virus is transmitted in this way, health organizations and governments have taken safety measures to reduce the likelihood and risk of infection. These include maintaining social distance, wearing masks and gloves, and avoiding touching surfaces that may have been contaminated by an infected person. In this pandemic environment of COVID- 19 , banknotes and vending machines become unsafe surfaces to interact with. Thus, the COVID- 19 epidemic has changed the way people handle their financial activities. Consumers are moving to contactless payment methods as they are secured payment methods that prevent physical contact with surfaces (Sahinaslan et al., 2021). Following the COVID- 19 outbreak, policymakers have called for a significant shift in the current payment system to cashless payments. Saudi Arabia has set a goal of achieving cashless transactions by the end of this decade. 70 percent of payments must be cashless by the end of this decade, up from 36 percent in 2019 (Welch, 2021).

The COVID- 19 pandemic has led to the expansion of contactless digital technologies for the benefit of customers and businesses (Ofosu-Ampong and Acheampong, 2022). It has been reported that online shopping is on an increasing curve since the pandemic started (Runkel, 2020). Contactless payment is one of the preferred options in the current COVID- 19 pandemic situation because they are convenient and contactless, which prevents transmission of the virus. This kind of payment services allow users to make payments without having to physically interact with cash or payment points (Sahinaslan *et al.*, 2021). Contactless M-Payments allow users to pay for their purchases by remotely holding their phone in front of a point-of-sale terminal or by paying online

with their mobile device (Srivastava *et al.*, 2021). In recent period, the adoption of contactless payments has increased rapidly, and consumer and merchant preference for contactless payment platforms is growing (Yu and Chen, 2022). Given the current emphasis on security and social distance, the ability to accept contactless payments will be a key factor influencing M-Payment adoption behaviour. During the lockdown, nearly 42% of Indians increased their use of digital payment options, indicating strong user interest in adopting these services (Srivastava *et al.*, 2021).

Furthermore, the MasterCard study showed that eight out of ten of its clients declared that they use contactless cards in their payments. The same report revealed that contactless payments grew 2.5 times faster than non-contactless payments in the Asia Pacific region as people look for safer means to conduct their business transactions (Mastercard, 2020). Nonetheless, online payment may help reduce the risk of exposure to viruses and germs. It is also considered as a valuable data source for banks, payment platforms, and Fintech companies and helps them understand consumers' purchasing behaviour.

2.2.3 Status of M-Payment pre and after COVID-19 pandemic worldwide

During the last decade, banks and Fintech companies have spent massive investments to digitize their banking services and stimulate consumers to adopt them instead of traditional banking services such as ATMs and Bank branches. In a report released in May of 2018, The Deloitte canter for Financial Services had surveyed 17,100 bank customers from 17 different countries to measure the current state of banks' digital engagement. The results indicate that customers showed high intention for banking digital engagement in their banks. However, ATMs and branches are still the banking customers' primary choice to get cash and perform their banking services (Deloitte, 2018).

Given the near ubiquity of mobile devices, it is not surprising that global adoption of M-Payment systems is increasing and driving the growth of cashless transactions. Mobile money services have spread rapidly in African, Asian and Latin American markets, and have fuelled the global growth of consumer M-Payment services by enabling hundreds of millions of people to make their first electronic transactions (Tighe, 2020). China leads the world in the use of M-Payments in proximity 81% of smartphone users have made a nearby M-Payment in 2021. This compares to a usage rate of 41% in second-place Denmark (de Best, 2022). It is estimated that there will be 1.31 billion M-Payment users globally in 2023, up from 950 million in 2019 (Statista Research Department, 2022). Before the pandemic, in- store payment was the most preferred payment mode worldwide. In-store transactions accounted for 41% of all daily transactions, but digital payments

accounted for 59% of all consumer payment transactions (Hoyman, 2019). Figure 3 shows the most popular payment method according to internet users worldwide in 2017.

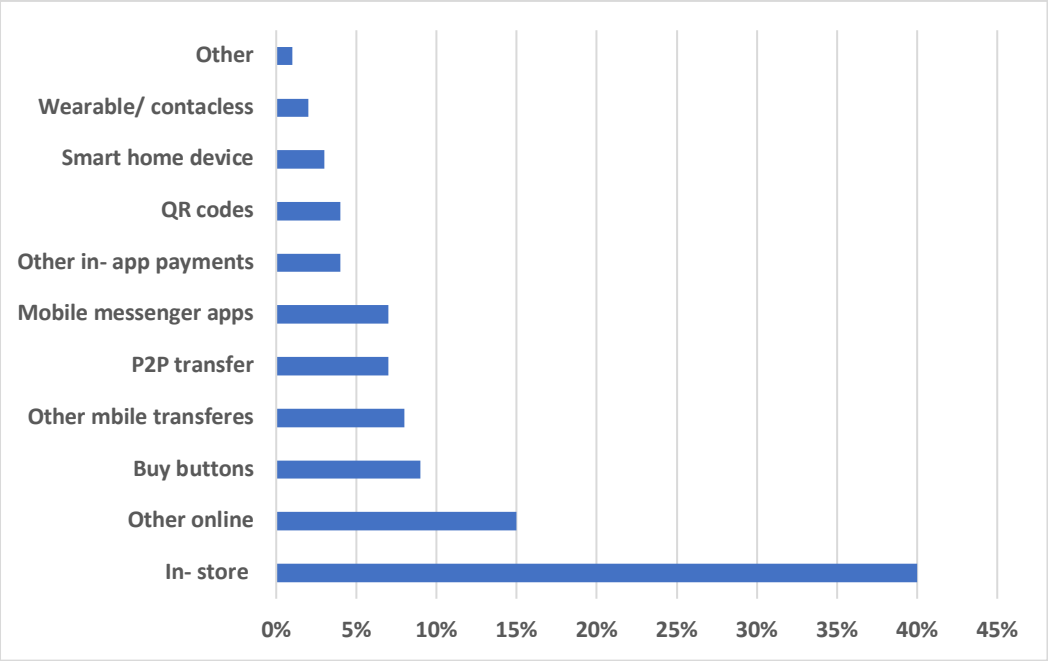

Figure 3. Most popular payment method worldwide in 2017

Source: (van Gelder, 2023)

When the pandemic forced people to stay home and close stores, In-store retail sales fell dramatically. Nonetheless, online retailing flourished as Internet users shopped online for a variety of products, including food (Abrams, 2021). The global M-Payments market was valued at $40.59 billion in 2021 (Grand View Research 2022). As figure 4 shows, the M-Payments market in the United States is valued at $9.1 billion in 2021 and is expected to grow at a compound annual growth rate (CAGR) of 35.3% between 2022 and 2030 (Grand View Research 2022). The market expansion can be attributed to reasons such as expansion of the m-commerce industry and global smartphone penetration. Due to the problems created by the COVID- 19 epidemic, both e-commerce and traditional businesses are focusing on adapting to the changing customer behaviour, including cashless payment alternatives via mobile devices. The growth of the market during the forecast period is expected to be driven by the above factors.

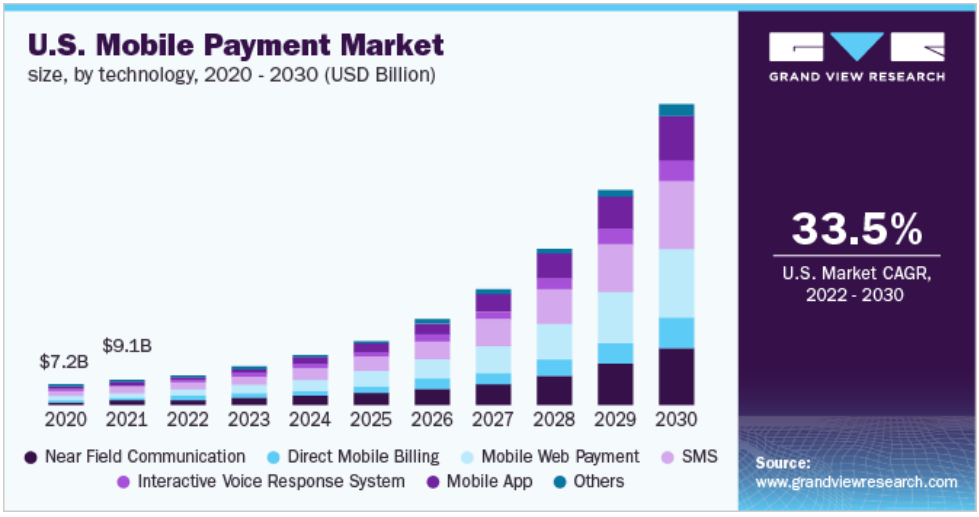

Figure 4. U.S M-Payments market

Source: (Grand View Research 2022)

2.2.4 Status of M-Payment pre and after COVID-19 pandemic in Hungary

The Hungarian payment system is dominated by cash. According to the Magyar Nemzeti Bank (MNB), around 80% of payments in 2019 were cash based (Eszter Hergár, 2019). To drive financial inclusion forward, Hungary should put more efforts to promote FinTech services in the country. Reports indicated that around 74.4% of Hungarians are banked (Patrick Brusnahan, 2019). Furthermore, the Internet and smartphone penetration rate are considered as important enablers for Fintech adoption and as main factors for financial inclusion (Lewan, 2019). In Hungary, internet user penetration rate stood at 76.87% and smartphone user penetration rate at 74.19 % in 2020, and they are expected to reach 80.25% and 85% respectively by 2025 (Laricchia, 2022).

As a result of the crisis COVID- 19, digital technology adoption in Hungary rose from 79% to 95% as same as other European countries, an increase that would take three years in most other industries at pre-pandemic growth rates (Fernandez et al., 2020). Figure 5 shows the average digital adoption before and after the pandemic in Europe. Based on the data, the pandemic shrunk the gaps among European countries in term of online participation. The increasing use of mobile phones and the expansion of the e-commerce sector, especially during the coronavirus pandemic, have accelerated the digital adoption in Europe, and Hungary market is not an exception.

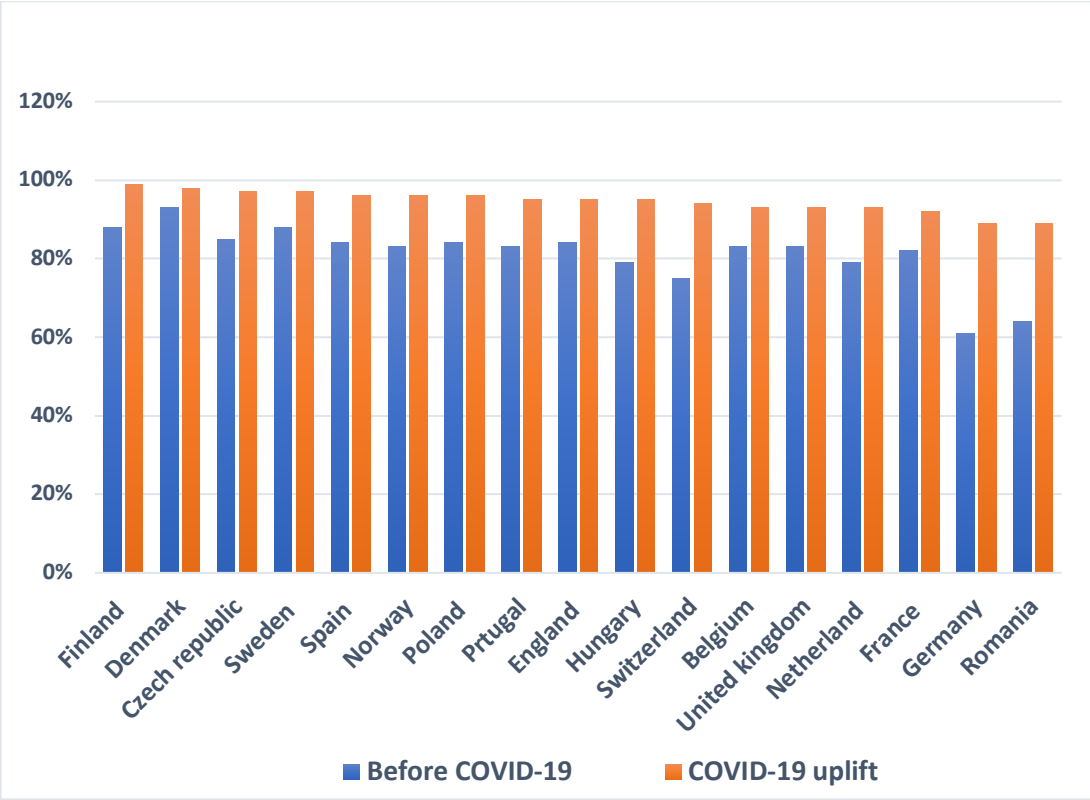

Figure 5. Average digital adoption before and after the pandemic in Europe

Source: Mckinsey & Company

Furthermore, millions of people in European countries prefer cashless payments to cash and credit cards. According to Finaria, Europe will showed the largest growth in digital payments in 2021, with the value of transactions increasing 28.3% to $1.17 trillion. By 2025, the value of the entire business is expected to reach $1.95 trillion, continuing the industry's remarkable upward trend (Kranjec, 2021). Meanwhile, the increase in the average transaction value per user in the digital payments segment in Hungary was noticeable, as it reached an average of $869 per user in 2020 compared to $728, $752, and $756 in the past 3 years respectively (Statista 2022). Additionally, it is projected by Statista, a company that specializes in market and consumer data, that the total transaction value of digital payments in Hungary will reach $6.566 billion in 2022, and is expected to show an annual growth rate of 15.67% yearly from 2022 to 2027 (Statista 2022).

The significant increase of deaths caused by COVID- 19 makes it important to adopt new contactless behaviours. Table 1 shows the number of deaths, as well as in the COVID- 19 disease in Hungary. The death rate caused by COVID- 19 constitutes 6.4% of total deaths in Hungary at the end of 2020, and reached 16% of total deaths by the end of 2021.

Table 1. The number of deaths, as well as in the COVID- 19 disease in Hungary

Sex	Total Deaths in 2019	Total Deaths in 2020	Deaths caused by COVID-19 in 2020	% COVID-19 to the Total deaths in 2020	Deaths in 2021	Deaths caused by COVID- 19 in 2021	% COVID-19 to the Total deaths in 2021
Male	62843	68661	4615	**9.3%**	77099	12839	**16.7%**
Female	66760	72341	4369	**6%**	78522	11999	**15.3%**
Total	129603	141002	8984	**6.4%**	155621	24838	**16%**

Source: (KSH Demográfiai Táblázó (Demo), 2021)

The Hungarian government, like many others, acted quickly to promote cashless payments and reduce physical contact at the point of sale. The maximum amount that can be paid without a PIN code has been raised from HUF5,000 to HUF15,000 (£36/€42) in 2020, and in the fourth quarter of 2020 alone, the number of POS terminals at merchant acceptance points increased by 7 percent as consumers increasingly make contactless payments (Bakonyi, 2021). In part, this reflects merchants' efforts to change consumer payment preferences. Whether you agree with this view or not, it is undeniable that contactless technology has enabled a huge transformation. It is predicted that the use of card payments in Hungary will continue to grow as this method becomes more popular. In addition to various alternative payment methods, the use of smartphones that utilize the NFC capabilities of the existing payment terminal infrastructure will also increase. However, As figure 6 shows that noncash the contactless card remains the preferred payment method of Hungarians followed by E-Payments since the COVID- 19 pandemic as it offers security, convenience, comfort and health safety (Bakonyi, 2021) (Medve Flora, 2021). Figure 6 shows The distribution of E-commerce payments in Hungary in 2021.

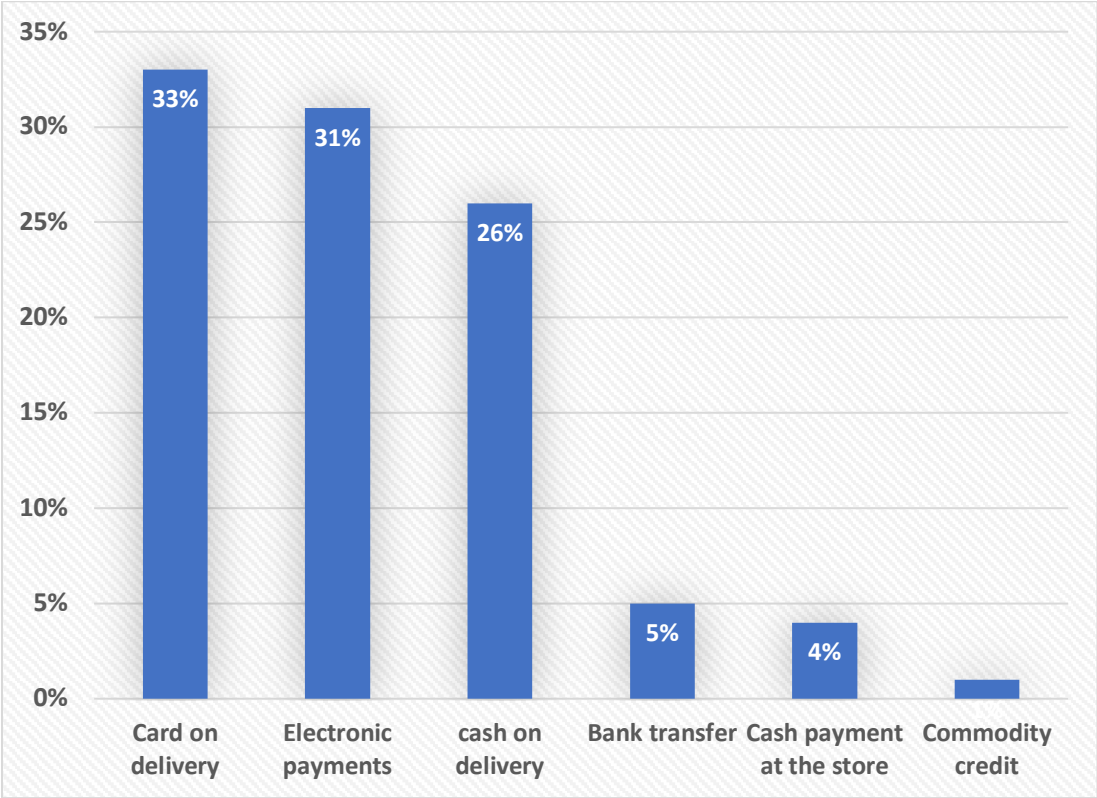

Figure 6. Distribution of E-commerce payments in Hungary

Source : Statista, 2021

2.2.5 Digital immigrants usage of M-Payment in post COVID-19

The COVID- 19 pandemic spread to most parts of the world and the virus transmission affected people of all ages. Yet, as mentioned above, disease complications varied amongst different generation segments. For instance, Baby Boomers, those born before 1965, face greater risk of disease complications. Clinical assessment of the pandemic suggests that older generations with underlying health problems are more susceptible to COVID- 19 (Javadi and Nateghi, 2020). In May 2020, nearly 70% of coronavirus-related deaths in the United States involved people aged 65 years and older. The percentage is similar in different countries around the world. Transmission of COVID- 19 virus can be reduced by physical separation and routine disinfection of areas that are frequently touched. Given the danger posed by COVID- 19 -contaminated surfaces and the vulnerability of baby boomers to the virus, it is appropriate for financial institutions to use the pandemic as part of an emotional appeal to encourage baby boomers to embrace M-Payments.

In the Hungarian context, Figure 7 shows the deaths rate by age segments in Hungary in 2022, the death rate among Hungarians is increasing by age, and it significantly high among Digital Immigrants compared to Digital Natives. Digital Natives, individuals born before 1980, was selected in this study due to the fact First the average age of the population in Hungary was 43.3

years in 2020, and it is expected to reach 45.1 years by 2025, suggesting that Digital Immigrants may represent the age of Hungarian society (O'Neill, 2023, pp. 1950–2100). Therefore, this generation is more likely to take preventive measures to avoid infection (World Health Organization [WHO], 2020).

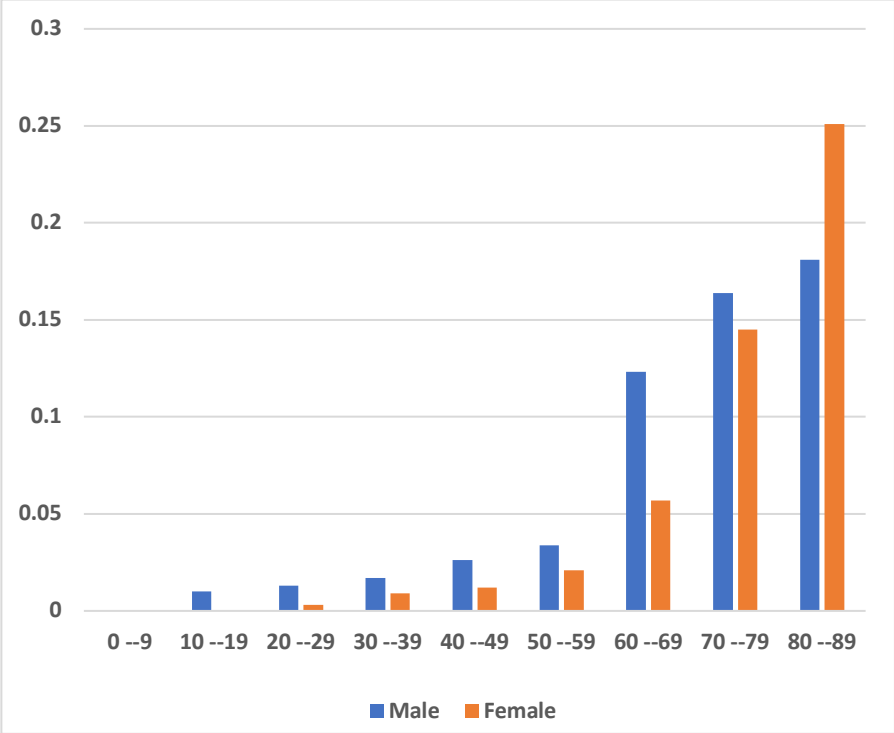

Figure 7. Deaths rate by age segments in Hungary in 2022

Source: (PANDEMIA.HU, 2022)

Historically , the baby boomers /elderly market has been characterized as inactive, lonely, relying only on health and medical care products and services, and reluctant to adopt the latest technologies (Babin et al., 2021) (Kumar and Lim, 2008). In comparison, the current generation of baby boomers has greater purchasing power, lower technology anxiety, and higher Internet use (Kumar and Lim, 2008). Because of their income position, baby boomers are crucial consumers of luxury goods, retail, hospitality, and tourism (Babin et al., 2021). In industrialized nations such as the United States, baby boomers are reportedly wealthier than the previous generation, and they control three-quarters of the country's financial wealth (Davis et al., 2006). This suggests that today's baby boomers are different from those of the past. Since marketers typically use age groups to identify market segment needs, it is critical to understand the behaviour of this market; hence the significance of including this generation in this study.

Interestingly, Generation X is considered as the most willing of all generation segments to adhere to social distancing measures (Stiege Cory, 2020). Generation X is considered risk-averse people, given that they are at an age where the risk of negative complications increases when contracting diseases. Moreover, Generation X is considered the backbone of the family; they often have children who need care and older adults who require assistance and support as well. (Blue@Work, 2020). Portal & Sanchez (2017) argued that age would be one of the main factors affecting the level of engagement with technology (Calvo-Porral and Pesqueira-Sanchez, 2019). However, studies indicate that Generation X moves toward digital adoption in similar pattern to that of Generation Z and Millennials. Based on a survey conducted by Pew research center to measure the level of technology adoption amongst different age generations in the US, the research revealed that there is significant growth in technology adoption amongst old generations. More specifically, it reaches around 90% in Generation X (EMILY A. VOGELS, 2019). The situation is not much different in the rest of Europe as indicated by Global Web Index report which showed a significant increase in the use of smartphones amongst Generation X, and that they are considered a highly engaged audience to digital services. The report also states that the reasoning behind such adaptation is due to the fact that the majority of Generation X are busy professionals, most of them have families, and often they have significant purchasing power. Furthermore, such rigorous lifestyle and the limitation of available time for Generation X, makes the use of digital services as an effective and quick tool to carry out their professional and commercial daily activities (Mander and Valentine, 2019).

Since direct contact with humans and surfaces is a major factor in transmitting infection, it has become important for people in general and those who are old in specific to avoid direct contact when completing their commercial and banking transactions. It has been reported that online shopping is on an increasing curve since the pandemic started (Runkel, 2020). Furthermore, the MasterCard study showed that eight out of ten of its clients declared that they use contactless cards in their payments. The same report revealed that contactless payments grew 2.5 times faster than non-contactless payments in the Asia Pacific region as people look for safer means to conduct their business transactions (Mastercard, 2020). Nonetheless, online payment may help reduce the risk of exposure to viruses and germs. It is also considered as a valuable data source for banks, payment platforms, and Fintech companies and helps them understand consumers' purchasing behaviour.

2.3 Theoretical foundation and hypotheses formulation

The theoretical foundation of this study is anchored in three key theories: the Theory of Planned behaviour (TPB), Technology Continuance Theory (TCT), and Protection Motivation Theory (PMT). These theories serve as pillars for understanding the behavioural dynamics and motivations behind the sustained use of mobile payment technologies among digital immigrants in the aftermath of the COVID-19 pandemic. The Theory of Planned behaviour (TPB) posits that individuals' intentions to perform a behaviour are influenced by their attitudes, subjective norms, and perceived behavioural control. In the context of mobile payment usage, this theory suggests that digital immigrants' intentions to continue using mobile payment platforms are shaped by their perceptions of the technology's usefulness, societal norms regarding its adoption, and their perceived ability to utilize it effectively.

Technology Continuance Theory (TCT) extends the understanding of technology adoption beyond initial acceptance to sustained usage over time. It emphasizes the role of post-adoption factors such as satisfaction, habit, and perceived switching costs in determining users' continued engagement with a technology. In our study, TCT provides insights into the factors that contribute to digital immigrants' ongoing use of mobile payment services, considering the evolving socio-technical landscape post-COVID-19.

Protection Motivation Theory (PMT) focuses on individuals' cognitive processes related to threat appraisal and coping appraisal when faced with potential risks. In the context of mobile payment adoption, PMT helps elucidate how digital immigrants assess the security and privacy concerns associated with using these platforms and the strategies they employ to mitigate perceived risks. Understanding these motivational factors is essential for predicting and promoting sustained usage among this demographic.

Based on the theoretical foundation provided by TPB, TCT, and PMT, we formulate hypotheses that align with the constructs inherent in these models. These hypotheses will explore the relationships between key variables such as attitudes towards mobile payment, subjective norms, perceived behavioural control, satisfaction with mobile payment services, habit formation, perceived switching costs, threat appraisal, coping appraisal, and the sustained use intention of digital immigrants. Through rigorous empirical investigation, we aim to validate our proposed model and hypotheses, thereby contributing to a deeper understanding of the factors driving digital immigrants' sustained use of mobile payment technologies in the post-COVID-19 era. By integrating insights from multiple theoretical perspectives, our research endeavours to offer

practical implications for stakeholders in the mobile payment industry, policymakers, and researchers interested in the intersection of technology adoption, risk perception, and behavioural sustainability.

2.3.1 Theoretical foundation

In this study, several theoretical frameworks were used to explain the sustainable adoption of M-Payments in the post- COVID- 19 era. The proposed model integrates three theories TPB, TCT, and PMT. While, TBP is the extension of Theory of Reasoned Actions (TRA), TCT built based on the constructs of Technology Acceptance Model (TAM), and Expectation Confirmation Model (ECM) (Ajzen, 1991) (Liao et al., 2009). TCT, developed by integrating TAM and ECM, focuses on predicting and explaining users' continuous usage intentions. It includes constructs such as confirmation, perceived usefulness, perceived ease of use, satisfaction, attitude, and continuous intention. Notably, TCT's combination of satisfaction and attitude enhances its explanatory power, making it suitable for studying continuous intention in various adoption phases, including post-adoption.

PMT, a framework for studying social and health behaviours, assesses individuals' protective motivation in response to perceived threats (Van Bavel *et al.*, 2018). It comprises threat appraisal (perceived vulnerability and severity) and coping appraisal (responsiveness and self-efficacy). PMT has been applied extensively in technology adoption contexts, particularly during the COVID-19 pandemic, where M-Payment adoption serves as a protective health behaviour against the virus. The integration of these theories provides a comprehensive framework for understanding the sustainable adoption of M-Payments. TPB addresses behavioural intentions, TCT focuses on continuous usage intention, and PMT accounts for the influence of perceived threats and coping mechanisms, particularly relevant in the pandemic context. This multi-theoretical approach allows for a nuanced examination of factors shaping M-Payment adoption behaviour, considering both individual motivations and external threats.

Furthermore, the study acknowledges the evolving landscape of technology adoption, especially in response to global health crises like COVID-19. It recognizes the role of M-Payments as a preventive health behaviour, aligning with recommendations for contactless digital payment methods to mitigate virus transmission risks. By integrating PMT's threat and coping appraisals, the study aims to elucidate the complex interplay between perceived threats, self-efficacy, and continuous intention to adopt M-Payments, thus contributing to both theoretical understanding and practical interventions in the post-pandemic era.

In summary, this study leverages a multi-theoretical approach encompassing TPB, TCT, and PMT to explore the sustainable adoption of M-Payments, recognizing their significance in the post-COVID-19 landscape. It underscores the importance of understanding individual motivations, perceived threats, and coping mechanisms in shaping adoption behaviour, offering valuable insights for policymakers, businesses, and researchers alike.

2.3.1.1 Theory of Planned Behaviour (TPB)

(TPB) is an extension of the Theory of Reasoned Action (TRA), which is often used to explain consumer behaviour (Ting et al., 2016) . One determinant of intention is missing from the TPB model, and that is perceived behavioural control. (Ajzen, 1991). adopted the determinant of perceived behavioural control to predict a person's behavioural intentions that are not fully under his or her control. Perceived behavioural control is the degree of ease or difficulty that consumer perceives when performs a certain behaviour (Thakur and Srivastava, 2014). The more resources and opportunities a person has to anticipate obstacles occur, the greater his or her ability to control behaviour (Ajzen, 1991). The greater a person's perceived behavioural control, the greater his or her motivation to engage in certain behaviour (Ajzen, 1991).

This theory is also well explained and used to examine the adoption and influence of new information systems such as networks, social media, e-banking, M-Payment applications, etc. (Almajali, 2018) (Liébana-Cabanillas, Ramos de Luna and Montoro-Ríos, 2017) (McLaughlin and Stephens, 2015). It is comprehensive and includes three dimensions attitude, subjective norms , and perceived behavioural control. In addition, TPB is a well-known theory to explain human behaviour and intention to use technology. Figure 8 shows Theory of Planned Behaviour constructs.

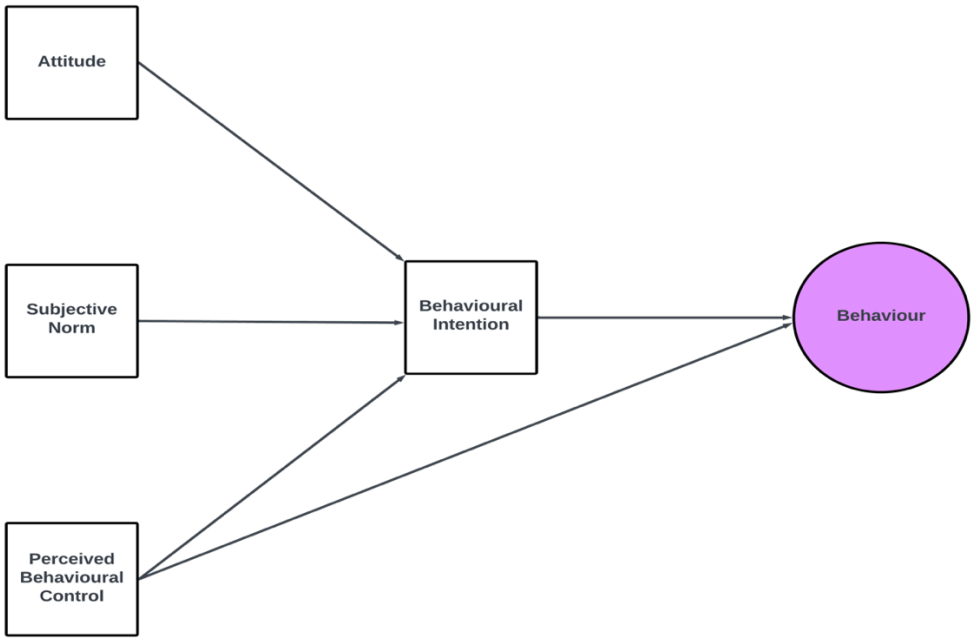

Figure 8. Theory of Planned Behaviour

Author's own construction- based on (Ajzen, 1991)

2.3.1.2 Technology Continuous Theory (TCT)

TCT was developed by Liao et al. (Liao et al., 2009) as a theory to predict and explain information system acceptance and users' continuous usage intention. TCT was developed by integrating three popular I.S. models: TAM, ECM, and Cognitive Model (COG) into one integrated model (Davis, 1989) (Bhattacherjee, 2001) (Oliver, 1980). While TAM proposed perceived usefulness and perceived ease of use as the main parameters to study the user acceptance of a technology (Hubert *et al.,* 2019). ECM relied on satisfaction as the main parameter to determine the user's continuous intention to use technology (Foroughi et al., 2019). COG states that continuous behavioural intention is determined by satisfaction and attitudes (Oliver, 1980). According to Liao et al. (Liao *et al.,* 2009), TCT provides a solid foundation for assessing the user's continuous intention. The theory includes six constructs from the previously mentioned models, namely: confirmation, perceived usefulness, perceived ease of use, satisfaction, attitude, and continuous intention.

The significant contribution of TCT was the combination of satisfaction and attitude in one model, which increased the explanatory power of the dependent variable (continuous intention). In addition to the functional value of using a system, the inclusion of attitude in the model adds meaning to the symbolic/emotional value of the user (Khayer and Bao, 2019). TCT represents a fundamental improvement over ECM, TAM and COM. The model also shows superiority over the previously mentioned models due to its applicability in different life cycles (initial, short term and

long term) adoption (Liao *et al.*, 2009). Several researchers have used TCT to determine the continuous intention to use banking and payment systems (Foroughi *et al.*, 2019) (Khayer and Bao, 2019) (Rahi *et al.*, 2020). (Foroughi *et al.*, 2019) have confirmed the high exploratory power of TCT in explaining users' perceived usefulness of variables that influence users' continuous intention to use m-banking. (Khayer and Bao, 2019) developed an integrated model between Context Awareness Theory and Technology Continuance Theory to investigate users' continuous intention of Alipay payment platform. The study found that all TCT constructs except perceived ease of use significantly influence users' continuous choice. According to (Rahi *et al.*, 2020), decision makers in the banking sector should focus on expectation confirmation, perceived usefulness, and satisfaction to ensure users' continuous intention to use e-banking services. Therefore, TCT was used in this study due to the high explanatory power that the model exhibits in determining the post-adoption phase. Figure 9 shows The Technology continuous Theory constructs.

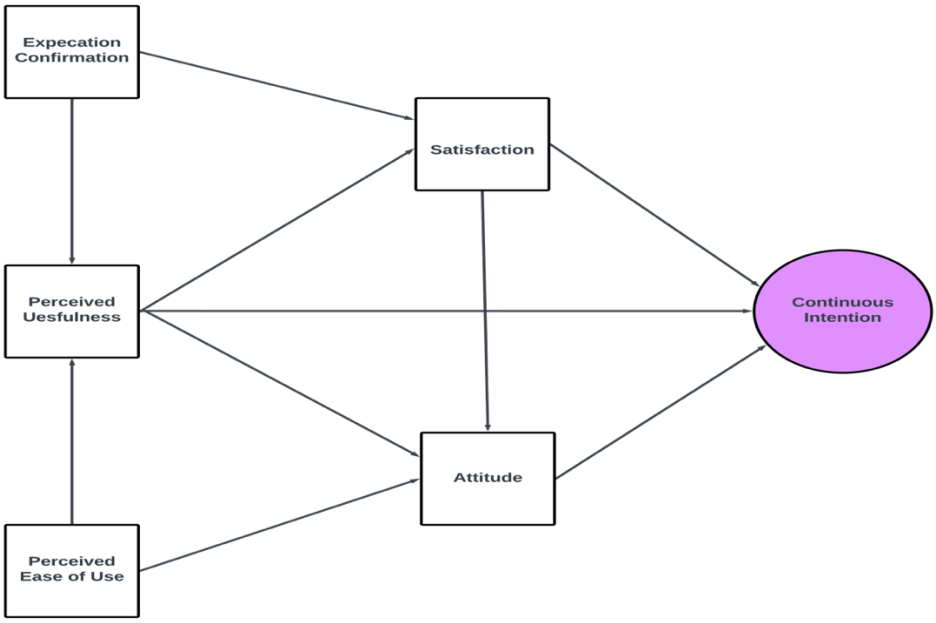

Figure 9. Technology continuous theory (TCT)

Author's own construction- based on (Liao *et al.*, 2009)

2.3.1.3 Protection Motivation Theory (PMT)

Rogers' PMT is a useful framework for studying people's social and health behaviours (Siponen *et al.*, 2014). Threat appraisal and coping appraisal are two dimensions of protection motivation theory (Rippetoe and Rogers, 1987). In other words, threat appraisal and coping appraisal influence individuals' protective motivation behaviour in response to a perceived threat. Threat appraisal consists of two components: perceived vulnerability and perceived severity. While,

coping appraisal is the combination of responsiveness and self-efficacy in dealing with a perceived threat (Rogers 1975). From a cognitive perspective, behaviours are made based on rational expectations. The PMT considers a perceived health threat, self-efficacy as determinants of willingness to act based on health circumstances. The model assumes that people who anticipate a health threat are more willing to engage in a particular health behaviour (Champion and Skinner, 2008). Perceived health threat consists of perceived susceptibility (P-SUS) and perceived severity (P-SEV). Glanz et al. (Glanz *et al.*, 2008) argued that people are more likely to perform a particular action if they expect that such action will reduce a severe illness. Protection motivation theory has been widely used and validated to assess an individual's protection behaviours in a variety of contexts, including health care systems (Chen and Lee, 2008), anti-spyware software (Liang and Xue, 2010), online harassment (Lwin et al., 2012), and mobile health services (Lv et al., 2012).

PMT has been widely used in the technology adoption literature (Van Bavel *et al.*, 2018) (Fischer-Preßler *et al.*, 2022) (Nguyen and Tang, 2022). The high prevalence and mortality of coronavirus disease have placed it at the top of the global health and social priority list. However, this disease can be greatly reduced by following hygiene principles and protective behaviours. Identifying the processes involved in protective health behaviours appears to be effective in planning and implementing appropriate interventions to encourage the community to adopt protective behaviours. Therefore, (Ezati Rad *et al.*, 2021) used PMT, to predict preventive behaviours in COVID- 19 adult Iranians. (Aji *et al.*, 2020) reported that the COVID- 19 outbreak negatively affected Indonesian and Malaysian customers' intention to use physical money. However, it increased the use of E-Wallets in their financial activities. In the same context, M-Payment is viewed as a preventive health behaviour that reduces the possibility of getting infected with the virus (C.C and Prathap, 2020). Whereby cash, banknotes, and contacted payment tools could help the spread COVID- 19 , the WHO encouraged consumers to adopt the contactless digital payment methods in their financial activities (Durr, 2020). PMT alone cannot explain behavioural adoption related to technology. (Srivastava *et al.*, 2021) integrated PMT and UTAUT to understand the factors influence Indians to use contactless payment services during the pandemic. Results showed that both threat and coping appraisal had a positive influence on intention to use contactless payments. In the context of our study, M-Payment adoption during the COVID- 19 pandemic can be considered a protective health behaviour. Consumers expect M-Payments to suppress the risk of contracting the SARS-2 virus. They would be more likely to adopt a M-Wallet if their expectations were confirmed. Since the use of remote payments has become inevitable during the pandemic, the study considers the perceived threat of COVID- 19 which includes perceived

susceptibility and perceived severity as antecedents to confirm the expectation of M-Payment adoption. The study also considers perceived self-efficacy as a critical factor to determine the continuous intention to adopt M-Payments in the future as well. Figure 10 shows The Protection Motivation Theory constructs.

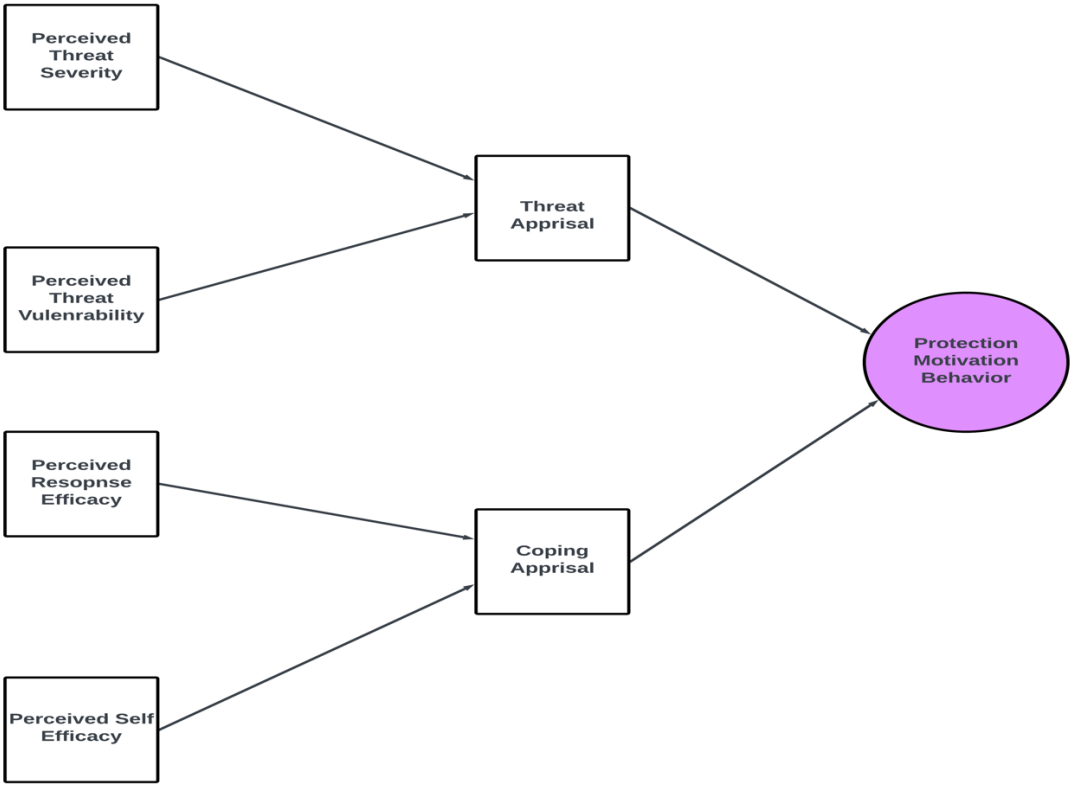

Figure 10. Protection Motivation Theory (PMT)

Author's own construction- based on (Rogers 1975).

2.3.2 Hypotheses development

In this study, several models are used to examine the factors that influence consumers' intentions to continue using digital wallets. Appendix 2 provides definitions of the constructs that comprise the research model. Based on TCT, attitude, satisfaction and perceived usefulness are the most important predictors of intention to continue using. Meanwhile, confirmation and perceived ease of use are the drivers of perceived usefulness.

The exploration of consumers' intentions to continue using digital wallets is essential in understanding the dynamics of digital payment adoption. In this study, we delve into this phenomenon by employing various theoretical frameworks, including the TPB, TCT, and PMT.

These models offer comprehensive lenses through which to examine the multifaceted factors shaping individuals' decisions regarding the sustained usage of digital wallet services.

Central to our investigation is the construct of the TPB, which posits that behavioural intentions are influenced by attitudes, subjective norms, and perceived behavioural control. Through the lens of TPB, we aim to dissect the cognitive processes underlying consumers' intentions to continue using digital wallets. Moreover, TCT provides a valuable framework for understanding the determinants of continued technology usage. TCT emphasizes the role of factors such as attitude, satisfaction, and perceived usefulness in shaping individuals' intentions to persist with digital wallet adoption.

Building upon the foundation laid by TCT, we further integrate the insights of PMT into our research framework. PMT underscores the significance of threat appraisal and coping appraisal in motivating protective behaviours. By incorporating PMT, we seek to elucidate how perceptions of security and risk mitigation influence consumers' decisions to continue utilizing digital wallets. Through the synergistic integration of these theoretical perspectives, we aim to offer a comprehensive understanding of the complex interplay of factors driving digital wallet continuance.

In alignment with the theoretical underpinnings of TCT, our research identifies attitude, satisfaction, and perceived usefulness as pivotal predictors of consumers' intentions to persist with digital wallet usage. We posit that individuals' overall attitudes towards digital wallets, coupled with their satisfaction levels and perceived utility derived from these services, significantly influence their propensity to continue using them. Moreover, confirmation and perceived ease of use emerge as crucial drivers of perceived usefulness, as per the tenets of TCT. Understanding these underlying mechanisms is imperative for devising effective strategies to promote sustained digital wallet adoption.

As we navigate the intricacies of consumers' intentions to continue using digital wallets, it becomes evident that a nuanced understanding of their perceptions and motivations is essential. Through our utilization of diverse theoretical frameworks, including TPB, TCT, and PMT, we endeavour to unravel the multifaceted determinants shaping individuals' decisions in this domain. By shedding light on factors such as attitudes, satisfaction, perceived usefulness, and threat perceptions, our study aims to offer valuable insights for both academia and industry practitioners seeking to foster the continued uptake of digital wallet technologies.

2.3.2.1 Confirmation (CF)

Confirmation is insofar as the current usage experience confirms the initial expectations (Oghuma *et al.,* 2016). ECM indicates that confirmation of expectations positively affects perceptions of usefulness and satisfaction of IT products and services (Bhattacherjee, 2001). which is consistently confirmed by prior studies (Chiu et al., 2020) (Khayer and Bao, 2019) (Rahi et al., 2020) (Pang et al., 2020) (Shiau et al., 2020). According to (Bhattacherjee, 2001), the higher the level of expectancy confirmation, the more useful the system is to the user, the more satisfied the user is with the system, and the higher the user's intention to continue using such a system. Moreover, a study by (Susanto et al., 2016) found that post-use confirmation is important in influencing users' perceptions of using mobile banking services, including perceived usefulness and perceived security. It also has a positive effect on user satisfaction. Confirmation is defined as the user's belief that actual performance when using a particular IT system meets expected expectations (Bhattacherjee, 2001). Previous studies confirmed the significant effect of expectation confirmation on satisfaction and perceived usefulness (Rahi et al., 2020) (C.C and Prathap, 2020) (Foroughi et al., 2019). Consumers are satisfied when they perceive that their expectations of using e-wallet services have been met (Rahi and Abd. Ghani, 2019). Moreover, the user's perceived usefulness increases as a result of the confirmation. In other words: In the initial stages of technology adoption, perceived usefulness is likely to be insignificant. However, confirmation experiences can change this perception as users learn that their initial perceptions were unrealistically low (Foroughi *et al.,* 2019). Similar to (C.C and Prathap, 2020) study and supported by (Humbani and Wiese, 2019) perspective, this study considers the terms confirmation and adoption interchangeably, conceptualizing the experience after the first use of a particular service. In the context of this study, confirmation/adoption of digital wallets represents protective health behaviours during the COVID- 19 pandemic. We therefore hypothesize the following:

H1a: Adoption/Confirmation has a positive impact on digital immigrants' perceived usefulness of M-Payment systems.

2.3.2.2 Perceived ease of use (PEU)

Based on TAM and UTAUT, which represent the base of TCT, perceived ease of use and perceived usefulness are the primary antecedents of behavioural intention in the context of IS adoption (Davis, 1989). In the context of COVID- 19 , (Velicia-Martin *et al.*, 2021) found that TAM had high explanatory power for respondents' intention to adopt a mobile app that indicated whether they were in contact with people infected with COVID- 19 . In the same study, perceived

usefulness and perceived ease of use were found to significantly influence participants' attitude and intention. Other studies also showed similar results (Rizun and Strzelecki, 2020a), (Siti et al., 2021). In the context of this study, perceived ease of use represents consumers' belief that using M-Wallets requires less effort (Davis, 1989) (Hoehle and Venkatesh, 2015). perceived ease of use is considered a significant predictor of consumers' attitude regarding online shopping (Vijayasarathy, 2004). Previous studies also showed the positive effect of perceived ease of use on attitude towards using mobile banking services (Rahi et al., 2020) (Shaikh and Karjaluoto, 2015) (Munoz-Leiva et al., 2019). Likewise, s several studies confirmed the positive effect of perceived ease of use on perceived usefulness related to mobile application usage (Humbani and Wiese, 2019) (Shang and Wu, 2017) (Natarajan *et al.*, 2018). (Ashraf *et al.*, 2016) claimed that individuals believe that it is more efficient to complete their tasks if the new technology is easy to use. According to their claim, a convenient and easy system is accessed more frequently, which would affect the perceived usefulness of such a system. We therefore hypothesize the following:

H2a: Perceived ease of use has a positive impact on digital immigrants' perceived usefulness of M-Payment systems.

H2b: Perceived ease of use has a positive impact on digital immigrants' attitudes toward the continued use of M-Payment systems.

2.3.2.3 Perceived usefulness (PU)

Perceived usefulness is the extent to which a person believes that using a particular IS would improve their job performance (Davis, 1989). Using IS, users can benefit in many ways, such as increased accuracy, efficiency, and speed in completing tasks (Yang *et al.*, 2009). A study by (Rahi *et al.*, 2020) confirmed that perceived usefulness has a significant positive impact on users' intention to continue using internet banking. (Foroughi *et al.*, 2019) also confirmed the significant positive effect of perceived usefulness on users' satisfaction using m-banking. Several other studies have demonstrated the positive relationship between perceived usefulness and continuous usage intention as well as perceived usefulness and perceived user satisfaction (Susanto *et al.*, 2016) (C.C and Prathap, 2020) (Chiu *et al.*, 2020) (Khayer and Bao, 2019) (Shiau *et al.*, 2020). Based on previous literature, we assume that the more benefits users derive from the e-wallet, the more satisfied they are with it and the more likely they will continue using it. Venkatesh et al. (Venkatesh *et al.*, 2003) argue that user behaviour and intention to continue using may depend on the user's belief about the perceived usefulness of a particular system. Thus, consumers may show an intention to continue using M-Wallet if they perceive them to be useful. Previous studies

confirmed the positive effect of perceived usefulness on consumers' intention to continue using mobile or internet banking (Rahi *et al.*, 2020) (Foroughi *et al.*, 2019) (Rahi and Abd. Ghani, 2019). Following TAM and prospect theory and mental accounting, perceived usefulness has a significant positive effect on users' attitude (Davis, 1989) (Kim *et al.*, 2004). (Foroughi *et al.*, 2019) found that consumers' attitude to continue using mobile banking was predicted by perceived usefulness and satisfaction. Several studies have also confirmed the positive relationship between perceived usefulness and user satisfaction (C.C and Prathap, 2020) (Foroughi *et al.*, 2019) (Humbani and Wiese, 2019). Moreover, (Rahi and Abd. Ghani, 2019) argued that perceived usefulness and expectation confirmation are the most important drivers to increase customer satisfaction with internet banking. Therefore, based on the previous literature, we hypothesize the following:

H3a: Perceived usefulness has a positive impact on digital immigrants' satisfaction to continue the use of M-Payment systems.

H3b: Perceived usefulness has a positive impact on digital immigrants' attitudes to continue the use of M-Payment systems.

H3c: Perceived usefulness has a positive impact on digital immigrants' intention towards the continued use of M-Payment systems.

2.3.2.4 Satisfaction (SF)

Oliver (Oliver, 1980), who developed cognitive theory, argued that an individual's behavioural intention can be conceptualized by satisfaction and attitude. Satisfaction refers to "a psychological or affective state related to and resulting from a cognitive evaluation of the discrepancy between expectancy and performance" (Bhattacherjee, 2001). Previous studies have confirmed that satisfaction positively influences users' attitudes (Rahi *et al.*, 2020) (Foroughi *et al.*, 2019). Concerning IS, satisfaction is expected to increase users' intention to continue using the system (Limayem *et al.*, 2007). Hence, higher perceived satisfaction might lead to repeat the usage of IS in the future. According to ECT theory, users' satisfaction positively affects their intention to continue using the same IS) (Brown *et al.*, 2014). This relationship has been confirmed in several studies (Susanto *et al.*, 2016) (C.C and Prathap, 2020) (Chiu *et al.*, 2020) (Khayer and Bao, 2019) (Rahi *et al.*, 2020) (Pang *et al.*, 2020). (Bhattacherjee, 2001) argued that user satisfaction plays a critical role in determining post-adoption behaviour, including continuance intention. At the same time, (Chuah *et al.*, 2017) discussed that consumer satisfaction has a critical impact on consumer loyalty towards a particular product or service. In predicting continuous intention to use a M-

Wallet, satisfaction is a phase of post-use evaluation. In other words, when consumers confirm that using M-Wallet has met their expectations, consumer satisfaction is evident. Therefore, satisfied consumers are more likely to show the intention to use such a system continuously. The ECM suggests that user satisfaction can be considered the most important parameter in determining the user's intention to continue using a particular system (Foroughi *et al.*, 2019). A study by Singh et al. (Singh *et al.*, 2017) indicated the relationship between satisfaction and usage rate of M-Wallet, which found an increase in usage rate when consumers exhibited a significant satisfaction level. We therefore hypothesize the following:

H4a: Satisfaction has a positive impact on digital immigrants' attitudes towards continued use of M-Payment systems.

H4b: Satisfaction has a positive impact on digital immigrants' intention towards the continued use of M-Payment systems.

2.3.2.5 Attitudes (ATT)

According to TCT, attitude is the main driver of users' continuous intention, along with satisfaction and perceived usefulness. Attitude defines the favourable or unfavourable feelings that an individual develops to perform a particular behaviour (Hill *et al.*, 1977). (Davis, 1989) found that attitude has additional explanatory power in understanding the factors influencing users' intention toward a particular system. In the context of continuous use, researchers such as (Rahi and Abd. Ghani, 2019) found that attitude positively influences consumers' intention to continue using Internet banking. (Foroughi *et al.*, 2019) explained similar results when examining predictors of intention to continuously use mobile banking. Accordingly, we hypothesize the following:

H5: Consumer's attitudes have a positive impact on digital immigrants' intention to continue using M-Payment systems.

2.3.2.6 Self-efficacy (SE)

Perceived behavioural control is an individual's belief that he or she can successfully perform a particular behaviour (Bandura, 1977). The concept indicates the individual's internal confidence in his or her ability to accomplish a particular task. Several studies have addressed the role of self-efficacy in the future use of information technology systems (Compeau and Higgins, 1995) (John, 2013) (Alfadda and Mahdi, 2021). Higgins (Compeau and Higgins, 1995) found that self-efficacy positively influences individuals' computer use. It has also been demonstrated that self-efficacy is

a significant determinant in predicting health behaviours (Wei et al., 2020) (Wu et al., 2007). (C.C and Prathap, 2020) confirmed that consumer self-efficacy influenced M-Payment adoption/affirmation COVID- 19 . Self-efficacy has long been associated with perceived ease of use and perceived usefulness in the context of information technology adoption. A study by (Gbongli et al., 2019) showed a significant association of self-efficacy with perceived ease of use and perceived usefulness concerning the use of mobile money services. They interpreted the results to mean that self-efficacy makes users aware of their ability to master such services, which increases the perceived usefulness of mobile money services. Previous studies have shown the role of self-efficacy in predicting users' intention to continue using IS. According to (Foroughi et al., 2019), consumers' intention to continue using mobile banking increases as long as their self-efficacy in using this technology is high. Therefore, since continued intention depends on the willingness and ability to use such a system, we hypothesize the following:

H6a: Perceived self-efficacy is positively associated with perceived ease of use of digital immigrants to use M-Payment systems.

H6b: Perceived self-efficacy is positively associated with continuous intention of digital immigrants to use M-Payment systems.

2.3.2.7 Perceived health risk (PHR)

Perceived threat is one of the determinants of protective behaviour related to health (Paige *et al.*, 2018). According to Paige et al. (Paige *et al.*, 2018), an individual's protective health behaviour changes only when, in addition to perceived threat, adopting such a protective behaviour reduces disease risk. Perceived threat is a combination of two basic constructs, including perceived severity and perceived susceptibility. Such a combination causes people to take protective actions (Rosenstock, 1974). Perceived severity represents beliefs about the degree of harm that will result from a negative outcome of a particular behaviour (Gaube *et al.*, 2019). Perceived susceptibility, also referred to as perceived vulnerability or perceived likelihood, is a person's belief that they may acquire an adverse health outcome due to a particular behaviour (Gaube *et al.*, 2019). Several studies have confirmed the role of perceived severity and vulnerability on intention and actual adoption of mobile health technologies (Wei et al., 2020) (Zhao et al., 2018) (Dou et al., 2017). (Alaiad *et al.*, 2019) have argued that patients who perceive mobile health apps as useful show positive attitudes towards using such technologies once they perceive health threats. The effect of perceived health constructs on perceived usefulness of technology use in relation to health has also been confirmed in other studies (Wei *et al.*, 2020) (Dou *et al.*, 2017).

Moreover, the study by (C.C and Prathap, 2020) showed a high level of perceived severity and vulnerability among Indian consumers during the COVID- 19 pandemic, as well as the direct effect of these constructs on adoption/confirmation and perceived usefulness of M-Payment. The study also found that both constructs indirectly influence consumers' continuous intention through confirmation, perceived usefulness, and satisfaction. In relation to the current study, consumers are expected to adopt M-Wallet as a protective behaviour to avoid the common health hazards of using cash or contact-based payments. We therefore hypothesize the following:

H7a: The health risk of COVID- 19 has a significant positive effect on the Confirmation/adoption of digital immigrants to use M-Payment systems.

H7b: The health risk of COVID- 19 has a significant positive effect on the perceived usefulness of digital immigrants to use M-Payment systems.

2.3.2.8 Subjective norms (SN)

Subjective norms is a critical behavioural intention factor in TRA and TPB (Fishbein and I. Ajzen, 1991; Hill et al., 1977). SN's importance in the technology acceptance field is mainly due to the fact that TRA represents a major theoretical basis for TAM theory development (Momani and Jamous, 2017). While the original TAM did not account for subjective norms (Davis, 1989), (Malhotra and Galletta, 1999), argued the importance of including subjective norms /social factors in TAM prior to the addition of subjective norms to TAM2 in the following year. In the context of M-Payment, subjective norms can be defined as the degree of influence on the individual from their surrounding social environment (family, friends, experts, celebrities) causing him/her to view M-Payment as more desirable (Flavian *et al.*, 2020). Such influence is often described as Opinions/views shared with the individual either face to face or via other means of communications like social media interactions (Oliveira *et al.*, 2016). (Schepers and Wetzels, 2007) conducted a meta-analysis study that investigated the role of subjective norms in TAM. They reported that 91.67% of the examined articles showed significant influence of subjective norms on perceived usefulness which is used in TAM. As well, perceived usefulness found to mediate the relationship between social image and intention of Chinese consumers to use a Facial-Recognition Payment system (Zhang and Kang, 2019).

(Xie *et al.*, 2011) argued that during risky circumstances like SARS, the individual's behaviour is influenced by the social environment. News, safety measures, and concerns of COVID- 19 which is often delivered via traditional media sources, social media, or by other means lead to serious

changes in the way people in Hungary and the rest of the world carry out their usual daily activities. A study by (Koch *et al.*, 2020) found that expert opinions and media reports directly influenced consumers' behavioural intentions in terms of online clothes shopping during the COVID- 19 pandemic. Furthermore, a study by (Revathy and Balaji, 2020), revealed that social influence has encouraged Indian customers to use e-wallet during the COVID- 19 outbreak. It also focused on the role played by family, friends, experts and celebrities to increase the awareness about the risk of physical transactions and priority to avoid it during the pandemic.

In this research we hypothesis that such forms of communications to exchange information and concerns over the current pandemic, represent subjective norms that will impact individuals' choice when it comes to conducting their daily business transactions. More specifically, we predict that subjective norms will affect the BI of Generation X causing them to adopt safety measures such as the use of M-Payment instead of using cash. Therefore, we propose the following hypotheses:

H8a: Subjective norms has positive effect on Perceived health risk of digital immigrants towards using M-Payment systems.

H8b: Subjective norms has positive effect on self-efficacy of digital immigrants to use M-Payment systems.

H8c: Subjective norms has positive effect on continuous intention of digital immigrants to use M-Payment systems.

The definitions of the model constructs are summarized in appendix 2.

2.3.3 conceptual framework

This study proposes a comprehensive model based on the integration of three theories/models (TPB, TCT, and PMT) that can provide a better understanding of the factors that influence Digital Immigrants' intention to continue using M-Payments in the post-COVID- 19 era. Each of the theories related to IT system adoption can make a unique contribution to understanding technology acceptance behaviour (Hubert *et al.*, 2019). However, scholars claim that it is necessary to modify, combine, or extend different theories to understand initial and post-adoption behaviour of technologies (Veeramootoo *et al.*, 2018) (Awa *et al.*, 2017). (Al-Rahmi *et al.*, 2019) proposed an integrated TAM and Innovation Diffusion Theory (IDT) model to investigate the factors that influence the adoption of e-learning systems. (Humbani and Wiese, 2019) developed an integrated

theory framework of ECM and Technology Readiness Index (TRI) to investigate the initial and ongoing intention to use M-Payment apps. Moreover, (Chiu *et al.*, 2020) argued that the integrated ECM and investment model (IM) model helps to better understand the decision-making process of fitness and health app users.

Similarly, the integrated model of TCT and Task Technology Fit (TTF) had significant explanatory power in predicting the continuance intention of internet banking users (Rahi *et al.*, 2020). Regarding the adoption of systems for health purposes, (Ahadzadeh *et al.*, 2015) argue that HBM and TAM are independently unable to explain the cognition and related factors that affect individuals use of Internet health systems. In the context of the present study, COVID- 19 is considered a threat to the overall health of consumers. To the extent that consumers become aware of the severity of COVID- 19 ; and the possibility of becoming infected, they are more likely to make preventative health decisions. Besides, efficacy and the ability to adopt health-related behaviours are considered factors that influence the adoption of one set of protective payment behaviours and the avoidance of another. In a related context, the WHO has recommended that consumers use contactless payment methods to manage their purchasing behaviour. Contact-based payment methods such as cash and banknotes could be carriers of the virus (World Health Organization [WHO], 2020). As mentioned earlier, it is still uncertain when this pandemic will end, and the PMT alone is insufficient in determining the user's continued intent to use e-wallet. This is because continued adoption is influenced by the extent of utility, satisfaction, and attitude toward using such payment methods. Therefore, this article integrates the PMT, which focuses on pre-emptive behaviour, with TPB and TCT, which showed superiority over other technology acceptance models in understanding continued behaviour toward a particular system to determine the user's continued intention to use M-Payments in the context of COVID- 19 .

3 CHAPTER THREE: METHODOLOGY AND MATERIALS

Research methodology is a series of systematic research techniques. This is simply a guide to conducting research. It outlines and analyses the methods, illuminates their limitations and resources, clarifies their premises and consequences, and relates their potential to the beginnings of knowledge (Patel and Patel, 2019). The research methodology chosen for this study allows the researcher to quantitatively assess and evaluate the predictors of initial adoption and intent to continue using M-Payment services after the COVID- 19 pandemic. Consequently, the research

methodology will further the understanding of the adoption of new mobile technologies and the intention to continue using them.

3.1 Research design

A research design specifies the methods and procedures by which research data will be collected, processed, and analysed (Akhtar, 2016). For this research, an empirical study will be conducted using a survey. (Glasow, 2013) define survey research as an investigation that aims to determine the occurrence, frequency, and distribution of certain characteristics within a study population. In this study, a survey is used to gather information about respondents' characteristics and experiences with M-Payment systems during the pandemic.

According to (Kabir, 2016), researchers can collect either qualitative or quantitative data. Quantitative research is characterized by the collection of data from large samples that are usually analysed statistically. In contrast, qualitative research uses very small samples for methods such as interviews, observation, and focus groups. In this study, a self-administered online questionnaire is used to collect data from respondents. Appendix 3 shows the survey used in this study. The study uses a cross-sectional design because respondents were asked to complete the questionnaire only once at a specific time. The cross-sectional design was chosen because the goal of the study was not to detect changes in respondents' behaviour over time, as is the case with longitudinal studies.

Because a quantitative methodology was used in this study, a positivist research paradigm is used to evaluate the hypotheses. Positivism focuses on the hypothetico-deductive method of testing a priori hypotheses, often formulated quantitatively, from which functional relationships between causative and explanatory factors/ independent variables and outcomes/ dependent variables can be inferred (Park et al., 2020). Consequently, a positivist paradigm is used to attempt to achieve the objective of the study by assessing the predictors of adoption and intention to continue using M-Payment systems in post COVID- 19 pandemic.

The research design for this study incorporates an empirical approach utilizing survey research. In this context, the survey will serve as a means to gather information about respondents' characteristics and their experiences with M-Payment systems during the pandemic. Utilizing a survey aligns with the study's objective of understanding the adoption and intention to continue using M-Payment systems in the post-COVID-19 era, providing a structured method to collect data directly from the target population.

Furthermore, in selecting the research methodology, the study opts for a quantitative approach, which involves the collection and analysis of numerical data. This decision is informed by the need to assess predictors of adoption and intention to use M-Payment systems quantitatively. By utilizing a self-administered online questionnaire, the study can efficiently gather data from a large sample of respondents. The cross-sectional design is employed, as it suits the research objective of capturing a snapshot of respondents' behaviours and perceptions at a specific point in time. Unlike longitudinal studies that track changes over time, the cross-sectional design enables the study to focus on understanding the current state of M-Payment system adoption and intentions without considering temporal variations.

3.2 Hypotheses and conceptual framework

The study includes the following hypotheses to investigate the relationship between the constructs and the effect of the constructs on the dependent factors, including the effect of the variables on Digital immigrants' continuous intention to use M-Payments.

Hypothesis 1 -

H1a: Adoption/Confirmation has a positive impact on Digital immigrants' perceived usefulness of M-Payment systems.

H1b: Adoption/ Confirmation has a positive impact on M-Payment systems Digital immigrants' satisfaction.

Hypothesis 2 -

H2a: Perceived ease of use has a positive impact on Digital immigrants' perceived usefulness of M-Payment systems.

H2b: Perceived ease of use has a positive impact on Digital immigrants' attitudes towards the continued use of M-Payment systems.

Hypothesis 3 -

H3a: Perceived usefulness has a positive impact on Digital immigrants' satisfaction to continue the use of M-Payment systems.

H3b: Perceived usefulness has a positive impact on Digital immigrants' attitudes to continue the use of M-Payment systems.

H3c: Perceived usefulness has a positive impact on Digital immigrants' intention towards the continued use M-Payment systems.

Hypothesis 4 -

H4a: Satisfaction has a positive impact on Digital immigrants' attitudes towards continued use of M-Payment systems.

H4b: Satisfaction has a positive impact on Digital immigrants' intention towards the continued use of M-Payment systems.

Hypothesis 5 -

H5: Consumer's attitudes have a positive impact on Digital immigrants' intention to continue using M-Payment systems.

Hypothesis 6 -

H6a: Perceived self-efficacy is positively associated with Perceived ease of use of Digital immigrants' to use M-Payment systems.

H6b: Perceived self-efficacy is positively associated with continuous intention of Digital immigrants' to use M-Payment systems.

Hypothesis 7 -

H7a: The health risk of COVID- 19 has a significant positive effect on the Conformation/adoption of Digital immigrants to use M-Payment systems.

H7b: The health risk of COVID- 19 has a significant positive effect on the perceived usefulness of Digital immigrants to use M-Payment systems.

Hypothesis 8 -

H8a: Subjective norms have positive effect on perceived health risk of Digital immigrants towards using M-Payment systems.

H8b: Subjective norms have positive effect on self-efficacy of Digital immigrants to use M-Payment systems.

H8c: Subjective norms have positive effect on continuous intention of Digital immigrants to use M-Payment systems.

Figure 11 shows the proposed conceptual research framework based on the proposed hypotheses.

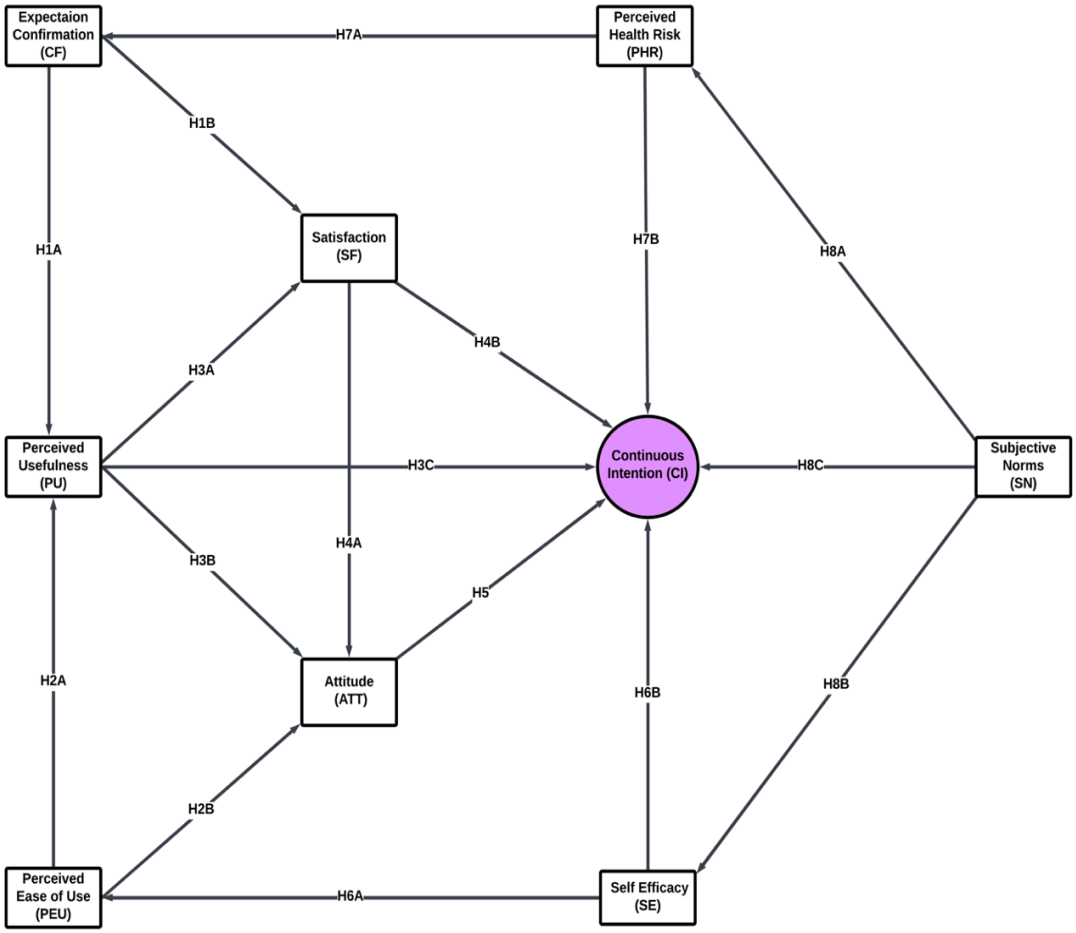

Figure 11. The proposed theoretical framework

Source: Author's own construction

3.3 Scale development

The study questionnaire began with an explanation of the purpose and objectives of the study. At the beginning, a description of the term "M-Payment service" and examples of M-Payment applications were given for explanation.

The questionnaire was divided into three sections. First section focused on participants demographic background. The second section participants were asked about their knowledge of

M-Payment and current use of M-Payment during the pandemic COVID- 19 . This section aims to find out the extent to which respondents know about M-Payment and whether the pandemic has changed their level of use. Therefore, this section asks questions about respondents' preferred payment methods during the pandemic, the availability of M-Payment on their devices, the frequency of their use, and the types of products or services they have purchased using these apps to date. The third section provides statements measuring the predictors of consumers' intention to continue using M-Payment systems after the COVID- 19 pandemic. This section consisted of 27 items that were used to measure the model constructs. The measures were rated using a five-point Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree". The measures of the constructs were taken from the literature and slightly modified to fit the context of this study. Confirmation, perceived ease of use, perceived usefulness, and continuous intention were measured using three measures adopted from studies (Bhattacherjee, 2001). Measures of consumer attitude and satisfaction were adapted from studies (Rahi *et al.*, 2020) (Kumar *et al.*, 2018). perceived health risk were adapted from study (Saleeby, 2000). While subjective norms items were adapted from studies (Fishbein and I. Ajzen, 1991; Hill *et al.*, 1977). Finally, measures of self-efficacy were adapted from study (Gbongli *et al.*, 2019). Section C captures the demographic profile of respondents in terms of age, gender, education level, respondent residence by province, and household income. All constructs measured in this study are included in the questionnaire, which can be found in Appendix 3.

3.4 Data collection

Data was collected using a web-based survey or questionnaire. This approach depends on collecting information from participants who respond to the study link using Internet-based communication technology (e.g., email, social media apps, or online survey platform). Researchers are showing increasing interest in Online-based data collection methods, as evidenced by the growing number of studies using online surveys to collect data during the COVID- 19 pandemic (Akintunde *et al.*, 2021, p. 1). Compared to other remote data collection methods (e.g., interviews), it also provides a cheaper and faster way to collect data (no interview is needed and data are entered automatically) (Hlatshwako *et al.*, 2021).

Regarding the language, the questionnaire was written in two languages: English and Hungarian. Both versions were reviewed by professors in Hungary who are fluent in both languages. The questionnaire was distributed among bachelor students at the Faculty of Finance and Accountancy in Budapest Business University, through the internal system of the university. The students were

asked to share the survey with their parents and relatives in social media. The participation in this survey was voluntary, and we did not give any benefits to them in order to fill it.

A total of 580 responses were received, of which 415 were used for further analysis. 165 responses were excluded because respondents indicated that they had no experience with M-Payment transactions. The sample size was determined using Slovin's formula. In terms of precision, a confidence level of 95%, as recommended by (Kothari *et al.*, 2005), indicates a 95 out of 100 probability that the sample results accurately reflect the true state of the population within a specified precision range. Conversely, there is a 5 out of 100 chance that the sample results do not accurately represent the population (Adhikari, 2021). Based on the Slovin's formula below sample size of 380 to 400 can significantly represent a population from 10000 to 10000000 person. Therefore, The sample size well represents the study's population (Digital immigrants in Hungary).

Slovin's formula is ($n = N/1+Ne^2$). Where:
N = The sample size.
N = The population of the study.
E = Margin of error (5%).

The researchers conducted a pilot test with 60 participants to measure the reliability and consistency of the instrument. Pilot studies are critical because they can predict where the main research project might fail, whether research protocols are not being followed, or whether the methods proposed or the instruments used are inadequate or too complex (Van Teijlingen and Hundley, 2002). The pilot test we conducted aimed to assess the reliability and validity of our survey instrument and model. We selected a subset of 60 participants from the overall pool of 415 study respondents. Participants were chosen to represent the demographic diversity of the larger sample. The results of the pilot test indicated promising levels of reliability and validity. Cronbach's alpha measure exceeded the threshold of (0.70) for all constructs. The results also supported the consistency of the constructs as they showed no intercorrelation among the items. Hence, The findings provided a promising indication that gathering data from the entire participant pool would offer valuable insights into the factors affecting the willingness of digital immigrants to embrace mobile payment technologies in the post-pandemic environment. which provided confidence in the robustness of our research tools.

3.5 Data analysis mechanisms

In the study, three statistical programmes were used to analyse the data, namely (Excel, IBM SPSS and PLS-SEM). The next step after creating and administering a questionnaire would be to enter the raw data into a data management application such as Microsoft Excel. Microsoft Excel is a spreadsheet program for organizing numbers and data using formulas and functions (Gipson, 2020). Excel analyses are widely used all over the world and are used by companies of all kinds for financial analysis. Using Excel, we were able to create a codebook for our data that would allow us to import the data into another program where the data analysis would be performed (e.g., SPSS and PLS-SEM).

Statistical Product and Service Solutions (SPSS) was used to analyse the respondents' descriptive data. IBM acquired the software package in 2009 and it is now known as IBM SPSS (Frey, 2017). The original manual for SPSS, written by the developers of the software, is considered one of the most important books in sociology of all time because it focuses on making statistical analysis user-friendly for ordinary academics (Jatnika, 2015). Other important functions of SPSS are data management and data documentation (Rahman and Muktadir, 2021). Students and researchers in business, sociology, psychology, and other disciplines use this application most often. SPSS is an excellent option for marketing and survey companies to analyse and predict consumer behaviour (Mesquita and Kostelijk, 2021).

Finally, similar to previous studies (Hubert *et al.*, 2019) (Foroughi *et al.*, 2019) (Khayer and Bao, 2019), the partial least square structural equation modelling (PLS-SEM) was carried to analyse the research model. (PLS-SEM) is widely used in the fields of marketing and social sciences (Shmueli *et al.*, 2019). (PLS-SEM) is considered a suitable approach for models that contain many constructs, indicators, and relationships (Shiau *et al.*, 2020). Moreover, PLS-SEM is a causal-predictive model. It is based on explaining the underlying cause and then predicting the future behaviour (Shmueli *et al.*, 2019). For the above reasons, the study (PLS-SEM) predicted consumer behaviour towards digital wallets in the contribution of COVID- 19 .

In the context of the current study, the utilization of PLS-SEM serves as a strategic choice to investigate consumer behaviour towards digital wallets amidst the backdrop of COVID-19. Given the unprecedented disruptions caused by the pandemic, understanding and predicting shifts in consumer preferences and behaviours have become paramount for businesses and policymakers alike. PLS-SEM's capacity to model complex relationships and its predictive prowess make it an ideal tool to explore the nuanced interplay of factors influencing consumer adoption and usage of

digital wallet services during these turbulent times. By leveraging PLS-SEM, the study not only aims to unravel the underlying drivers of consumer behaviour but also endeavours to offer actionable insights for stakeholders navigating the evolving landscape of digital transactions in the wake of COVID-19.

4 CHAPTER FOUR: RESULTS OF ANALYSIS

4.1 Demographic information

The analysis of respondents' demographic information plays a pivotal role in understanding the composition of the surveyed population and provides valuable insights into the context of the data collected. By incorporating demographic factors such as sex, age, education, and occupation, researchers gain a comprehensive understanding of the diverse characteristics within their sample.

Gender: The results show that (59.42%) of the respondents were male, and 40.58% were female. Thus, our results show a higher frequency level of male participants compared to the female participants. The participants distribution based on sex shown in Appendix 4.

Age: The results show that the majority of the respondents were from generation X (40- 55 years) with 48%, followed by those between 56 and 70 years of age (39%). While around 13% of participants were older than 70. Appendix 4 shows he participants distribution based on age.

Education: The level of education varied among the respondents. The results show that around 42% of the participants have a bachelor's degree. Followed by those who hold a PhD degree with 25.5% of participant. Master's level represent 22% of the respondents. While those at PhD level reach about 10.3% of the participants. Appendix 4 shows he participants distribution based on education level.

Occupation: The majority pf participant were among the lecturers (Schools teachers and universities professors/assistants with 87% of the whole participants. 18.6% of the participants work at administrative levels in the targeted educational institutions. Finally, only 3.2% of the participants were workers or external supervisors in the educational institutions. Appendix 4 shows he participants distribution based on occupation.

Furthermore, surveyed people were asked six other questions related to M-Payment usage behaviour of respondents during the pandemic. The following questions are:

1. When you began using M-Payment systems?

2. What types of transactions do you primarily use M-Payment for?
3. How frequently do you use M-Payment now compared to before the pandemic?
4. I believe that using M-Payment is a health protective tool from COVID- 19 infection?
5. How important is the health preventive role of M-Payment in your decision to continue using them after the pandemic?
6. In your opinion, do you believe that M-Payment will continue to play a significant role in health preventive measures post-pandemic?
7. Will you continue using M-Payment?
8. How likely are you to recommend M-Payment to your friends or family members for their health safety and convenience?

The results of the first question give a clear sign that adoption of M-Payment systems among Digital Immigrants was influenced by the effect of COVID- 19 pandemic. As we can notice in Appendix 5. 36% of the participants declared that they began started using M-Payment systems during the COVID- 19 pandemic. On the other side, almost 64% of the participants said that were users of M-Payment systems before the pandemic. The second question shows that Digital Immigrants used M-Payment transactions for different purposes. The results show they are most likely to use this payment method for In-store purchase, online shopping, and bills payment (39%, 31%, 18%, and 12% respectively). The third question focused to the frequency of the M-Payment usage among Digital Immigrants before and after the pandemic. The results show a significant increase of M-Payment usage among Digital Immigrants after the pandemic (65%). While, around 26% of respondents declared that were no changes of their usage, and only 9% said that their M-Payment usage tend to be less frequent compared to before the pandemic. Moreover, results of the fourth and fifth questions support the belief about the effect of COVID- 19 pandemic on consumers usage behaviour in terms of thoughts/beliefs and the actual behaviour. Around 62% of the participants believe that using M-Payment systems during the COVID- 19 pandemic could be a health protective tool from the infection risk of the virus. Meanwhile, 54% of the participants that the protective health role of M-Payment affect their decision to continue using M-Payments after the COVID- 19 pandemic. Based on the results of the sixth question, almost half of the participants believe that M-Payments will continue to play a significant role in health preventive measures post-pandemic. Finally the last two questions in this section focus on the core of this research

work. Participants were asked clearly if they have the intention to continue using M-Payment systems in the future, and recommend it to their friends and family members. The results of those question demonstrates a clear idea that Digital Immigrants have a strong intention to continue using M-Payment in the future with 68% announced in their positive intention. While 56% declared that they will recommend their peers and friends to use it.

4.2 Common method bias (CMB)

Since the dependent and independent variables were collected from the same respondents using the same instrument (electronic survey), the CMB could occur (Podsakoff *et al.*, 2003). The CMB occurs when the estimated relationship between the measures could be strengthened. Consequently, an excessively expected systematic variance is generated. As a result, this may lead to imbalances in the assessment of reliability and convergent validity of the scale constructs (Rodríguez-Ardura and Meseguer-Artola, 2020). We applied Harman's one-factor test to examine the potential of CMB (Maxwell and Harman, 1968). The CMB threat occurs when a single factor accounts for 50% or more of the variance (Podsakoff *et al.*, 2003). Our results showed that the first factor accounted for 34.13% of the variance, which is far below the minimum threshold. We also applied the PLS marker variable technique to diagnose CBM. We included a variable unrelated to the survey as a marker variable. The results showed that the correlation between the marker variable and all variables is positive and less than 0.30, which means that the marker variable is relatively uncorrelated with the dependent variable. Then, we included the marker as an endogenous variable in the research model to analyse the new results and compare them with the baseline results. The results showed insignificant changes in the beta coefficient and coefficient variance. We also checked the variance inflation factor (VIF) to test for multicollinearity between the constructs. According to Koch, bias is said to exist when the VIF threshold is higher than 3.3 (Kock, 2015). The results showed that the VIF is less than 3.3 among all constructs, indicating that the model is free from common method bias.

Common method bias (CMB) poses a significant challenge in research methodology, particularly in studies where both dependent and independent variables are gathered from the same respondents using the same instrument. This phenomenon, as noted by (Podsakoff *et al.*, 2003) can lead to an overestimation of relationships between variables, resulting in inflated variance and potentially skewing the reliability and convergent validity assessments of scale constructs. Such biases can compromise the accuracy and generalizability of research findings. Despite the employment of rigorous statistical techniques like Harman's one-factor test to assess the potential presence of

CMB, its detection and mitigation remain crucial tasks in ensuring the robustness of research outcomes.

Moreover, researchers have employed various strategies beyond traditional statistical tests to address CMB concerns effectively. One such approach, the PLS marker variable technique, involves introducing an unrelated variable as a marker to gauge the extent of common method bias. By observing the correlations between the marker variable and the study variables, researchers can ascertain the degree of contamination due to common method variance. Integrating marker variables into the research model enables a comparative analysis of results, providing insights into the impact of CMB on the relationships under investigation. Additionally, diagnostic measures like variance inflation factor (VIF) analysis serve as a supplementary tool for assessing multicollinearity and further validating the absence of common method bias. Through these multifaceted strategies, researchers can enhance the rigor and credibility of their findings in the face of common methodological challenges.

4.3 Descriptive statistics (Assessing normality)

Many statistical tests, such as parametric tests assume normal data, so determining whether the data are normal is a fundamental requirement. Normality can be assessed by two methods: Plots and numerical values including statistical tests (Prescott, 2010). The advantage of statistical tests is that they provide an objective assessment of normality. However, the disadvantage is that they are sometimes inadequate for small sample sizes or oversensitive for large sample sizes. In situations where numerical tests may be over- or under-sensitive, graphical evaluation has the advantage of providing a robust assessment of normality. Despite the fact that graphical methods for assessing normality require a great deal of experience to avoid misinterpretation. Therefore, If we do not have sufficient experience, we should rely on numerical methods (Prescott, 2010).

The most well-known methods for testing the normality of continuous data are the Kolmogorov-Smirnov test, the Shapiro-Wilk test, kurtosis, skewness, histogram, boxplot, Q-Q plot, P-P plot, Q-Q plot, mean, and standard deviation. In this study skewness and kurtosis used to assess whether the data are normally distributed or not. Skewness is a measure of how symmetric a distribution is. It is called skewed if the distribution of responses for a variable extends toward the right or left end of the distribution. Statistically, kurtosis is a measure of whether the distribution is excessively peaked (a relatively narrow distribution in which most responses are concentrated in the middle/center) (Hair *et al.*, 2017). When the skewness or kurtosis (excess) of the data is between -1 and +1, the distribution is said to be "approximately normal." As you can see in Appendix 6,

the majority of items fall within this range, which give a clear indication that the data are normally distributed.

4.4 Evaluation of measurement models

When you perform a PLS analysis, the first step is to evaluate the measurement model. The measurement model establishes rules for how measurable and latent variables should be related (Hair *et al.*, 2017). It also provides researchers with the option of using any number of variables for an independent or dependent construct. Evaluation of measurement models, particularly in the context of PLS analysis, is crucial for ensuring the robustness and accuracy of research findings. Beyond establishing rules for the relationship between measurable and latent variables, evaluating the measurement model allows researchers to assess the fidelity of their constructs and the instruments used to measure them.

Validity and reliability are two of the most important criteria used in PLS analysis to evaluate the measurement model (Hair et al., 2017). Tests of an instrument's stability and consistency are called reliability tests, while tests of an instrument's ability to accurately measure a particular idea are called validity tests (Hair et al., 2017). Moreover, validity tests play a pivotal role in determining the extent to which the measurement instruments accurately capture the intended constructs. Validity assessment ensures that the measurements align closely with the theoretical concepts under investigation, bolstering the credibility and trustworthiness of the research findings. Reliability of individual items, internal consistency of the construct, and validity of the construct are considered when evaluating the measurement model in PLS. The measurement model was evaluated based on reliability, convergent validity and discriminant validity.

Furthermore, the evaluation of measurement models facilitates the identification of potential sources of bias or confounding variables, thereby enhancing the rigor and robustness of the analysis. Reliability tests, such as assessing the internal consistency of constructs, help researchers identify and rectify any inconsistencies or redundancies within their measurement instruments, ensuring that the constructs are accurately represented. Similarly, validity tests, including convergent and discriminant validity assessments, enable researchers to confirm that the measurement instruments effectively capture the intended constructs while maintaining distinctiveness from unrelated variables. By conducting a comprehensive evaluation of the measurement model, researchers can instill confidence in their findings, ultimately contributing to the advancement of knowledge within their respective fields.

4.4.1 Internal consistency reliability

Indicators outer loadings and Cronbach's alpha were used to assess the internal consistency of the constructs. According to (Hair *et al.*, 2017), indicators with outer loadings greater than 0.70 would be retained and those with a loading less than 0.40 would be eliminated. However those indicators with outer loading between .40 and .70 can be removed from the scale only if its deletion results in an increase in CR or average extracted variance above the proposed threshold. Nevertheless, indicators with extremely low outer loadings (below 0.4) must always be excluded from the scale. Thus, for reflective items to be acceptable for the present phase, all outer loadings must be 0.4 or greater, meaning that the common variance between the construct and its measures is greater than the error variance (Hair *et al.*, 2017). Based on the results in Appendix 7, no indicator is removed as all indicators are above the thresholds (0.70).

Internal consistency reliability serves as a critical aspect of ensuring the validity and accuracy of measurements within research and assessment contexts. By assessing the extent to which items within a test or scale measure the same underlying construct, researchers can establish the reliability of their instruments. This process is particularly essential in fields such as social and organizational sciences, where precise and consistent measurement is paramount for drawing accurate conclusions. Internal consistency reliability, often quantified through methods like Cronbach's alpha, provides researchers with valuable insights into the consistency of responses and the coherence of their measurement instruments.

In the social and organizational sciences, it is common to use Cronbach's alpha reliability as a measure of reliability. Alpha was developed in 1951 by scientist Lee Cronbach to quantify the internal consistency of a test or scale. It is a number between 0 and 1. Internal consistency indicates the extent to which all items on a test measure the same concept or construct, and therefore refers to the relationships among items on the test. Before a test is used for research or assessment purposes, its internal consistency must be assessed to verify its validity. In addition, estimates of test reliability provide information about the degree of measurement inaccuracy. Simply put, this meaning of reliability refers to the correlation of the test with itself. The index of measurement error is calculated by squaring this correlation and subtracting 1.00 from it (Tavakol and Dennick, 2011). The larger the reliability estimate, the smaller the proportion of error in the test result . As shown in Appendix 7, Cronbach's α-values for all constructs are greater than the thresholds of Internal consistency reliability, suggesting the consistency and reliability of the measurement model.

In summary, by rigorously evaluating internal consistency reliability, researchers can ensure the validity, accuracy, and reliability of their measurement instruments, thereby strengthening the overall quality of their research endeavours.

4.4.2 Convergent validity

Convergence validity (CR) is the degree of confidence of a characteristic that is effectively quantified by its data. The convergent validity of the measurement model can be assessed with the CR and the average extracted variance (AVE).

CR (also referred to as construct reliability) is a measure of the internal consistency of scale items, similar to Cronbach's alpha (Netemeyer *et al.*, 2003). It can be thought of as the ratio of the total variance of real scores to the total variance of scale scores (Brunner and SÜβ, 2005). Alternatively, it is an indicator of the common variance of observed variables that serves as a sign of a latent construct (Fornell and Larcker, 1981). CR are above the suggested minimum value of .70, suggesting the validity of our model.

The average variance extracted (AVE) was also used to assess convergent validity. To achieve the convergent validity condition, the AVE of the constructs should be equal or higher than the thresholds (0.50) (Fornell and Larcker, 1981). AVE for all constructs of the model was greater than .50, thus meeting the second requirement for achieving convergent validity as suggested by (Fornell and Larcker, 1981) (Hair *et al.*, 2017).

CR holds paramount importance in research methodologies as it ensures the robustness and reliability of the measurement model. By assessing convergent validity through metrics like AVE, researchers can ascertain the extent to which different indicators of a construct converge and align with one another (Fornell and Larcker, 1981). This alignment is crucial as it indicates the consistency and coherence of the measurement instrument in capturing the underlying latent construct accurately. Without robust CR, the reliability and validity of the entire research framework could be called into question, potentially leading to erroneous conclusions or misinterpretations of the data. Therefore, thorough evaluation of CR not only validates the measurement model but also enhances the credibility and trustworthiness of the research findings.

Moreover, the assessment of CR aids researchers in identifying and rectifying any potential shortcomings or inconsistencies in the measurement model. By ensuring that the CR and AVE meet the recommended thresholds, researchers can validate the conceptual framework underlying their study and strengthen the confidence in their results (Hair *et al.*, 2017). This meticulous evaluation not only enhances the internal consistency of the measurement model but also bolsters the overall validity of the research outcomes. Consequently, researchers can have greater confidence in drawing meaningful conclusions and making informed decisions based on the empirical evidence gathered from their study. Thus, prioritizing CR safeguards against methodological weaknesses and reinforces the credibility of research endeavors in various domains.

4.4.3 Discriminant validity measurement

Discriminant validity assess the extent to which a predictor variable actually differs from other predictor factors. In other words, discriminant validity refers to whether indicators that measure different things are not highly correlated with each other (Campbell and Fiske, 1959). After establishing convergent validity, I assessed the discriminant validity of the model by evaluating correlations between variables that may overlap. Items should load more heavily on their respective model variables. In addition, the average variance shared by each variable and its measures should be greater than the variance shared by the variable with other variables. Discriminant validity can be assessed using the cross-loading indicator, the Fornell & Larcker criterion, and the heterotrait-monotrait (HTMT) correlation ratio.

When examining cross-loading, the loading indicators for the assigned construct must be greater than the loading of all other constructs, provided that the cut-off value for the factor loading is greater than 0.70. In this study, the discriminant validity of all items was demonstrated, as the cross-loadings between the different constructs were greater than the established cut-off point, as shown in Appendix 8.

The second criteria to assess the discriminant validity is Fornell-Lacker criterion. (Fornell and Larcker, 1981) stated that discriminant validity is achieved when the square root of AVE is higher than the correlation coefficient between constructs. As shown in Table 2, the values of AVE ranged from (0.633 to 0.725) and the values of inter-construct correlation coefficients ranged from (0.293 to 0.852). These results support the discriminant validity of our study.

Table 2. Fornell-Lacker criterion

	ATT	CF	CN	SN	PEU	PHR	PU	SE	SF
ATT	0.908								
CF	0.698	0.863							
CN	0.796	0.705	0.909						
SN	0.713	0.644	0.699	0.775					
PEU	0.342	0.359	0.335	0.300	0.865				
PHR	0.748	0.627	0.754	0.668	0.318	0.775			
PU	0.770	0.711	0.793	0.657	0.420	0.722	0.852		
SE	0.518	0.494	0.525	0.453	0.265	0.518	0.538	0.798	
SF	0.681	0.754	0.736	0.603	0.371	0.650	0.811	0.487	0.883

Note 1: ATT= Attitude; CF = Conformation; CN = Continuous intention; SN = Subjective norms; PEU = Perceived ease of use; PHR = Perceived health risk; PU = Perceived usefulness; SE = Self-efficacy; SF = Satisfaction.

Meanwhile, (Henseler *et al.*, 2014) argue that cross-loading and the Fornell-Larcker approach are inefficient in detecting the lack of discriminant validity; they argue that they have unacceptably low sensitivity. Therefore, they strongly recommend using the heterotrait-monotrait ratio (HTMT) scale to assess discriminant validity in variance-based SEM. The threshold is acceptable if it is less than 0.90 for the similar constructs and less than 0.85 for the distinct constructs. Table 3 shows that all HTMT values are below the threshold.

Table 3. Heterotrait-Monotrait Ratio (HTMT)

	ATT	CF	CN	SN	PEU	PHR	PU	SE	SF
ATT									
CF	0.807								
CN	0.789	0.816							
SN	0.760	0.803	0.839						
PEU	0.381	0.423	0.375	0.363					
PHR	0.804	0.751	0.822	0.840	0.368				
PU	0.801	0.784	0.837	0.802	0.480	0.846			
SE	0.643	0.641	0.651	0.606	0.340	0.663	0.674		
SF	0.771	0.791	0.835	0.736	0.428	0.764	0.863	0.620	

Note 1: ATT= Attitude; CF = Conformation; CN = Continuous intention; SN = Subjective norms; PEU = Perceived ease of use; PHR = Perceived health risk; PU = Perceived usefulness; SE = Self-efficacy; SF = Satisfaction.

4.5 Evaluation of the structural model in PLS-SEM

Having confirmed the reliability and validity of the measurement model, the next step is to test the research hypotheses using the structural model. When evaluating a structural model, the path coefficients between the latent variables of the structural model must be evaluated (Henseler *et al.*, 2009). The significance level for significant path coefficients must be at least 0.05. The bootstrap method can be used to determine the significance of path coefficients. PLS-SEM provides only standard values, not the standard error. To obtain an accurate estimate of the standard error, a repeated sample was used, which can be achieved by bootstrapping. For path coefficients to be considered significant, the significance level must be at least 0.05. With a total of 5,000 repeated iterations, the bootstrapping method can be used to calculate the significance level of the paths. The results of the proposed model are shown in figure 12.

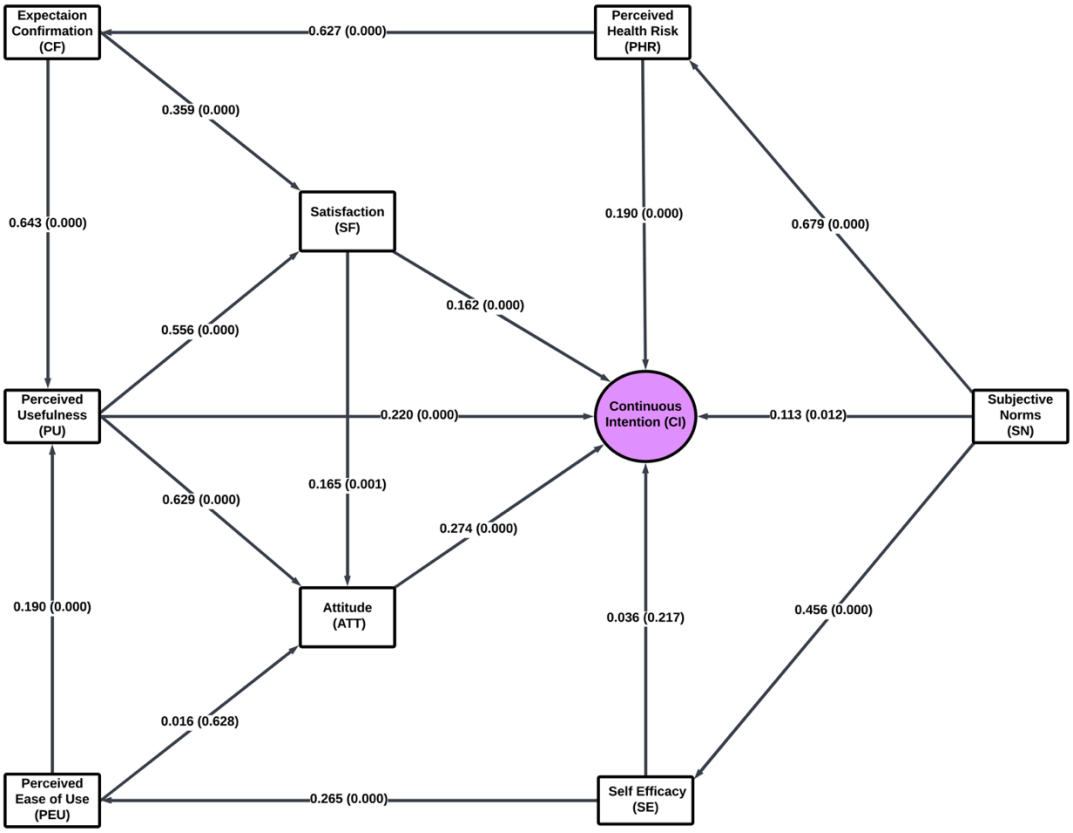

Figure 12. *Results of the proposed model*

Note 1: ATT= Attitude; CF = Conformation; CN = Continuous intention; SN = Subjective norms; PEU = Perceived ease of use; PHR = Perceived health risk; PU = Perceived usefulness; SE = Self-efficacy; SF = Satisfaction.

Note 2: P-value < 0.05 is significant; P-value > 0.05 is insignificant

4.5.1 Model validity: Path coefficients

A full bootstrapping procedure with (5000 replicate samples) was used to assess the significance of the standardized path coefficients. According to (Jr *et al.*, 2011).1.96 (significance level = 5%), 2.85 (significance level = 1%), and 3.29 (significance level = 0.1%) are the respective critical t values for a two-sided test. Non-significant or opposite paths do not support a prior hypothesis, but significant paths pointing in the hypothesized direction provide empirical support for the suspected causal relationship (Jr *et al.*, 2011). Therefore, t-values of 1.96 or greater are considered significant and support the proposed hypotheses in this study, while t-values of less than 1.96 indicate no significant effects and do not support the predetermined hypotheses in this study. The results of the hypotheses are presented in Table 4.

The results showed that adoption/confirmation has a significant effect on perceived usefulness and satisfaction (β 0.346, t-value 8.089, $p < 0.05$ and β 0.123, t-value 2.927, $p < 0.05$, respectively). Therefore, H1A and H1B were confirmed. Similarly, the results showed that perceived ease of use has a significant effect on PU(β 0.190, t-value 5.713, $p < 0.05$). However, the effect of perceived ease of use on attitude was insignificant (β 0.010, t-value 0.344, $p > 0.05$). Thus, H2A was confirmed while H2B was not. H3A, H3B and H3C are all confirmed as perceived usefulness significantly influenced satisfaction, attitude and continuous intention (β 0.526, t-value 12.009, $p < 0.05$; β 0. 575, t-value 10.693, $p < 0.05$; and β 0. 219, t-value 3.717, $p < 0.05$, respectively).

Satisfaction also has a significant effect on attitude and continuous intention (β 0.146, t-value 2.738, $p < 0.05$ and β 0.160, t-value 3.818, $p < 0.05$, respectively). Thus, H4a and H4b were confirmed. The effect of attitude on continuous intention was also significant (β 0.270, t-value 4.666, $p < 0.05$). Thus, H5 was confirmed. On the other hand, PMT constructs were not fully significantly related to TCT constructs. Although, self-efficacy had a significant effect on PEU(β 0.265, t-value 5.797, $p < 0.05$), however it had insignificant relationship with attitude and continuous intention (β 0.096, t-value 1.794, $p < 0.05$ and β 0.035, t-value 1.290, $p < 0.05$, respectively). Thus, H6A were confirmed, while H6B and H6C were rejected. Moreover, perceived health risk had the significant effect on confirmation, satisfaction and continuous intention (β 0.627, t-value 20.419, $p < 0.05$; β 0.053, t-value 1.396, $p < 0.05$; and β 0.190, t-value 3.638, $p < 0.05$, respectively). Based on that, H7A and H7C were confirmed, while H7B were rejected. Finally, subjective norms had a direct significant effect on continuous intention (β 0.123, t-value 2.972, $p < 0.05$). Consequently, H8 were confirmed.

Table 4. Hypotheses testing

No.	Hypothesis	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values	Status
H1A	CF -> PU	0.346	0.348	0.043	8.089	**0.000**	**Supported**
H1B	CF -> SF	0.123	0.123	0.042	2.927	**0.004**	**Supported**
H2A	PEU -> PU	0.190	0.191	0.033	5.713	**0.000**	**Supported**
H2B	PEU -> ATT	0.010	0.011	0.029	0.344	**0.731**	**Not supported**
H3A	PU -> SF	0.526	0.524	0.044	12.009	**0.000**	**Supported**
H3B	PU -> ATT	0.575	0.570	0.054	10.693	**0.000**	**Supported**
H3C	PU -> CN	0.219	0.220	0.059	3.717	**0.020**	**Supported**
H4A	SF -> ATT	0.146	0.151	0.053	2.738	**0.009**	**Supported**
H4B	SF -> CN	0.160	0.166	0.042	3.818	**0.007**	**Supported**
H5	ATT -> CN	0.270	0.268	0.058	4.666	**0.003**	**Supported**
H6A	SE -> PEU	0.265	0.268	0.046	5.797	**0.002**	**Supported**
H6B	SE -> CN	0.035	0.034	0.027	1.290	**0.198**	**Not supported**
H7A	PHR -> CF	0.627	0.627	0.031	20.419	**0.000**	**Supported**
H7B	PHR -> CN	0.190	0.186	0.052	3.638	**0.010**	**Supported**
H8A	SN -> PHR	0.679	0.671	0.026	25.826	**0.000**	**Supported**
H8B	SN -> SE	0.456	0.458	0.040	11.492	**0.000**	**Supported**
H8C	SN-> CN	0.123	0.123	0.042	2.927	**0.004**	**Supported**

Note 1: ATT= Attitude; CF = Conformation; CN = Continuous intention; SN = Subjective norms; PEU = Perceived ease of use; PHR = Perceived health risk; PU = Perceived usefulness; SE = Self-efficacy; SF = Satisfaction.

4.5.2 Model validity: Collinearity statistics (Inner VIF)

SEM is a statistical method for examining the relationships between constructs based on their covariance matrix (Hu *et al.*, 2019). After ensuring that the data met the reliability and validity criteria, the next step was to evaluate the structural model by examining the model's explanatory power and the t-value of the path coefficients. For this purpose, we tested the collinearity between the constructs and all items to eliminate all items with variance inflation (VIF) above 5 to avoid the problem of collinearity (Hair *et al.*, 2019). Appendix 9 shows that all items have VIF values of less than 5. In addition, Table 5 shows that all constructs have VIF values of less than 5. Therefore, all constructs and their items were retained.

Table 5. Collinearity Statistics - Inner VIF Values

	ATT	CF	CN	SN	PEU	PHR	PU	SE	SF
ATT			3.419						
CF							1.148		2.141
CN									
SN	1.423		2.297			1.517			
PEU	1.218						1.148		
PHR		1.107	2.786						2.208
PU	1.593		4.223						2.713
SE	1.411		1.507		1.040				
SF			3.049						

Note 1: ATT= Attitude; CF = Conformation; CN = Continuous intention; SN = Subjective norms; PEU = Perceived ease of use; PHR = Perceived health risk; PU = Perceived usefulness; SE = Self-efficacy; SF = Satisfaction.

4.5.3 Model validity: The coefficient of determination (R2) value

The adequacy (goodness) of the structural model is tested using the (R^2) and the t-value of the path coefficients. R^2 can be calculated using PLS-SEM through running the function of the PLS algorithm. According to (Hair *et al.*, 2017), the R^2 measures the predictive power of a model and is determined as the squared correlation between the actual and expected values of a given endogenous component. The general range for the R^2 value is between 0 and 1. (Falk and Miller, 1992) suggested a minimum acceptable value for the R^2 of 0.10 as an alternative. (Chin and Marcoulides, 1998) R^2 proposed that values above 0.67 should be considered substantial, while values between 0.33 and 0.67 are considered moderate, values between 0.19 and 0.33 are considered weak, and values below 0.19 are considered unsatisfactory. Nevertheless, (Hair *et al.*, 2019) have shown that R^2 values of 0.19, 0.33, and 0.67 can be classified as weak, moderate, and substantial, respectively. Table 6 shows the results of the structural model. The value of R^2 indicated that the model constructs explained 75.4% of the variance in continuous intention, which considers an acceptable substantial level. Moreover, satisfaction has been explained in substantial level (72.2%). In addition, the model constructs explained in a moderate level (61.1%, 53.7%, and 39.3%) of the variance of attitudes, perceived usefulness, and confirmation. Finally, perceived ease of use has been explained in a weak level by self-efficacy (7%).

Table 6. Coefficient of determination (R2)

	R Square	R Square Adjusted
ATT	0.616	0.613
CF	0.393	0.392
CN	0.754	0.751
PEU	0.070	0.068
PU	0.537	0.535
SF	0.722	0.720

Note 1: ATT= Attitude; CF = Conformation; CN = Continuous intention; SN = Subjective norms; PEU = Perceived ease of use; PHR = Perceived health risk; PU = Perceived usefulness; SE = Self-efficacy; SF = Satisfaction.

4.5.4 Model validity: Effect size (F2)

Evaluating the effect size (f^2) of each pathway is another approach to evaluating the structural model (Cohen, 2013). Effect size is essential to determine the predictive power of exogenous constructs. In other words, to measure the strength of the relationship between constructs. In our study, we used f^2 to assess effect size. According to Cohen (1988), f^2 values of (0.35, 0.15, and 0.02) indicate high, medium, and low levels of effect size, respectively (Cohen, 2013).

The following table presents the effect size of exogenous variables upon endogenous variables. Red values in Table 7 represent weak effects that lack practical significance. Based on that, we notice that perceived health risk and perceived usefulness has a substantial effect on continuous intention with values (0.372 and 0.358 respectively). While attitude and subjective norms showed a medium effect (0.186 and 0.167 respectively), self-efficacy and satisfaction showed a weak effect (0.003 and 0.048 respectively). Similar to continuous intention, constructs like self-efficacy, satisfaction and perceived ease of use (0.034, 0.19, and 0.000 respectively). While perceived usefulness showed a substantial effect on attitude (0.368). The effect of confirmation and perceived usefulness on satisfaction was substantial with values (0.352 and 0.467 respectively). From other side, the effect of perceived health risk on satisfaction was weak (0.005). the effect of confirmation on perceived usefulness was the highest among the all constructs (0.829). While the effect of perceived health risk on confirmation was the second highest effect among the constructs (0.747). Finally the effect of self-efficacy on perceived ease of use was very limited (0.076). The preceding discussion indicates that most of the exogenous constructs have effects on the endogenous constructs.

Table 7. Constructs' effect size (f2)

	ATT	CF	CN	SN	PEU	PHR	PU	SE	SF
ATT			0.186**						
CF							0.829***		0.352***
CN									
SN			0.167**			0.854***		0.261**	
PEU	0.000*						0.168**		
PHR		0.747***	0.372***						
PU	0.368***		0.356***						0.467***
SE	0.034*		0.003*		0.076*				
SF	0.019*		0.084*						

Note 1: ATT= Attitude; CF = Conformation; CN = Continuous intention; SN = Subjective norms; PEU = Perceived ease of use; PHR = Perceived health risk; PU = Perceived usefulness; SE = Self-efficacy; SF = Satisfaction.

Note 2: * = Low effect size; ** = Medium effect size; *** = High effect size

4.5.5 Model validity: The predictive relevance (Q2)

Q^2 is crucial for assessing predictive validity in complex models (Akter *et al.*, 2011). To assess Q^2, we used the blindfolding procedure. Blindfolding is a sample reuse procedure that omits data for a given block and then predicts the original values (Hair *et al.*, 2019). Assessing the Q^2 of a model is fundamental in determining its practical utility and reliability in real-world scenarios. Beyond mere statistical fit, Q^2 evaluates the model's ability to accurately predict outcomes for new data not used in its construction. This predictive validity is essential, especially in complex models where the relationships between variables might be intricate and nuanced. Without a satisfactory Q^2, even a statistically sound model might fail to generalize well to unseen data, rendering it less useful in practical applications. Therefore, incorporating Q^2 assessment provides researchers and practitioners with valuable insights into the model's robustness and applicability, guiding decision-making processes and interventions based on the model's predictions.

Utilizing the blindfolding procedure for evaluating Q^2 ensures rigorous testing of the model's predictive performance by simulating real-world conditions where new data is encountered. A positive Q^2 value indicates that the model can reliably predict outcomes beyond the data it was trained on, thereby enhancing its credibility and practical utility. Moreover, different magnitudes of Q^2 values provide nuanced insights into the model's predictive strength, enabling researchers to gauge the level of confidence in its predictions (Hair *et al.*, 2019). By identifying areas with low Q^2, such as perceived ease of use in the mentioned study, researchers can pinpoint potential weaknesses in the model and refine it further to improve its predictive accuracy and overall effectiveness in real-world applications.

A value of Q^2 greater than zero would be acceptable, indicating that the measure has Q^2 (Cohen J., 1988). However, Q^2 values of (0.02, 0.15, and 0.35) represent low, medium, and high Q^2, respectively (Cohen, 2013). With respect to our study, as shown in Table 8, all Q^2 values are positive and higher than .15, which represents a significant level of Q^2, except perceived ease of use which shows a low level of predictive validity (0.049).

Table 8. The predictive relevance (Q2)

	SSO	SSE	Q^2 (=1-SSE/SSO)
ATT	1560.000	776.871	0.502
CF	1560.000	1111.864	0.287
CN	1560.000	600.640	0.615
SN	2080.000	2080.000	
PEU	1560.000	1482.990	0.049
PHR	2600.000	1889.000	0.273
PU	2080.000	1277.009	0.386
SE	1560.000	1360.000	0.127
SF	1560.000	691.923	0.556

Note 1: ATT= Attitude; CF = Conformation; CN = Continuous intention; SN = Subjective norms; PEU = Perceived ease of use; PHR = Perceived health risk; PU = Perceived usefulness; SE = Self-efficacy; SF = Satisfaction.

4.5.6 Model validity: Mediation/indirect effect

To study mediation effects, partial least squares structural equation modelling (PLS-SEM) is an alternative. In recent years, testing methods for mediation have become more sophisticated. Mediation accounts for the presence of an intermediate variable or mechanism that transfers the effect of an antecedent variable to an effect (Aguinis et al., 2017). Typically, mediation occurs when the effect of perceived usefulness on customers' intention to continue using M-Payment is mediated by customer satisfaction, such that the effect of perceived usefulness on customer satisfaction influences customers' desire to continue using M-Payment (Hair *et al.*, 2017). Mediation thus refers to the underlying effects that link the causes and effects of variables. Despite the widespread use of mediation tests, much of the research at PLS-SEM does not include mediation effects in their hypotheses and therefore does not assess the relevance of irrelevant structural models (Hair et al., 2017). In the worst case, researchers only consider direct correlations and exclude mediation effects.

The main characteristic of a mediation effect/indirect effect is that it is a third variable that plays an intermediate role in the relationship between the independent and dependent variables. Technically, for example, the effect of self-efficacy on continuous intention is mediated by attitude, which is referred to as the mediating variable or mediator. The effect of perceived health risk on satisfaction is mediated by (confirmation and perceived usefulness). The mediating effect of perceived usefulness is also reflected in the effect of (self-efficacy and perceived ease of use) on (attitude and continuous intention). These are evidences of the importance of these variables in strengthening the relationship between perceived health risk and satisfaction. This is consistent with (Preacher and Hayes, 2008) argument that including multiple mediators and comparing their specific mediating effects is also useful for comparing different competing theories. In this sense, researchers are interested in comparing the strength of specific mediation effects. Hence, we can conclude that perceived usefulness plays a crucial role in strengthen the effect of independent variables on dependent variables in our proposed model.

4.5.7 Importance-performance map analysis

The importance of performance matrix analysis (IPMA) seems to enable researchers to gain additional results to improve management activities (Rahi *et al.*, 2020). IPMA helps researchers to distinguish constructs that may have relatively high importance but somewhat low performance in shaping the dependent variable (Hair *et al.*, 2017). The importance of the independent variables is determined by their overall effects on the dependent variable. At the same time, the average values of the latent variables estimate the performance rescaled from the lowest 0 to the highest 100 (Hair *et al.*, 2017). According to the results of IPMA in Table 9, consumer's perceived health risk and perceived usefulness have the highest importance value (0.449 and 0.466, respectively), followed by confirmation and attitude, which have intermediate importance levels (0.366 and 0.254, respectively). However, self-efficacy and perceived ease of use have a slightly low effect on continuous intention compared to the other constructs with (0.086 and 0.074, respectively). In term of the constructs performance for continuous intention, consumer's perceived health risk and perceived usefulness also have the highest performance (71.586 and 71.285, respectively). Suggesting that the health threat construct is critical in determining consumers' continuance intention towards M-Payment adoption in the future. On the other side, self-efficacy and perceived ease of use also have the lowest performance for continuous intention (59.762 and 58.364, respectively).

Table 9. Importance of performance matrix analysis

	Construct Performances for [CN]	***Construct Total Effects for [CN]***
ATT	68.8474	0.2579
CF	65.6746	0.3892
SN	68.5856	0.5068
PEU	58.3643	0.0794
PHR	71.5332	0.4832
PU	71.2854	0.4937
SE	59.7511	0.0561
SF	69.7362	0.1920

Note: ATT= Attitude; CF = Conformation; CN = Continuous intention; SN = Subjective norms; PEU = Perceived ease of use; PHR = Perceived health risk; PU = Perceived usefulness; SE = Self-efficacy; SF = Satisfaction.

5 CHAPTER FIVE : DISCUSSION OF RESULTS AND CONCLUSIONS

The previous chapter explained the results of the data analysis and explored the potential predictors of intention to continue using M-Payment systems and intention among Digital Immigrants in Hungary. The Partial Least Squares Structural Equation Modelling approach (PLS-SEM) was used to examine the effect of the constructs on the dependent variables. This chapter discusses the main results presented in Chapter 5, Novel results, theoretical and managerial implications, limitations of the study, and finally an overall conclusion about the study.

5.1 Study Findings

Due to the unique nature of this study, the major goal is to help describe the wide issue of M-Payment implementation during and after the COVID- 1919 pandemic among Digital Immigrants in Hungary. This study drawing on known models and theories to reach these results. The research issues were addressed through data collection and analysis using model created based on three well known theories namely; TPB, TCT, and PMT, with asking participants some behavioural questions assuming a phenomenological approach to support the qualitative aspect of the research. The empirical research findings, including the results of each research question, are addressed further below.

The second section of the questionnaire has been designed to answer and interpret the first two question:

1. What is the impact of COVID- 19 on M-Payment adoption among Digital Immigrants?

2. What is the level of M-Payment adoption among Digital Immigrants during the pandemic, and identify their willing to continue use it?

The results show that more than one third of the Hungarians Digital Immigrants participants in this survey declared that they used M-Payment for the first time after the pandemic began. The results consistent with The Statista Digital Market Outlook that forecasted that the value of M-Payment is set to continue increasing in the years ahead, with 28 percent growth predicted between 2019 and 2024 (McCarthy, 2020). Figure 13 shows the global transaction value forecast of M-Payments. Besides, almost two third of participants mentioned that they use M-Payment more frequently since the COVID- 1919 pandemic began. The results is totally consistent with Statista Research Department study which found that 65 percent of French people stated that they would use M-Payment applications at least as much as during lockdown (Medve, 2021). Moreover, the results also supported by a survey conducted by (Medve, 2022b) in 2022, nearly 80% of Hungarians were mobile banking users. And 15% of respondents used a mobile banking application at least once a day.

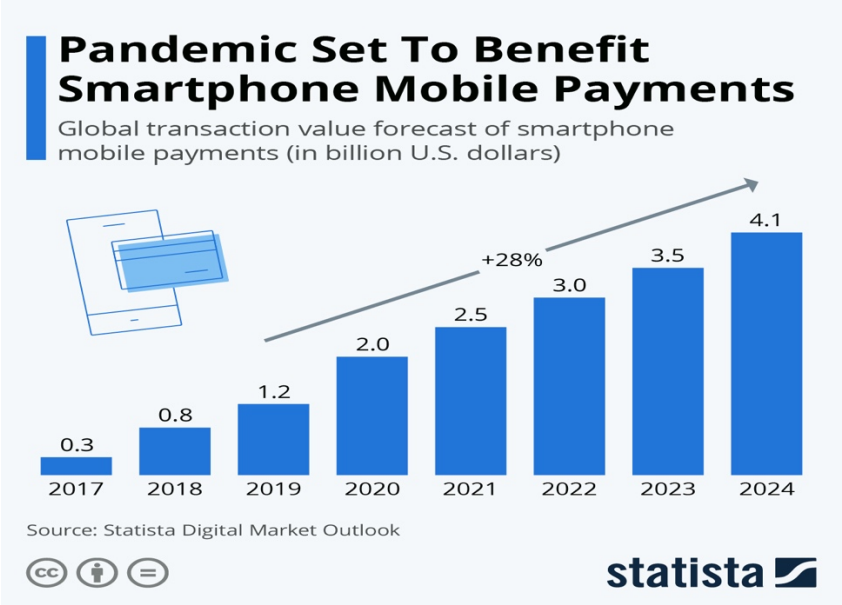

Figure 13. Global transaction value forecast of M-Payments

Source: (McCarthy, 2020)

Based on our results, 62% of the participants declared that they consider M-Payments as a preventive health tool from the COVID- 19, and 54% confirmed that the preventive health tool of the COVID- 19 influenced their decision to use M-Payments. The results correspond with (C.C and Prathap, 2020) study, which shed lights on the impact of COVID- 19 perceived health

risk on M-Payment adoption in India. In meantime, participants also showed an strong intention to continue use M-Payment in the future, and 56% of them said that will recommend using it to friends and family members due to health safety and convenience considerations.

In this context, we can argue that COVID- 19 pushed and expanded M-Payments usage and frequency among Hungarian Digital Immigrants majorly for four reasons. Firstly, such transactions are considered to be instrumental in adhering to social distancing and health preventive norms (Hanif and Lallie, 2021). Where Hungarians Digital Immigrants could conveniently execute digital payment transactions. Secondly, the fear that face Digital Immigrants as they are among the high risky segment of death possibility if they get infected by the virus pushed them to look at contactless M-Payment as a preventive health tool. Thirdly, many retailers and delivery services began accepting digital payments, and customers were left with no choice but to adopt digital payment services (Horák, 2020). For instance, at the fourth quarter of 2020 alone, the number of POS terminals at merchant acceptance points increased by 7% as consumers increasingly make contactless payments (Bakonyi, 2021). Fourthly, The Hungarian government actions to promote cashless payments and reduce physical contact at the point of sale (Bakonyi, 2021).

The third section of the questionnaire has been designed to validate the integrated framework of TCT, TPB and PMT, and to answer the following questions:

1. What are the factors that influence Digital Immigrants' intention to continue using M-Payment systems?

2. What are the interactions between the factors influencing Digital Immigrants' intention to continue using and their behaviour.

3. Can the proposed model reliably measure the factors influencing Digital Immigrants' continued use of M-Payment systems in the context of the COVID- 19 pandemic or similar diseases that may occur in the future through direct contact?

The integrated model had the power to explain 75.4% of the variance in consumers' continuation intention toward M-Payment systems. In comparison to other studies (Wei *et al.*, 2020) (C.C and Prathap, 2020) (Puriwat and Tripopsakul, 2021) that focused on understanding the contactless payment adoption behaviour during the pandemic, our model showed significant acceptance level of interpreting the continuous intention to use M-Payment in the context of the COVID- 19

pandemic (Hair *et al.*, 2019). This give a proof that our model were reliable to measure the factors influencing Digital Immigrants' continued use of M-Payment systems.

In term of answering the third and fourth questions, the following discussion focuses on the influence level of the constructs on continuous intention to use M-Payments, and the interactions among the constructs.

The results of this study showed that perceived health risk had a significant impact on adoption/confirmation and perceived usefulness of M-Payments. Similar to the results of (C.C and Prathap, 2020) study that applied ECM to understand the continuous adoption of M-Payment among the Indian society. The continued rise in casualties due to the pandemic, reports confirming the possibility of the virus being transmitted through surfaces, including physical money, and what stood in the way of imposing social distancing and blocking measures. All these reasons make consumers aware of the seriousness of the disease and that their use of physical money can make them vulnerable to contracting the virus. Therefore, they believe that M-Payment use is viewed as a protective health behaviour, leading them to feel that the perceived usefulness of M-Payment as a financial tool reduces the risk of contracting the virus. Per public health reports, Digital Immigrants are among the generation segments that fall in the higher risk of COVID- 19 infection and health complications due to their age and active professional role in society. Furthermore, Digital Immigrants are often described as the generation segment of society that are responsible for and concerned about their well-being and those around them, such as children. Considering that using cash has been described as a vehicle of virus spread (WHO, 2020). it is understandable and logical that Digital Immigrants would consider a move towards cashless transactions. Overall, our findings are consistent with other studies and reports that have indicated the need to replace cash and direct contact payment methods with contactless digital payments (C.C and Prathap, 2020) (Aji *et al.*, 2020) (Auer *et al.*, 2020).

However, the constructs of perceived threat alone were not sufficient to determine consumers' continuous intention. Consumer self-efficacy is essential to ensure the ability to adopt digital wallets in the short and long term. The results showed that self-efficacy has an insignificant influence on attitude and continuous intention to use M-Payment. This may explain that Digital Immigrants are not fully confident of their ability to use M-Payment. These findings are inconsistent with previous studies that shown a direct effect of self-efficacy on continuous use of mobile banking services (Foroughi *et al.*, 2019) (Susanto *et al.*, 2016). Thus, we can argue that as

consumers have demonstrated inability to use M-Payment systems, their intentions to use them in the future are less.

Subjective norms significantly influences Digital Immigrants' intention of adopting M-Payment. The results correspond with pre-pandemic studies (Liébana-Cabanillas, Ramos de Luna and Montoro-Ríos, 2017) (Oliveira *et al.*, 2016), and post-pandemic studies (Koch *et al.*, 2020). The result also indicates that subjective norms is significantly associated with perceived usefulness, similar to previous studies (Aji *et al.*, 2020). (Sathye *et al.*, 2018) explained that perceived usefulness mediates the impact of subjective norms on BI. (Sathye *et al.*, 2018) analysis, we argue that if Hungarian family members and friends are adopting a M-Payment system, this will be an added-value in the diffusion of the M-Payment system as they will influence others to use it. This happens by sharing information and views about the risks, costs, and benefits of using such kinds of services. More specifically, the pandemic and adherence to social distancing forced people to rely more on social media and other forms of communication to exchange views and share information. We believe that family, friends, influencers, celebrities, health experts, and others via different communication outlets affect consumers' views and behaviours. The subjective norms effect on BI was evident in our study as most respondents who adopted M-Payments mentioned the influence of people they viewed as important on their decision. The effect of subjective norms on consumers' BI during the COVID- 19 crisis is expected as previous pre- COVID- 19 studies have shown this relationship to be significant during the crisis (Koch *et al.*, 2020).

According to TCT, the study showed that attitude and perceived usefulness had a significant impact on users' continuation intention, which is consistent with previous studies (Foroughi *et al.*, 2019) whom use TCT to investigate the determinants of m-banking continuance intention to use. And (Rahi *et al.*, 2020) whom integrated TCT with TTF theory in the context of understanding the Internet banking user continuance intention. This implies that Digital Immigrants intend to continue using M-Payment, influenced by consumers' perceived usefulness and attitude. Previous studies have confirmed that perceived ease of use and perceived usefulness are the most important antecedents to a user's attitude and intention to adopt a particular behaviour (Davis, 1989). Our results showed that perceived usefulness had a significant relationship with attitude. In contrast, perceived ease of use had an insignificant effect on Digital Immigrants' attitude. This result is not consistent with the study of (Rahi et al., 2020) who found a significant effect of perceived ease of use on users' attitude towards continued use of internet banking (Rahi et al., 2020). However, (Foroughi *et al.*, 2019) explained the non-significant relationship between perceived ease of use

and attitude. They argued that in the post-adoption phase, consumers became more experienced and familiar with using the mobile banking system (Foroughi *et al.*, 2019). Perceived usefulness is influenced by perceived ease of use and confirmation. Users' assertion that the current adoption has met the expectations and the ease of using this type of financial services may be the direct reason for increasing the perceived usefulness of using M-Payment. Based on TCT, consumer satisfaction is driven by confirmation and perceived usefulness (Rahi and Abd. Ghani, 2019). Our study found that consumer satisfaction with M-Payments is driven by confirmation and perceived usefulness, which is consistent with previous studies (Rahi *et al.*, 2020) ((Susanto *et al.*, 2016). These results suggest that if consumers' initial expectations are met and these consumers realize the functional and health benefits of using M-Payment during the pandemic, this will have a positive impact on satisfaction levels. In addition, satisfaction significantly influenced consumers' attitudes and intentions to continue using M-Payment, consistent with previous studies (Foroughi *et al.*, 2019) (Khayer and Bao, 2019).

The researcher conducted the effect size and IPMA analysis to gain a deeper insight into the factors that influence consumers' continuation intention of digital wallets. As shown in the effect size analysis, self-efficacy is the most significant construct in predicting Digital Immigrants' continuance intentions toward M-Payments. Therefore, to improve consumers' attitudes, they should perceive the benefits of M-Payment and show satisfaction with previous experiences. Since this study integrated two different models with multiple constructs, IPMA analysis is essential to determine the importance and performance of the model constructs. In terms of importance, IPMA results showed that self-efficacy was the most important factor, with an index value of 49%, followed by perceived usefulness, attitude, and satisfaction with index values (37.6%, 28.1%, 18.9%, respectively). The significant role of self-efficacy in determining the Digital Immigrants' continuous intention is confirmed in previous studies (C.C and Prathap, 2020) (Aji *et al.*, 2020). (Foroughi *et al.*, 2019) recommended banks to develop strategies to improve consumers' self-efficacy towards m-banking, such as providing training to bank customers on the features of m-banking services and how to use them (Foroughi *et al.*, 2019).

5.2 Novel Findings

This study presents new scientific findings based on research data and results. These findings can be used to develop future studies and research based on the analytical approach and additional constructs in the model.

1. The main theoretical contribution of this study is the development of a validated

research model that integrates three theories (TCT, TPB, and PMT). To our knowledge, this empirical study was the first to combine theory focused on people behaviour to cope with health threats (PMT), theory concerns with people motives to engage in a behaviour in certain time and place (TPB), and theory predicts users' willingness to keep using a certain technology based service (TCT). As the COVID- 19 pandemic pushed people to adjust their behaviours including payment behaviours in terms of health protection. Thus, the latter theories were best combination to create a model contributed to understand the factors that influence consumers' intentions to continue using M-Payment during and after the COVID- 19 pandemic.

2. As World health organization expected an increase in the frequency and coverage of the pandemics in the future (World Health Organization, 2022). The R2 value indicated that the model constructs explained 75.4% of the variance in continuous intention, which is an acceptable substantial level. It means that the model provided a better understanding of the factors influencing Digital Immigrants' intention to continue using M-Payment in the post-COVID- 19 era. Therefore, this model can be reliable to understand people intention to adopt various contactless technologies in times of appearance contact based disease pandemics in the future.

3. The age segment of the participants in this study was one of the determining factors. Based on previous studies, Digital Immigrants have less willingness to adopt new technologies or innovations, as they were born before the digital age and have less knowledge of how to use technical systems. The novelty of this study that it was the first focused on understanding digital immigrant intention to continue using M-Payment in Hungary. Meanwhile, our study proved that Digital Immigrants in Hungary have the intention to use M-Payment more than any time before influenced by varied factors such as the convenience and health safety role of M-Payments played during the pandemic. Thus, as Hungary is an aging country with an average age of 43, the government, policy makers, and financial institutions need to provide easy-to-use financial innovations that match the skills of Hungarian Digital Immigrants and teach them how to use them.

4. One of the main contributions of this study that it provides well-defined insights into the key aspects of M-Payment usage among Digital Immigrants. The primary motivation for Digital Immigrants to use M-Payment is the perceived health risk of

using cash and contact-based payment methods. Digital Immigrants considered M-Payment systems as a health-protective payment method during the pandemic. This view is supported by our results, which show that nearly 36% of respondents used M-Payment for the first time during the pandemic, and 65% of respondents reported that their use had increased since the pandemic began.

5. The study found that the one of the primary motivations for Digital Immigrants is that the service confirms their expectations that resulted from their initial use. This leads to the development of a concept of usability that helps digital immigrant users view M-Payment as a technology whose outcomes outweigh the effort required to use it on a daily basis. Hence, our study found the M-Payment in Hungary met Digital Immigrants expectations in terms of convenience and usefulness, and that reflected positively on their intention to continue use this service.

6. This work will also serve to shed light on the social factors that determine the long-term use of M-Payment by Digital Immigrants by examining them in the context of a larger social application. Integrating subjective norms one of the pillars of TPB to the model assist significantly in interpretation the intention of Digital Immigrants to continue use M-Payment. The influence of subjective norms on BI was evident in our study, as most respondents who adopted M-Payment mentioned the influence of people they considered important to their decision. The novelty of including subjective norms that the concept wide the society that influence user decisions from family and friends to include health experts and social media news. During the pandemic, the latter also had a significant influence on Digital Immigrants to adjust their old behaviours and adopt new behaviours such as M-Payment.

5.3 Study Implications and Recommendations

The implications and recommendations derived from this study on the usage of M-Payment among Digital Immigrants in Hungary post-COVID-19 span both theoretical and managerial domains, offering significant insights for scholars and practical guidance for decision-makers in financial institutions and FinTechs.

Theoretical contributions of this study lie in its innovative amalgamation of the TPB, PMT, and TCT, marking a pioneering endeavour in understanding the factors shaping consumers' intentions towards digital wallets amidst and beyond the pandemic. Notably, it underscores the pivotal role

of the health threat construct in propelling M-Payment adoption during crisis periods, aligning with prior research advocating for technology applications, including FinTech, in bolstering resilience. Moreover, the study illuminates the nuanced interplay of factors such as self-efficacy and subjective norms in shaping intentionality, shedding light on barriers impeding continuous usage among Digital Immigrants, such as inadequate skills and confidence. Importantly, it highlights the significance of social influences, emphasizing the role of familial and social networks in driving adoption, particularly during times of heightened reliance on digital communication channels.

From a managerial standpoint, the findings furnish policymakers and stakeholders in Hungary with actionable insights to navigate the challenges posed by social distancing measures and mitigate the risks associated with traditional financial transactions. By promoting M-Payment adoption, decision-makers can proactively mitigate direct contact-based transmission risks, offering a viable solution amidst pandemics and future health crises. Strategies encompass educational campaigns elucidating the health benefits of M-Payments and fostering financial literacy to empower consumers, especially Digital Immigrants, in embracing this transformative mode of transaction. Furthermore, incentivizing the FinTech industry through supportive policies, streamlined licensing procedures, and tax incentives can spur innovation and expansion in M-Payment projects, fostering economic growth and resilience.

Practically, the study underscores the imperative for service providers to enhance M-Payment platforms, tailoring features to user needs and facilitating seamless adoption. Collaborative efforts among stakeholders, including governments, financial institutions, and businesses, are advocated to incentivize adoption through rewards and discounts, thereby stimulating market demand. Additionally, raising awareness among Digital Natives and bolstering peer-to-peer education initiatives can accelerate adoption rates, bridging the digital divide and fostering a more inclusive financial landscape. In essence, the study's implications transcend theoretical boundaries, offering a holistic understanding of M-Payment adoption dynamics, while providing actionable recommendations to catalyse its uptake, thereby shaping the trajectory of financial innovation and resilience in Hungary and beyond.

5.3.1 Theoretical Implications

This study has introduced several theoretical contributions to the continuum of M-Payment usage in post of COVID- 19 among Digital Immigrants in Hungary. To our knowledge, this empirical study was the first to combine TPB, PMT and TCT. As a result, this model contributes to

knowledge by attempting to understand the factors that influence consumers' intentions to continue using digital wallets during and after the COVID- 19 pandemic. The study confirmed the role of health threat construct in driving consumers to use M-Payment during the pandemic. The study viewed adoption at this stage as a health-protective behaviour that must be carried out. This view is consistent with the recommendations of previous studies that emphasize the role of information and communication technology applications, including financial technology, in building resilience during crises (Heeks and Ospina, 2019) (Pal *et al.*, 2020) (Afawubo *et al.*, 2020). Moreover, our study highlights the crucial role of self-efficacy as one of the PMT and TPB constructs in determining the continuity of consumers' intentions. However, the effect of self-efficacy on continuous intention were insignificant. Thus, Digital Immigrants in Hungary showed less confidence in their abilities to use M-Payment and that effect on their intention to continue use it. Thus, the study confirmed the lack of knowledge and skills to use M-Payments is one of the crucial barriers that face Digital Immigrants to continue use it (Xiong, 2022). On contrast, subjective norms significantly influence the intention of Digital Immigrants to continue use M-Payment. Following (Sathye *et al.*, 2018) analysis, we argue that if Hungarian family members and friends adopt a M-Payment system, this will add value to the M-Payment system's spread as they will influence others to use it. This is done by sharing information and views about the risks, costs and benefits of using such types of services. More specifically, the pandemic and adherence to social distancing forced people to rely more on social media and other forms of communication to exchange opinions and share information. We believe that family, friends, influencers, celebrities, health professionals, influence Digital Immigrants views and behaviours through various communication channels.

The study also confirmed TCT factors as triggers for intention to continue using M-Payment. Consequently, confirming consumers' expectations of M-Payment can improve perceptions of performance. When performance meets or exceeds users' expectations, it would increase their satisfaction and attitude toward continued use of digital wallets. In addition, the results showed that the influence of perceived ease of use on consumers' attitude towards M-Payment was not significant. The reason may be that consumers' knowledge and experience will gradually increase in the post-adoption stage, so the role of attitude in mediating the relationship between perceived ease of use and continuous intention will be small. This can also be supported by the omission of attitudes from the extended TAM, TAM2 and TAM3 (Theocharidis *et al.*, 2020).

5.3.2 Managerial Implications and Recommendations

The results of the study provide decision makers in Hungary with additional solutions to the social distancing measures imposed to control the spread of the virus, and to reduce the direct based financial transactions in the future . The introduction of M-Payment reduces the need for outdoor purchases, thus reducing the likelihood of direct contact with surfaces and people who may be infected. It also reduces the need to use physical money, which could be an intermediary for transmission of the COVID- 19 virus or any contact based diseases that might appear in the future. Therefore, policymakers should encourage and make consumers aware of how easy it is to use M-Payment as a healthy financial tool during the pandemics. The Hungarian government and decision makers can launch comprehensive educational campaigns to raise awareness about the health benefits of M-Payments. These campaigns should highlight the reduced risk of exposure to viruses like COVID-19 through contactless transactions. Providing clear, simple instructions on how to use M-Payment platforms will empower digital immigrants to make the switch. Furthermore, they are suggested to initiate widespread financial literacy programs. These programs can educate citizens about the advantages of M-Payments, including security, convenience, and the potential for financial management tools.

On the other hand, the Hungarian government is suggested to support the development of the FinTech industry, including M-Payment projects, by encouraging the creation of these types of projects, facilitating their licensing procedures and reducing taxes. Implementing incentive programs can serve as a powerful motivator. Governments can collaborate with financial institutions and businesses to offer discounts, cashback rewards, or loyalty points for transactions made through mobile payment systems. These incentives not only encourage adoption but also provide immediate economic advantages.

Digital Natives in Hungary also suggested raising awareness among their peers about the use, importance and benefits of M-Payment systems compared to traditional payment channels. In addition, the insignificant effect of perceived ease of use and self-efficacy among Digital Immigrants on the initial and ongoing adoption should be considered. Service providers, including fintech companies and banks, are recommended to improve the design, content, and features of M-Payment applications to match the capabilities of current users and attract new potential users. In addition, M-Payment service providers are recommended to educate their current and potential customers about M-Payment usage mechanisms by publishing visual and written information about the benefits and mechanisms of using M-Payment systems.

5.4 Study limitations and Suggestions for Future Research

Despite the insightful practical and theoretical implications of our study, this study is not without some limitations. First, The study's primary drawbacks is the geographical concern. As this study has only a very limited sampling in a specific country (Hungary). Because of these concerns, the findings of this study cannot be generalized for all Digital Immigrants worldwide. Thus, further research in other countries in Europe and worldwide is recommended to verify the results. Second, Our study focused on the physical risk of becoming infected when using non-digital means of payment. Future studies should also consider other risks such as privacy risk, financial risk, and security risk. In addition, the study did not examine the moderating influence of Digital Immigrants demographic characteristics such as gender, income, and education level. Third, this study used the cross-sectional method, where data has been collected from participants in a single point of time. Future research could investigate the underlying factors in a longitudinal context to have a clear insight of Digital Immigrants' intention to continue using M-Payment in the future.

Fourth, this study uncovered the factors affect Digital Natives in Hungary to continue using M-Payment. Thus, future research suggested to make a comparison study about the factors affect both Digital Natives and immigrants, to identify the similarities and differences of both generations behaviours in term of using M-Payment. As health threat constructs' effect on the initial adoption is more obvious than the continuous adoption, future research could involve factors like trust as a crucial parameter that affect the consumers' intentions towards M-Payment continuous adoption. Finally, for further research on M-Payment usage, we propose considering these factors along with respondents' place of residence (i.e., rural/urban), household type (i.e., single without children/single with children/married with children/etc.), and employment status. Thus, these factors can be included as control variables to test the degree of their influence on Digital Immigrants behaviour patterns.

5.5 Conclusion and Thesis Summary

The world is taking steady steps towards a cashless society, supported by the increasing percentage of people who access the internet and mobile phone terminals (Liébana-Cabanillas *et al.*, 2020). The Fintech industry in developing countries like Hungary is in its early stages. Amongst Fintech industry branches, payment services are commonly adapted in Hungary (Kft Tanácsadó, 2020). The Hungarian online market during the first half of 2020 increased by 121%, with an estimate of 3.35 million online Hungarian shoppers in that period. This is not surprising considering the effects of the COVID- 19 crisis on people's daily lives and behaviours. Such impact on consumers'

purchasing behaviour is attributed to the influence the pandemic news and reports and the shared information of the surrounding environment like family, friends, etc. Therefore, M-Payment has been utilized to complete financial transactions while reducing the virus's risk.

The purpose of this empirical study was to evaluate factors that influence the behavioural intentions of Hungarians Digital Immigrants to use M-Payment services during the pandemic of COVID- 19. To achieve this goal, we conducted an electronic questionnaire-based survey of 415 people of ages within the category of Digital Immigrants. Previous studies argued that Digital Immigrants have less knowledge and capability in term of adopting technology (Rondan-Cataluña *et al.*, 2015; Walker Mark, 2019). However, our study found that Digital Immigrants in Hungary are in an increasing trend in term of using M-Payment as one of the technological payment solutions. Th study revealed that Digital Immigrants increased their usage of M-Payment since the COVID-19 pandemic began, and showed high level of intention to continue using it in the long term.

Structural Equation Modelling (SEM) was used to analyse the eight hypotheses developed based on the research's conceptual model. The current study examines consumers' continuous intention to adopt M-Payments with the integration of TPB, PMT and TCT. After reviewing the literature, we found that most recent studies have focused on the initial adoption of contactless fintech systems during the COVID- 19 pandemic, and few have focused on the post-adoption phase. Therefore, this study applied the PMT, which provided significant results to explain the initial adoption of M-Payment systems during the pandemic. We proposed the TCT, which showed high explanatory power for post-adoption behaviour, to investigate continuous adoption. The results showed that attitude, satisfaction, perceived usefulness and self-efficacy have a significant positive influence on consumers' intention to continue using M-Payment. In addition, our model was able to explain 75.4% of the variance in continuous intention.

In addition, the PMT constructs perceived health threat and self-efficacy had a significant influence on the initial acceptance of the M-Payment. In addition, IPMA results showed that perceived health threat and self-efficacy were each in the introduction regarding the performance and importance of the design of the dependent variable (continuous intention). The study provides evidence of the importance of continued adoption of M-Payment during the pandemic, which can be considered as protective health behaviour. Therefore, it is recommended that policy makers launch educational campaigns on the recommended behaviours that can help reduce the possibility of contracting the virus and correspond with social distancing measures. Such recommended

behaviours include adopting the M-Payment service. On the other hand, M-Payment service providers are recommended to offer modern, renewable services that meet consumers' needs and match their financial and technical capabilities .

6 CHAPTER SIX: APPENDICES

6.1 Appendix 1. References

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6.2 Appendix 2. Constructs definition

Construct	Definition	sources
Confirmation/adoption (CF)	The user's belief that actual performance when using a particular IT system meets expectations.	(Bhattacherjee, 2001)
Perceived ease of use(PEU)	The user's belief that using a particular IT system requires less effort.	(Davis, 1989) (Hoehle and Venkatesh, 2015)
Perceived usefulness (PU)	The users' belief about how useful a particular IT system is for performing their job.	(Davis, 1989)
Satisfaction (SF)	A psychological or affective state related to and resulting from a cognitive evaluation of the discrepancy between expectancy and performance.	(Bhattacherjee, 2001)
Attitudes (ATT)	The favorable or unfavorable feelings that an individual develops to perform a particular behaviour.	(Hill *et al.*, 1977)

Perceived health risk (PHR)	Beliefs about the degree of harm that will result from a negative outcome of a particular behaviour.	(Gaube *et al.*, 2019)
Self-efficacy (SE)	An individual's belief that he or she is capable of successfully performing a particular behaviour.	(Bandura, 1977)
Subjective norms (SN)	the degree of influence on the individual from their surrounding social environment to perform a particular behaviour.	(Flavian *et al.*, 2020).
Continuous intention (CI)	An individual's intention to use or reuse a particular system continuously.	(Bhattacherjee, 2001)

6.3 Appendix 3. Survey items

Understanding Digital Immigrants' sustained Use of Mobilepayments in post COVID-19 era

We hope this message finds you well. As part of an academic research project, we are conducting a survey on "Understanding Digital Immigrants' Sustained Use of Mobile Payments in the Post COVID-19 Era: IntegratingTechnology Continuous Theory with Protection Motivation Theory".

Your participation in this survey is crucial to help us gain a comprehensive understanding of the challenges and opportunities faced by digital immigrants in adopting mobile payment methods. and their motivations behind sustainedusage.

Your honest and thoughtful responses will contribute significantly to the success of our study. Your responses will remainanonymous and will be used strictly for research purposes.

Thank you for your time and consideration. If you have any questions or concerns regarding the survey or the researchproject, please feel free to contact us at [Daragmeh.Ahmad@phd.uni-mate.hu].

Sincerely,
Ahmad Daragmeh
Doctoral school of Business and Organizational sciencies.
Hungarian University of Agriculture and life sciences, Hungary

A digitális bevándorlók rendszeres mobilfizetési szokásainak vizsgálata a COVID-19 utáni időszakban

Tisztelettel üdvözöljük. Egy tudományos kutatási projekt részeként felmérést végzünk "A digitális bevándorlók rendszeres mobilfizetési szokásainak vizsgálata a COVID-19 utáni időszakban: A technológiai folytonosság elméletének és a megerősített motiváció elméletének integrálása" címmel.

Az Ön részvétele ebben a felmérésben kulcsfontosságú ahhoz, hogy átfogó képet kapjunk a digitális bevándorlók előtt álló kihívásokról és lehetőségekről, amelyekkel a mobilfizetési megoldások bevezetése során szembesülnek, valamint a folyamatos használat motivációiról.

Az Ön őszinte és átgondolt válaszai jelentősen hozzájárulnak tanulmányunk sikeréhez. Válaszai névtelenek maradnak, és szigorúan kutatási célokra használjuk fel őket.

Köszönjük, hogy időt szakított ránk és megfontolja a válaszadást. Ha bármilyen kérdése vagy aggálya van a felméréssel vagy a kutatási projekttel kapcsolatban, kérjük, forduljon hozzánk bizalommal a [Daragmeh.Ahmad@phd.uni-mate.hu] e-mail címen.

Tisztelettel,
Ahmad Daragmeh
Gazdálkodás- és Szervezéstudományok Doktori Iskola
Magyar Agrár- és Élettudományi Egyetem

Demographic variables/ Demográfiai jellemzők

1. Sex/ Neme *

- [ ] Male/ Férfi
- [ ] Female/ Nő

2. Age/ Kora *

- [ ] (Between 40 to 55) year/ 40 és 55 év közötti
- [ ] (Between 56 to 70) year/ 56 és 70 év közötti
- [ ] Over 70 year/ 70 évesnél idősebb

3. Education/ Legmagasabb iskolai végzettsége *

- [ ] Primary school/ Általános iskola
- [ ] High school/ Középiskola
- [ ] Undergraduate (Bachelor)/ Felsőfokú szakképzés (Alapképzés)
- [ ] Postgraduate (Master, PhD, Post Doc)/ Poszt-graduális képzés (Mester, PhD, Post Doc).

4. Occupation/ Foglalkoztatotti státusz *

- [ ] Employed (Private/Public/nonprofit) sector/ Alkalmazott (Magán-, állami-, vagy nonprofit szektorban).
- [ ] Self-employed/ Vállalkozó
- [ ] Retired/ Nyugdíjas

Mobile payment Behavioural usage questions/ A mobilfizetési szokásokra vonatkozó kérdések

5. When you began using mobile payment systems?/ Mikor kezdte el használni a mobilfizetési megoldásokat? *

- [ ] Before the COVID-19 pandemic/A COVID-19 pandémia előtt
- [ ] After the COVID-19 pandemic/ A COVID-19 pandémia alatt vagy után

6. What types of transactions do you primarily use mobile payments for? (Select all that apply:)/ Milyen típusú tranzakciókra használja elsősorban a mobilfizetést? (több válasz is lehetséges:)

7. How frequently do you use mobile payments now compared to before the pandemic?/ Milyen gyakran használja most a mobilfizetést a pandémia előtti időszakhoz képest?

- [ ] Less frequently/ Ritkábban
- [ ] About the same/ Ugyanolyan gyakran
- [ ] More frequently / Gyakrabban

8. I believe that using mobile payment is a health protective tool from COVID-19 infection/ Úgy gondolom, hogy a mobilfizetés egy egészségvédő eszköz a COVID-19 fertőzéssel szemben

- ☐ Yes/ Igen
- ☐ No / Nem
- ☐ Not sure/ Nem tudom megítélni

9. How important is the health preventive role of mobile payments in your decision to continue using them after the pandemic?/ Mennyire fontos a mobilfizetések egészségmegőrző szerepe abban, hogy a világjárvány után is használni fogja őket?

- ☐ Very Important/ Nagyon fontos
- ☐ Somehow Important/ Valamennyire fontos
- ☐ Not Important/ Nem fontos

10. In your opinion, do you believe that mobile payments will continue to play a significant role in health preventive measures post-pandemic?/ Véleménye szerint a mobilfizetés továbbra is jelentős szerepet fog játszani az egészségügyi megelőző intézkedésekben a járvány után?

- ☐ Yes/ Igen
- ☐ No / Nem
- ☐ Not sure/ Nem tudom megítélni

11. Will you continue using mobile payment ?/ Továbbra is fogja használni a mobilfizetést?

- ☐ Yes/ Igen
- ☐ No / Nem
- ☐ Not sure/ Nem tudom megítélni

12. How likely are you to recommend mobile payments to your friends or family members for their health safety and convenience?/ Milyen valószínűséggel ajánlaná a mobilfizetést ismerőseinek vagy családtagjainak egészségük biztonsága és kényelme érdekében?

- ☐ Very likely/ Nagy valószínűséggel
- ☐ Somewhat likely/ Valószínűleg igen
- ☐ Not likely/ Kis valószínűséggel

Study dimensions (Mobile payment usage behavior)/ A kutatás változói (Mobilfizetési szokások)

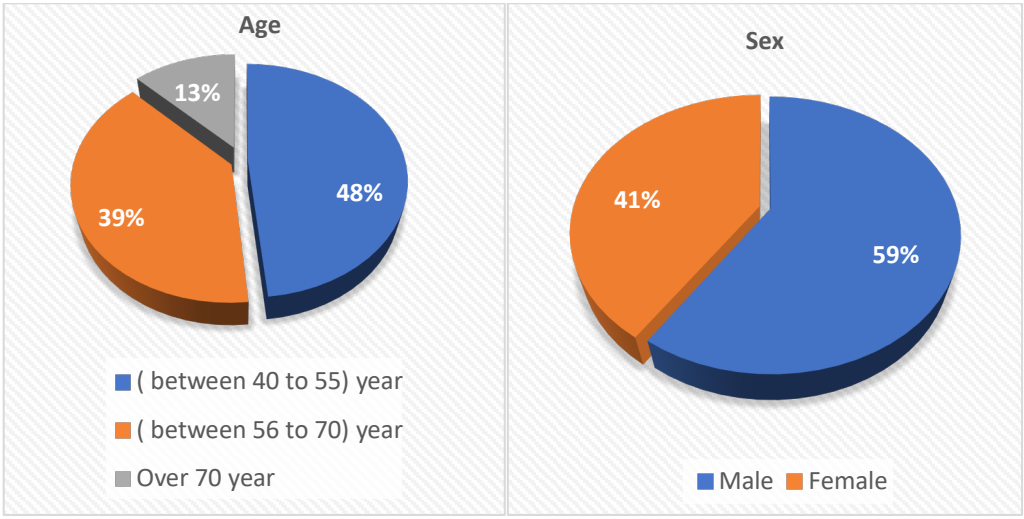
- Choose your scale for the below sentences from: 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree/ Válassza ki a skálát az alábbi mondatokhoz: 1. Egyáltalán nem értek egyet 2. Nem értek egyet 3. Semleges 4. Egyetértek 5. Teljesen egyetértek

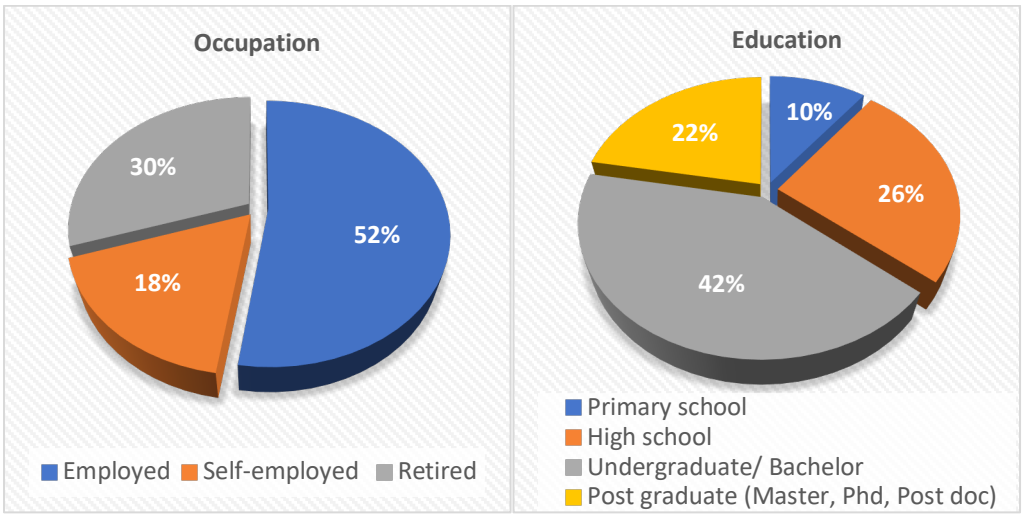
Construct/ Változó	Item
PHR/ Érzékelt egészségügyi kockázat (PHR)	
PHR1	There is a possibility to get infected by SARS-CoV-2 or contact based diseases due to using cash or physical contact payment tools. **((** Lehetőség van SARS-CoV-2 fertőzésre vagy érintkezésen alapuló betegségekre a készpénz vagy fizikai érintkezésen alapuló fizetési eszközök használata miatt **)).**
PHR2	My chances of infected by SARS-CoV-2 or contact based diseases if I use cash or physical contact payment tools are high. **((** Nagy az esélye annak, hogy SARS-CoV-2 vagy kontakt alapú betegségekkel fertőződöm, ha készpénzes vagy fizikai érintkezéses fizetőeszközöket használok**)).**
PHR3	I feel that SARS-CoV-2 or contact based diseases will develop health problems to me in the future. **((** Úgy érzem, hogy a SARS-CoV-2 vagy a kontakt alapú betegségek a jövőben egészségügyi problémákat fognak okozni nekem**)).**
PHR4	Thinking about getting infected by SARS-CoV-2 or contact based diseases due to using cash or physical contact payment tools makes me nervous. **((** A gondolat, hogy SARS-CoV-2 vagy kontakt alapú betegségekkel fertőződhetek meg, ha készpénzes vagy fizikai érintkezéses fizetőeszközöket használok, félelmet vált ki belőlem**)).**
PHR5	If I get infected by SARS-CoV-2 or contact based diseases due to using cash or physical contact payment tools, my whole life would change. **((** Ha a SARS-CoV-2 vagy más kontakt alapú betegséggel fertőződnék meg a készpénzzel vagy fizikai érintkezéssel történő fizetőeszközök használata miatt, az egész életem megváltozna**)).**
CF/ Megerősítés (CF)	
CF1	My experience with using M-Payment systems was better than what I expected. **((** A mobilfizetési rendszerek használatával kapcsolatos tapasztalataim jobbak voltak, mint amire számítottam**)).**
CF2	The service level provided by M-Payment systems was better than what I expected. **((** A mobilfizetési rendszerek által nyújtott szolgáltatási szint jobb volt, mint amire számítottam**)).**

CF3	Overall, most of my expectations from using M-Payment systems were confirmed. **((** Összességében a mobilfizetési rendszerek használatával kapcsolatos várakozásaim többsége beigazolódott**)).**
Perceived Ease of Use/ A használat érzékelt egyszerűsége (PEU)	
PEU1	Learning to use the M-Payment is easy for me. **((** A mobilfizetés használatának megtanulása számomra egyszerű**)).**
PEU2	My interaction with M-Payment procedure would be clear and understandable. **((** A mobilfizetési eljárás számomra világos és érthető interakciót jelent**)).**
PEU3	It would be easy for me to become skilful at using the M-Payment. **((** Könnyen elsajátíthatnám a mobilfizetés használatát**)).**
Perceived Usefulness/ Érzékelt hasznosság (PU)	
PU1	using M-Payment would enable me to pay more quickly. **((** A mobilfizetés használatával gyorsabban tudnék fizetni**)).**
PU2	using M-Payment make it easier for me to conduct payments. **((**A mobilfizetés használata megkönnyítené számomra a fizetést**)).**
PU3	using M-Payment would be advantageous rather than traditional payment methods (cash / contact payments). **((** A mobilfizetés használata előnyösebb lenne, mint a hagyományos fizetési módok (készpénz / érintéses fizetés**)).**
PU4	I would find M-Payment a useful possibility for paying. **((** A mobilfizetést hasznos fizetési lehetőségnek tartanám**)).**
Self- Efficacy/ Önhatékonyság (SE)	
SE1	It would be easy for me to learn how to use M-Payment systems. **((** Könnyen megtanulhatnám a mobilfizetési rendszerek használatát**)).**
SE2	I could use M-Payment if someone showed me how to do it. **((** Tudnám használni a mobilfizetést, ha valaki megmutatná, hogyan kell csinálni**)).**
SE3	I am able to use M-Payment if there is no one around to tell me what to do. **((** Képes lennék használni a mobilfizetést, még ha senki sem lenne a közelben, aki megmondaná, mit kell tennem**)).**
SN/ Szubjektív normák (SN)	
SN1	People who are important to me (e.g., family, friends, celebrities, and experts) think I should use M-Payment. **((** A számomra fontos emberek (pl. családtagok, barátok, híresség és szakértők) azon a véleményen vannak, hogy mobilfizetést kellene használnom**)).**

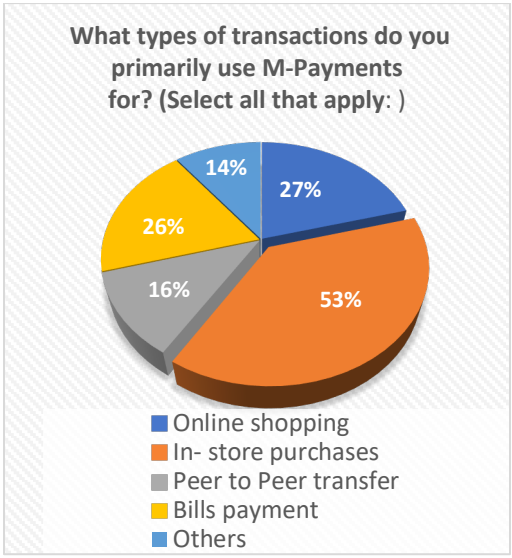
SN2	People whose opinions I value are prefer me to use M-Payment. **((** Azok az emberek, akiknek a véleményét nagyra értékelem, inkább a mobilfizetés használatát részesítik előnyben**)).**
SN3	People who are important to me support me to use M-Payment. **((** A számomra fontos emberek támogatják, hogy mobilfizetést használjak**)).**
SN4	People who are important to me influence my decision to use M-Payments. **((** A számomra fontos emberek befolyásolják a mobilfizetés használatára vonatkozó döntésemet**)).**
SF/ Elégedettség (SF)	
SF1	I feel satisfied with M-Payment usage. **((** Elégedett vagyok a mobilfizetés használatával**)).**
SF2	I feel contented with M-Payment usage. **((** A mobilfizetés használata kielégíti az elvárásaimat**)).**
SF3	I feel happy using M-Payment service. **((** Boldognak érzem magam a mobilfizetési szolgáltatás használatával**)).**
ATT/ Attitűd (ATT)	
ATT1	Using M-Payment systems for payment would be a wise idea. **((** A mobilfizetési rendszerek használata a fizetéshez bölcs elgondolás**)).**
ATT2	I like the idea of using M-Payment systems for payment. **((** Tetszik az ötlet, hogy a mobilfizetési rendszereket használjuk fizetésre**)).**
ATT3	Using M-Payment systems would be a pleasant experience. **((** A mobilfizetési rendszerek használata kellemes élmény lenne**)).**
CI/ Folytonos szándék (CN)	
CN1	I intend to continue using M-Payment systems rather than discontinue its use. **((** A mobilfizetési rendszerek használatát inkább folytatni kívánom, mintsem feladni**)).**
CN2	My intentions are to continue using M-Payment systems than using any alternative means. **((** Szándékaim szerint továbbra is a mobilfizetési rendszereket fogom használni, mintsem hogy bármilyen alternatív eszközt használjak**)).**
CN3	If I could, I would like to continue my use of M-Payment systems as much as possible. **((** Ha tehetem, szeretném továbbra is használni a mobil fizetési rendszereket, amennyire csak lehetséges **)).**

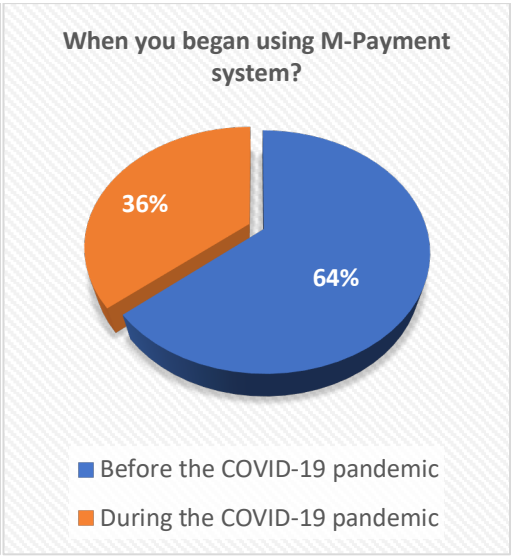
6.4 Appendix 4. Demographic statistics

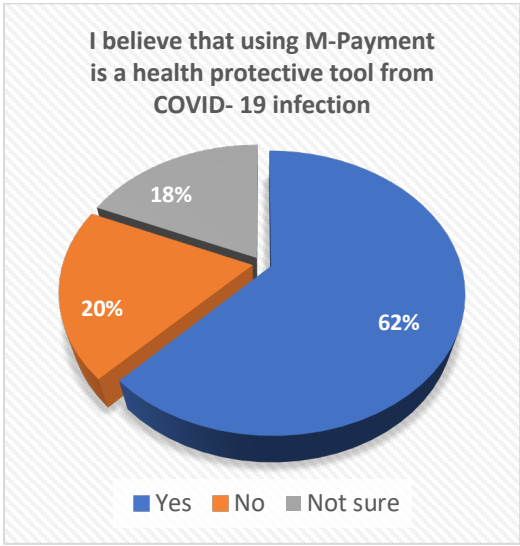


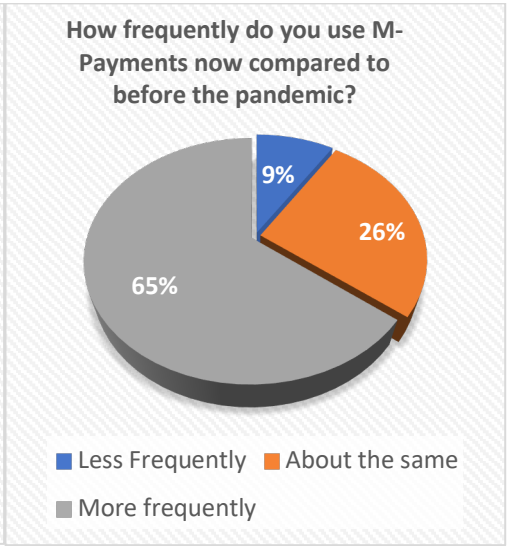


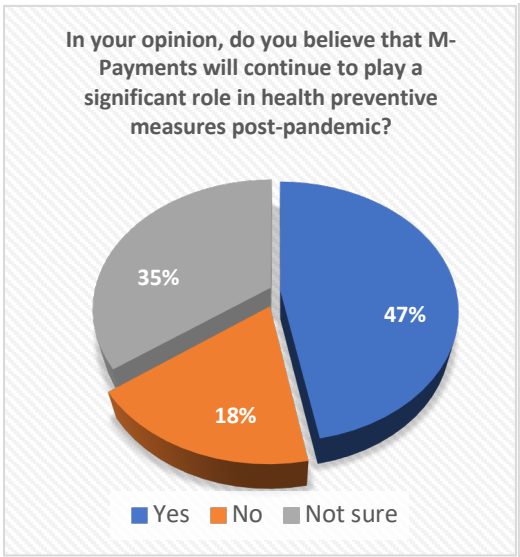
6.5 Appendix 5. M-Payment behavioural usage questions

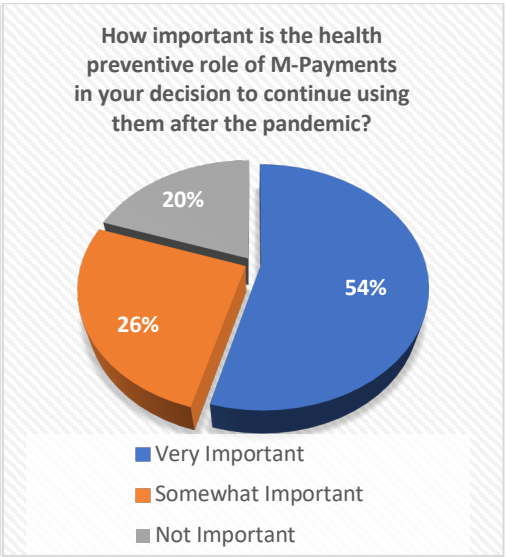


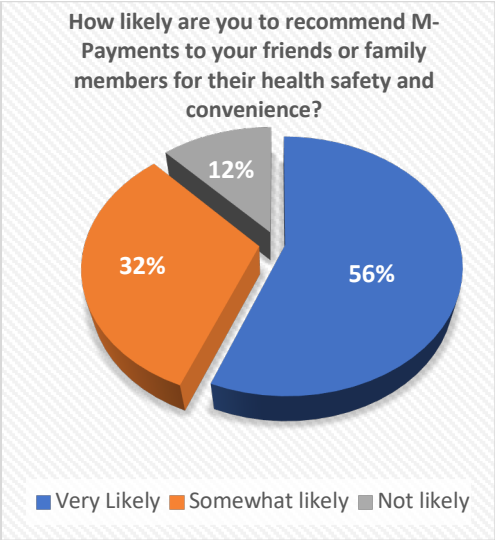


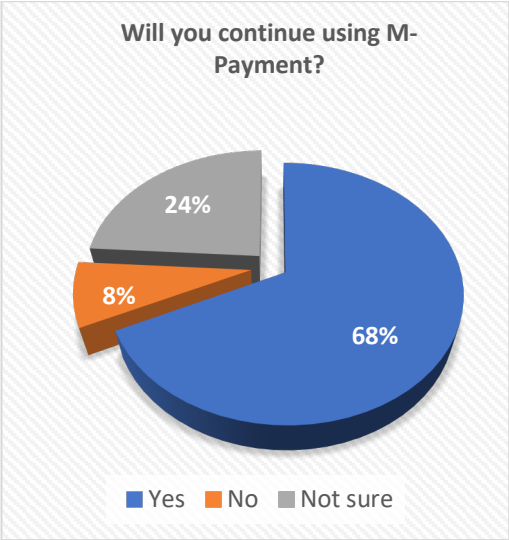












6.6 Appendix 6. Descriptive & Statistical Analysis

	No.	Missing	Mean	Median	Min	Max	Standard Deviation	Excess Kurtosis	Skewness
Sex	1	0	1.406	1	1	2	0.491	-0.859	0.385
Age	2	0	1.362	1	1	3	0.679	0.987	0.618
Education	3	0	2.044	2	1	4	1.043	-0.816	0.462
Occupation	4	0	1.252	1	1	3	0.504	0.731	0.484
WUBMP	5	0	1.271	1	1	2	0.445	-0.937	0.233
UMPHP	6	0	1.104	1	1	2	0.305	0.803	0.605
UMPI	7	0	1.206	1	1	2	0.404	0.132	0.246
HOUMP	8	0	1.933	2	1	5	1.161	0.864	0.286
KTUMP	9	0	2.363	2	1	4	0.905	-0.758	0.154
CUMP	10	0	1.11	1	1	2	0.312	0.799	0.606
PHR1	11	0	3.91	4	1	5	0.979	0.901	-0.412
PHR2	12	0	3.688	4	1	5	1.102	-0.219	-0.674
PHR3	13	0	3.929	4	1	5	0.979	0.423	-0.856
PHR4	14	0	4.038	4	1	5	0.923	0.827	-0.315
PHR5	15	0	3.712	4	1	5	1.02	-0.51	-0.501
PEU1	16	0	3.363	4	1	5	1.247	-0.935	-0.362
PEU2	17	0	3.4	4	1	5	1.243	-0.873	-0.274
PEU3	18	0	3.267	3	1	5	1.228	-0.989	-0.183
SE1	19	0	3.327	4	1	5	1.224	-0.866	-0.41
SE2	20	0	3.412	4	1	5	1.21	-0.912	-0.275
SE3	21	0	3.423	4	1	5	1.136	-0.727	-0.33
SN1	22	0	3.679	4	1	5	0.948	0.127	-0.61

SN2	23	0	3.673	4	1	5	1.008	-0.442	-0.428
SN3	24	0	3.667	4	1	5	1.03	0.059	-0.656
SN4	25	0	3.919	4	1	5	0.862	0.688	-0.818
CF1	26	0	3.667	4	1	5	0.98	-0.072	-0.622
CF2	27	0	3.587	4	1	5	1.06	-0.574	-0.359
CF3	28	0	3.621	4	1	5	1.01	-0.394	-0.524
ATT1	29	0	3.81	4	1	5	0.93	0.903	-0.935
ATT2	30	0	3.733	4	1	5	1.056	-0.219	-0.609
ATT3	31	0	3.71	4	1	5	1.005	0.211	-0.739
CN1	32	0	3.871	4	1	5	0.873	0.401	-0.755
CN2	33	0	3.748	4	1	5	0.99	0.061	-0.682
CN3	34	0	3.827	4	1	5	0.949	0.083	-0.677
PU1	35	0	3.819	4	1	5	1.026	-0.148	-0.705
PU2	36	0	3.79	4	1	5	1.058	0.007	-0.765
PU3	37	0	3.862	4	1	5	1.023	-0.152	-0.715
PU4	38	0	3.931	4	1	5	0.996	0.572	-0.975
SF1	39	0	3.821	4	1	5	1.069	0.26	-0.889
SF2	40	0	3.798	4	1	5	1.025	0.106	-0.782
SF3	41	0	3.756	4	1	5	1.021	0.447	-0.889

Note 1: ATT= ATT; CF = CF; CN = CI; CTA = CTA; PEU = Perceived ease of use; PHR = Perceived health risk; PU = Perceived usefulness; SE = SE; SF = SF.

6.7 Appendix 7. Results of reliability and convergent validity

	Outer loadings	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
ATT		**0.894**	**0.934**	**0.825**
ATT1	0.906			
ATT2	0.890			
ATT3	0.928			
CF		**0.828**	**0.898**	**0.745**
CF1	0.834			
CF2	0.888			
CF3	0.866			
CTA		**0.776**	**0.857**	**0.601**
SN1	0.795			
SN2	0.814			
SN3	0.810			
SN4	0.713			

PEU		**0.835**	**0.899**	**0.749**
PEU1	0.881			
PEU2	0.830			
PEU3	0.884			
PHR		**0.833**	**0.882**	**0.601**
PHR1	0.758			
PHR2	0.810			
PHR3	0.812			
PHR4	0.770			
PHR5	0.722			
PU		**0.874**	**0.914**	**0.726**
PU1	0.856			
PU2	0.850			
PU3	0.853			
PU4	0.848			
SE		**0.716**	**0.840**	**0.637**
SE1	0.766			
SE2	0.797			
SE3	0.830			
SF		**0.860**	**0.914**	**0.781**
SF1	0.865			
SF2	0.893			
SF3	0.892			
CN		**0.894**	**0.934**	**0.826**
CN1	0.899			
CN2	0.893			
CN3	0.933			

Note: ATT= Attitude; CF = Conformation; CN = Continuous intention; SN = Subjective norms; PEU = Perceived ease of use; PHR = Perceived health risk; PU = Perceived usefulness; SE = Self-efficacy; SF = Satisfaction.

6.8 Appendix 8. Cross loading

Item	ATT	CF	CN	SN	PEU	PHR	PU	SE	SF
ATT1	**0.906**	0.693	0.753	0.644	0.331	0.711	0.738	0.445	0.672
ATT2	**0.890**	0.582	0.702	0.649	0.289	0.626	0.650	0.459	0.555
ATT3	**0.928**	0.623	0.711	0.650	0.310	0.698	0.707	0.509	0.624
CF1	0.657	**0.834**	0.672	0.564	0.320	0.592	0.645	0.456	0.634
CF2	0.582	**0.888**	0.572	0.578	0.310	0.510	0.586	0.415	0.639
CF3	0.564	**0.866**	0.575	0.525	0.297	0.517	0.607	0.404	0.676

CN1	0.719	0.653	**0.899**	0.619	0.326	0.676	0.725	0.463	0.692
CN2	0.704	0.586	**0.893**	0.640	0.279	0.681	0.699	0.487	0.625
CN3	0.744	0.680	**0.933**	0.646	0.306	0.698	0.738	0.481	0.688
SN1	0.520	0.463	0.566	**0.795**	0.224	0.474	0.489	0.330	0.462
SN2	0.588	0.538	0.554	**0.814**	0.213	0.502	0.499	0.364	0.467
SN3	0.553	0.549	0.564	**0.810**	0.256	0.489	0.530	0.360	0.510
SN4	0.554	0.443	0.477	**0.713**	0.240	0.627	0.524	0.353	0.428
PEU1	0.323	0.340	0.318	0.279	**0.881**	0.292	0.371	0.203	0.355
PEU2	0.192	0.249	0.197	0.182	**0.830**	0.178	0.280	0.205	0.261
PEU3	0.343	0.328	0.328	0.295	**0.884**	0.327	0.416	0.271	0.334
PHR1	0.554	0.429	0.585	0.464	0.244	**0.758**	0.542	0.342	0.463
PHR2	0.629	0.559	0.606	0.545	0.227	**0.810**	0.545	0.443	0.515
PHR3	0.646	0.495	0.652	0.572	0.267	**0.812**	0.600	0.420	0.515
PHR4	0.518	0.490	0.559	0.479	0.254	**0.770**	0.583	0.414	0.537
PHR5	0.545	0.447	0.515	0.525	0.242	**0.722**	0.525	0.383	0.485
PU1	0.665	0.639	0.650	0.542	0.355	0.621	**0.856**	0.502	0.685
PU2	0.647	0.581	0.673	0.548	0.335	0.630	**0.850**	0.468	0.720
PU3	0.686	0.602	0.707	0.590	0.354	0.614	**0.853**	0.449	0.662
PU4	0.625	0.602	0.673	0.558	0.389	0.595	**0.848**	0.413	0.695
SE1	0.362	0.403	0.386	0.326	0.250	0.388	0.385	**0.766**	0.413
SE2	0.395	0.388	0.385	0.338	0.192	0.361	0.405	**0.797**	0.396
SE3	0.475	0.394	0.477	0.413	0.197	0.481	0.489	**0.830**	0.363
SF1	0.540	0.638	0.583	0.461	0.271	0.509	0.677	0.356	**0.865**
SF2	0.600	0.665	0.644	0.552	0.339	0.583	0.703	0.443	**0.893**
SF3	0.657	0.692	0.715	0.578	0.367	0.622	0.763	0.482	**0.892**

Note: ATT= Attitude; CF = Conformation; CN = Continuous intention; SN = Subjective norms; PEU = Perceived ease of use; PHR = Perceived health risk; PU = Perceived usefulness; SE = Self-efficacy; SF = Satisfaction.

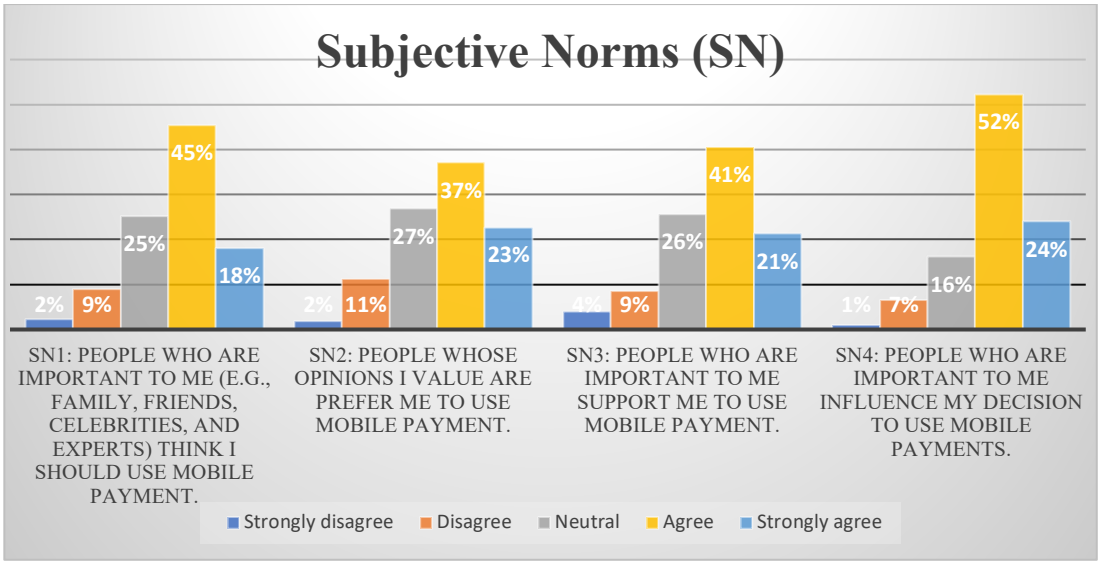
6.9 Appendix 9. Collinearity Statistics - Outer VIF Values

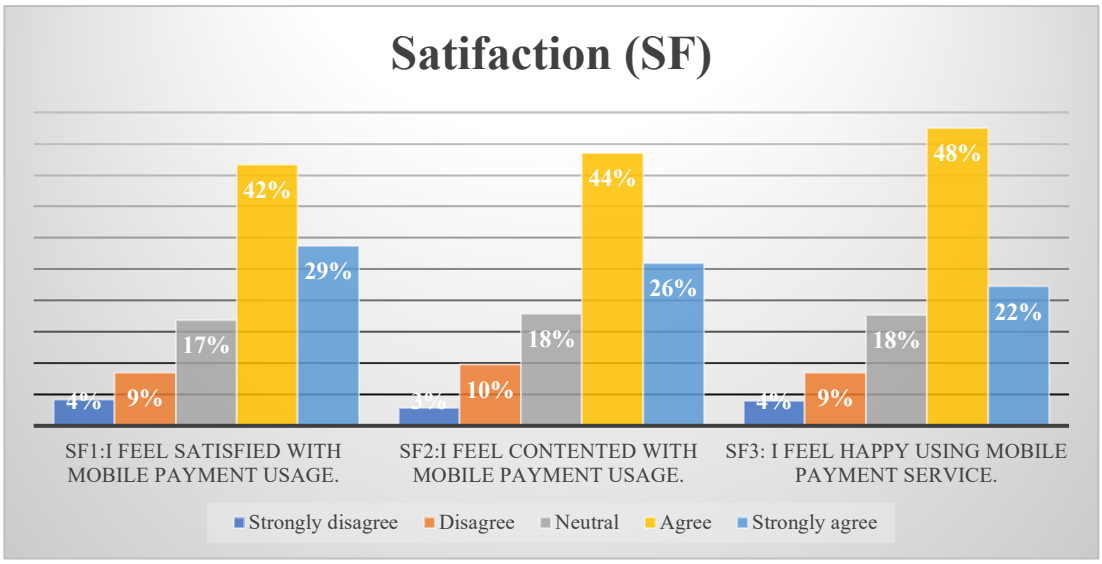
Item	VIF
ATT1	2.625
ATT2	2.485
ATT3	3.269
CF1	1.640
CF2	2.327
CF3	2.082
CN1	2.606
CN2	2.510

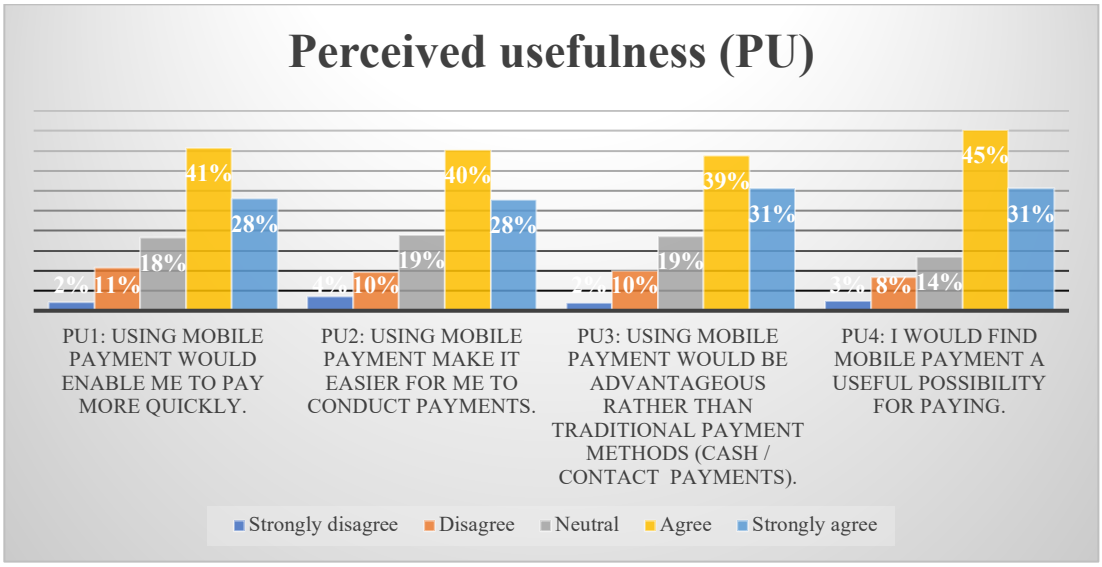
CN3	3.393
CTA1	1.586
CTA2	1.713
CTA3	1.712
CTA4	1.284
PEU1	2.086
PEU2	1.949
PEU3	1.841
PHR1	1.734
PHR2	1.838
PHR3	1.953
PHR4	1.686
PHR5	1.554
PU1	2.254
PU2	2.208
PU3	2.206
PU4	2.179
SE1	1.344
SE2	1.454
SE3	1.428
SF1	2.066
SF2	2.334
SF3	2.162

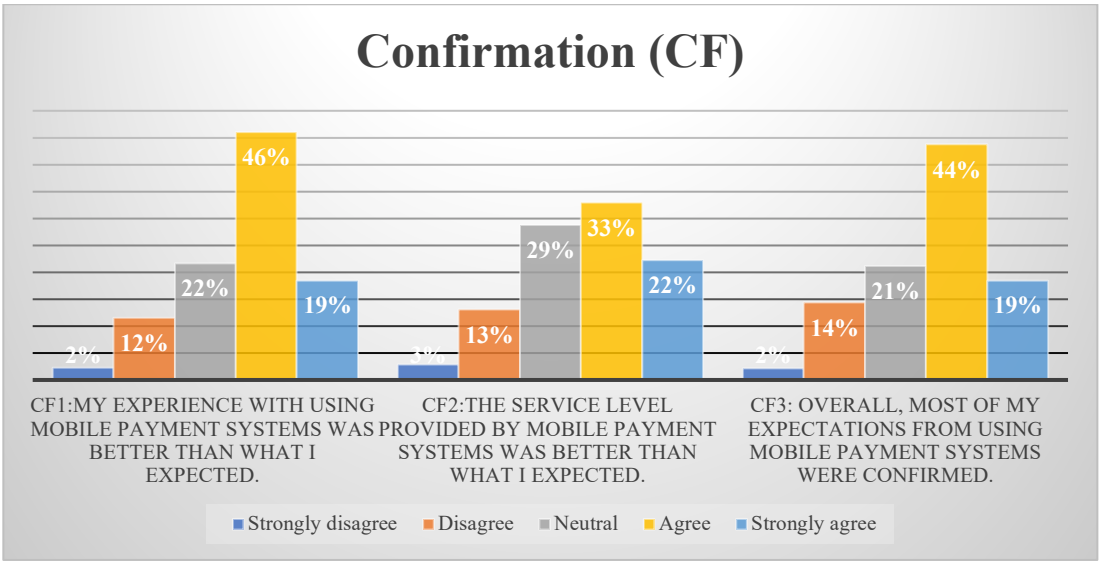
Note: ATT= Attitude; CF = Conformation; CN = Continuous intention; SN = Subjective norms; PEU = Perceived ease of use; PHR = Perceived health risk; PU = Perceived usefulness; SE = Self-efficacy; SF = Satisfaction.

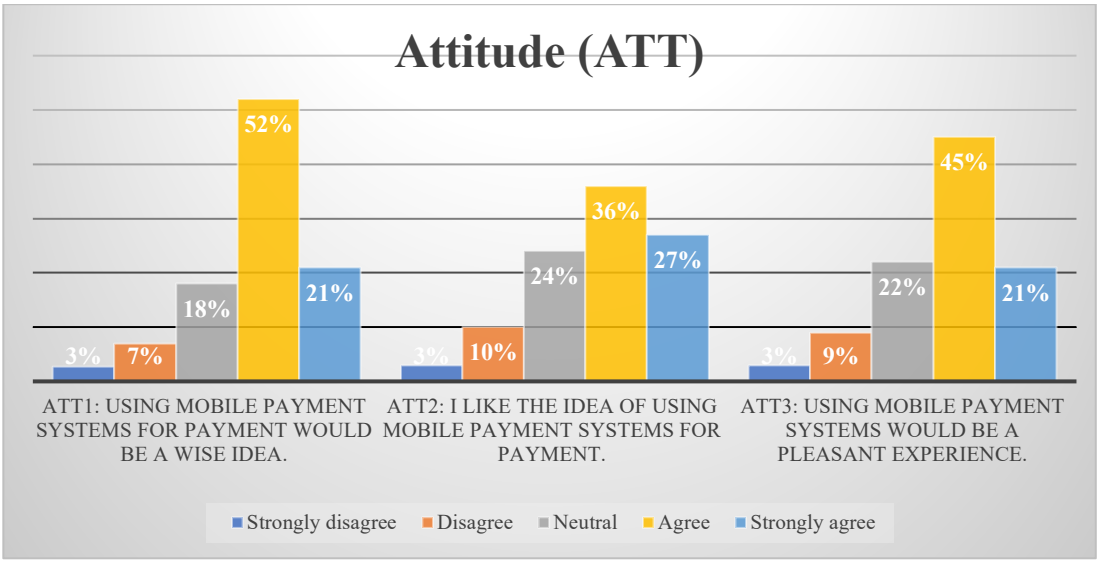
6.10 Appendix 10. Constructs measurements

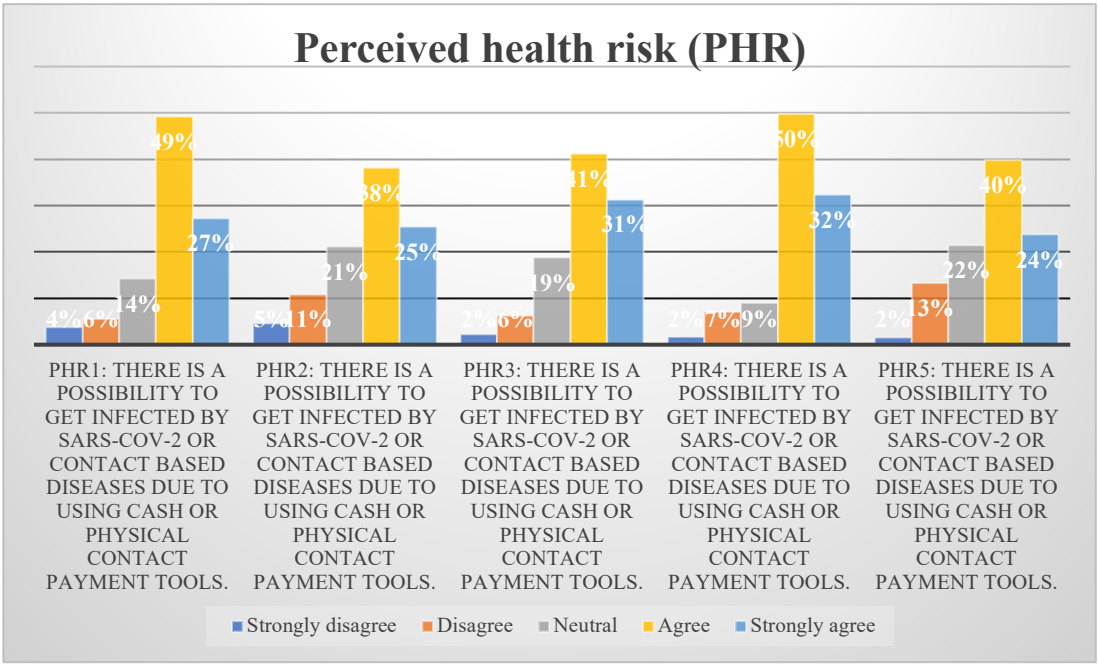


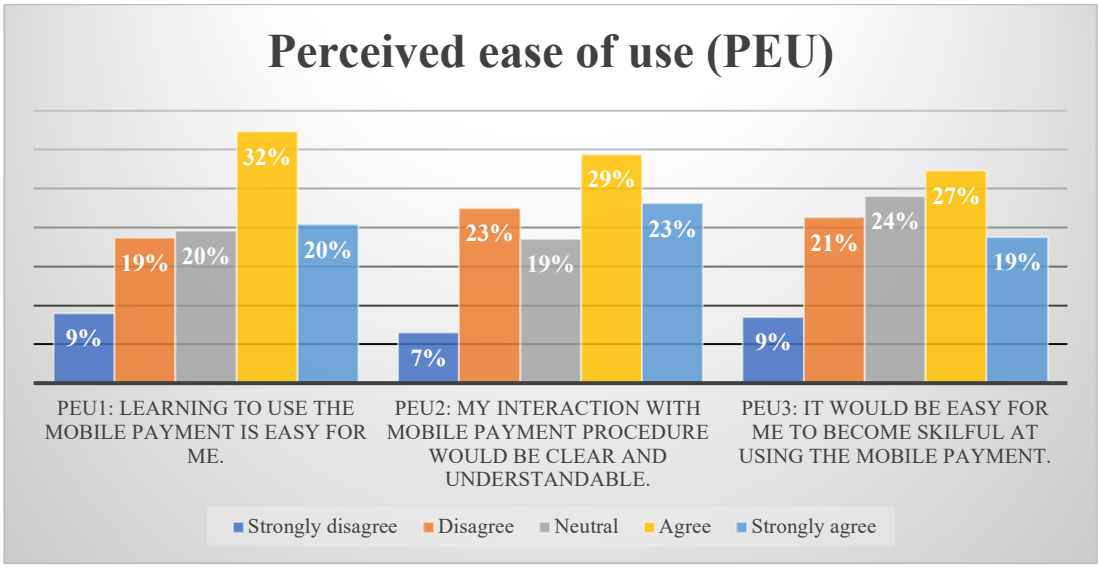


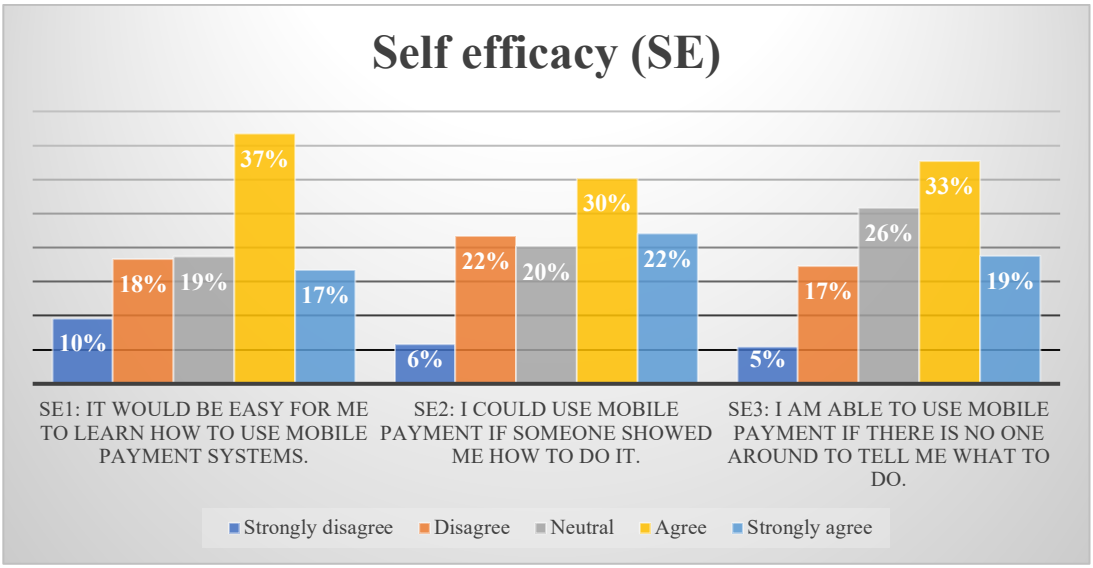


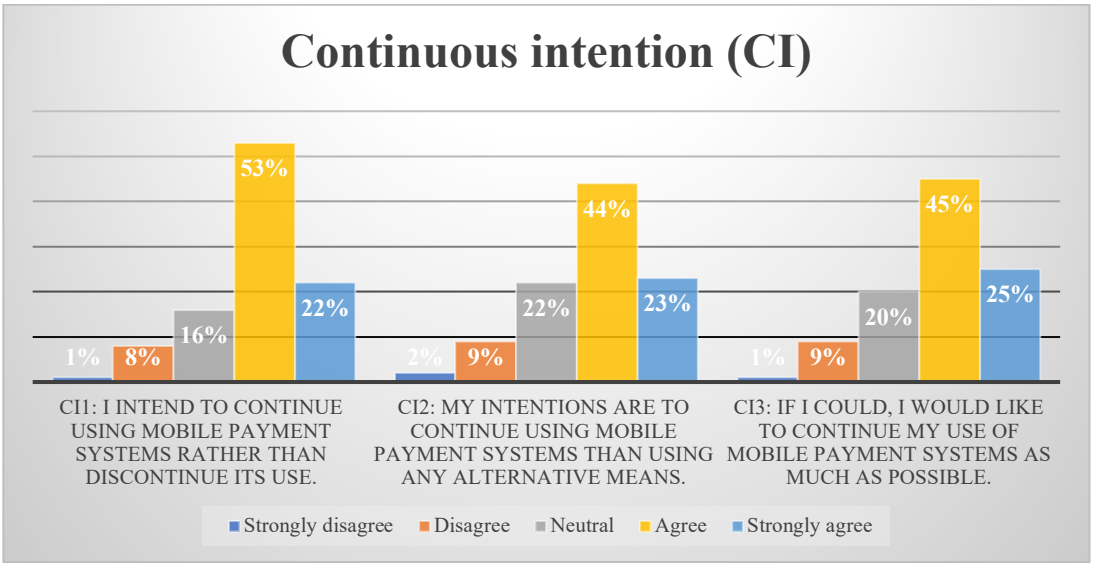

Confirmation (CF)
2%
12%
22%
46%
19%
3%
13%
29%
33%
22%
2%
14%
21%
44%
19%
CF1:MY EXPERIENCE WITH USING MOBILE PAYMENT SYSTEMS WAS BETTER THAN WHAT I EXPECTED.
CF2:THE SERVICE LEVEL PROVIDED BY MOBILE PAYMENT SYSTEMS WAS BETTER THAN WHAT I EXPECTED.
CF3: OVERALL, MOST OF MY EXPECTATIONS FROM USING MOBILE PAYMENT SYSTEMS WERE CONFIRMED.
Strongly disagree
Disagree
Neutral
Agree
Strongly agree


Attitude (ATT)
3%
7%
18%
52%
21%
3%
10%
24%
36%
27%
3%
9%
22%
45%
21%
ATT1: USING MOBILE PAYMENT SYSTEMS FOR PAYMENT WOULD BE A WISE IDEA.
ATT2: I LIKE THE IDEA OF USING MOBILE PAYMENT SYSTEMS FOR PAYMENT.
ATT3: USING MOBILE PAYMENT SYSTEMS WOULD BE A PLEASANT EXPERIENCE.
Strongly disagree
Disagree
Neutral
Agree
Strongly agree


Perceived health risk (PHR)
4%
6%
14%
49%
27%
3%
11%
21%
38%
25%
2%
6%
19%
41%
31%
2%
7%
9%
50%
32%
2%
3%
22%
40%
24%
PHR1: THERE IS A POSSIBILITY TO GET INFECTED BY SARS-COV-2 OR CONTACT BASED DISEASES DUE TO USING CASH OR PHYSICAL CONTACT PAYMENT TOOLS.
PHR2: THERE IS A POSSIBILITY TO GET INFECTED BY SARS-COV-2 OR CONTACT BASED DISEASES DUE TO USING CASH OR PHYSICAL CONTACT PAYMENT TOOLS.
PHR3: THERE IS A POSSIBILITY TO GET INFECTED BY SARS-COV-2 OR CONTACT BASED DISEASES DUE TO USING CASH OR PHYSICAL CONTACT PAYMENT TOOLS.
PHR4: THERE IS A POSSIBILITY TO GET INFECTED BY SARS-COV-2 OR CONTACT BASED DISEASES DUE TO USING CASH OR PHYSICAL CONTACT PAYMENT TOOLS.
PHR5: THERE IS A POSSIBILITY TO GET INFECTED BY SARS-COV-2 OR CONTACT BASED DISEASES DUE TO USING CASH OR PHYSICAL CONTACT PAYMENT TOOLS.
Strongly disagree
Disagree
Neutral
Agree
Strongly agree


Perceived ease of use (PEU)
9%
19%
20%
32%
20%
7%
23%
19%
29%
23%
9%
21%
24%
27%
19%
PEU1: LEARNING TO USE THE MOBILE PAYMENT IS EASY FOR ME.
PEU2: MY INTERACTION WITH MOBILE PAYMENT PROCEDURE WOULD BE CLEAR AND UNDERSTANDABLE.
PEU3: IT WOULD BE EASY FOR ME TO BECOME SKILFUL AT USING THE MOBILE PAYMENT.
Strongly disagree
Disagree
Neutral
Agree
Strongly agree


Self efficacy (SE)
10%
18%
19%
37%
17%
6%
22%
20%
30%
22%
5%
17%
26%
33%
19%
SE1: IT WOULD BE EASY FOR ME TO LEARN HOW TO USE MOBILE PAYMENT SYSTEMS.
SE2: I COULD USE MOBILE PAYMENT IF SOMEONE SHOWED ME HOW TO DO IT.
SE3: I AM ABLE TO USE MOBILE PAYMENT IF THERE IS NO ONE AROUND TO TELL ME WHAT TO DO.
Strongly disagree
Disagree
Neutral
Agree
Strongly agree


Continuous intention (CI)
1%
8%
16%
53%
22%
2%
9%
22%
44%
23%
1%
9%
20%
45%
25%
CI1: I INTEND TO CONTINUE USING MOBILE PAYMENT SYSTEMS RATHER THAN DISCONTINUE ITS USE.
CI2: MY INTENTIONS ARE TO CONTINUE USING MOBILE PAYMENT SYSTEMS THAN USING ANY ALTERNATIVE MEANS.
CI3: IF I COULD, I WOULD LIKE TO CONTINUE MY USE OF MOBILE PAYMENT SYSTEMS AS MUCH AS POSSIBLE.
Strongly disagree
Disagree
Neutral
Agree
Strongly agree

Acknowledgements

First and foremost, I express my deepest gratitude to God for guiding me through this arduous yet fulfilling journey of education and for granting me the strength and resilience to reach this significant milestone in my academic career.

I am profoundly indebted to my esteemed supervisors, Dr. Judit Sagi and Dr. Judit Barczi, whose unwavering support, invaluable guidance, and expertise have been instrumental in shaping this dissertation and in enabling me to contribute to the scientific community by publishing several papers in esteemed international journals.

I extend my sincere appreciation to the Head of the Doctoral School, Professor Dr. Zoltán Bujdosó, and to all the professors at the Doctoral School of Economic and Regional Sciences at the Hungarian University of Agriculture and Life Sciences (MATE) formally Szent István University. Their dedication to fostering a stimulating academic environment and providing essential resources has been indispensable in facilitating this dissertation and fostering my intellectual growth.

I am grateful to the committee members and reviewers, Professor Dr. Maria Fekete-Farkas, Dr. Enikő Lencsés, Dr. Lencsés Enikő, and Dr. Ildikó Rudnák, for their insightful feedback and constructive criticism, which have significantly enriched the quality of my work.

Furthermore, I would like to express my appreciation to my colleagues and friends, whose support and camaraderie have been invaluable both academically and personally.

I am deeply thankful to the Hungarian government and the Tempus Public Foundation for affording me the opportunity to pursue my studies in this esteemed country.

Lastly, I owe the greatest debt of gratitude to my family—my parents, brothers, and sisters—who have been my unwavering source of love, encouragement, and support from my childhood until this moment. Their belief in me has been the bedrock upon which I have built my academic aspirations.

Thank you to all who have contributed to this journey in ways both seen and unseen. Your support has been immeasurable, and I am forever grateful.