STUDY ON ADOPTION M PAYMENTS SYSTEM USING SMARTPLS

BY

A.S.M. SHAHORIA AZAD
ID: 201-15-3732

This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

Supervised By

Dr. Arif Mahmud
Associate Professor
Department of CSE
Daffodil International University

Co-Supervised By

Mr. Narayan Ranjan Chakraborty
Associate Professor and Associate Head
Department of CSE
Daffodil International University

DAFFODIL INTERNATIONAL UNIVERSITY
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APPROVAL

This Project/internship titled **"STUDY ON ADOPTION M PAYMENTS SYSTEM USING SMARTPLS"**, submitted by A.S.M. Shahoria Azad, ID No: 201-15-3732 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on *25/01/2024*.

BOARD OF EXAMINERS

Dr. Md. Zahid Hasan (ZH)
Associate Professor
Department of CSE
Daffodil International University

Chairman

Dr. Fizar Ahmed (FZA)
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Daffodil International University

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Assistant Professor
Department of CSE
Daffodil International University

Internal Examiner

Dr. Mohammed Nasir Uddin (DNU)
Professor
Department of Computer Science and Engineering
Jagannath University

External Examiner

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DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Dr. Arif Mahmud, Associate Professor, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

Supervised by:

Dr. Arif Mahmud
Associate Professor
Department of CSE
Daffodil International University

Co-Supervised by:

Mr. Narayan Ranjan Chakraborty
Associate Professor and Associate Head
Department of CSE
Daffodil International University

Submitted by:

Shahoria

(A.S.M. Shahoria Azad)
ID: 201-15-3732
Department of CSE
Daffodil International University

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ABSTRACT

Globally, mobile payment is becoming more and more popular as a substitute for cash, checks, and credit cards, both for individuals and businesses. The main goals of this research are to identify the key variables affecting the uptake of mobile payments and to recommend this technology. In order to fully tackle the intricacies of user behaviour, the research incorporates three notable models: UTAUT, DOI and TTF. Bangladesh, an Asian nation, provided 250 replies to an online survey that was used to experimentally test the study model. The structural equation modelling method was used to analyse the data (SEM). Moreover, the addition of perceived trust and personal inventiveness as moderators results in improvements to the R2 and Q2, respectively. This research aims to develop a complete model that captures the complex interaction of factors impacting the behavioral intentions and actual adoption of mobile payment systems among Bangladesh's tech-savvy Generation Z. It does this by synthesizing UTAUT, DOI, and TTF. It is anticipated that the results will provide insight into practical tactics for encouraging the country's wide adoption and use of mobile payment technologies.

Keywords: User behaviour, trust, M-Payments, and smart phones; SMARTPLS

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Chapter-1
INTRODUCTION

1.1 Introduction

Mobile payment, commonly referred to as m-payment, has totally changed how consumers manage their accounts and execute purchases. M-payment systems use mobile devices which are more common in today's world—to enable safe and practical electronic transactions. These systems remove the need for traditional physical currency and credit/debit cards by enabling users to conduct financial transactions, transfer money, and make payments using their mobile devices. The swift advancement of mobile technology and the growing need for smooth and effective financial transactions have propelled the launch of m-payment systems. This cutting-edge method of accepting payments has many advantages, including accessibility, quickness, and ease of use, which makes it a preferred option for both customers and companies.[1]

The adaptability of mobile payment systems is one of its main advantages. From the comfort of their smartphones, users may transact online, pay bills, send money to friends and family, and make purchases at physical businesses. These systems frequently combine a range of technologies, including Near Field Communication (NFC), QR codes, and mobile apps, to facilitate safe and speedy transactions. Strong authentication and encryption procedures have been implemented by m-payment system developers to safeguard users' financial information. Security is a top priority.[2]

Since m-payment systems enable people who might Their increasing acceptance has significant implications for financial inclusion, since it allows those who do not have access to traditional banking services to participate in the digital economy. Businesses also benefit from reduced transaction costs, higher output, and a wider customer base. M-payment systems will probably be very important in determining how banking and business are conducted in the future as the financial technology industry develops. These systems are positioned as a cornerstone in the continuing digital transformation of the global financial ecosystem because of its simplicity, accessibility, and security features.[3]

I used three different types of models here, and I'll discuss each one below:

A well-liked technique for researching user acceptance of mobile payment systems is the UTAUT model. The model outlines a number of elements, such as price value, trust, perceived risk, habit, hedonic motivation, social influence, effort expectation, performance anticipation, and enabling conditions, that influence the adoption of mobile payment systems.[4]

Diffusion of Innovation (DOI) is another theoretical framework that can be used to study the adoption of mobile payment systems. The model describes several factors that influence the uptake of new technology, encompassing trialability, observability, complexity, compatibility, and relative advantage [5].

Lastly, the Task-Technology Fit (TTF) paradigm can also be used to study how widely accepted mobile payment systems are. The model focuses on how the characteristics of the task and the features of the technology relate to each other, and how this relationship affects users' adoption and usage of the technology [6].

1.2 Motivation

Researching the adoption of mobile payment systems, or M-payment, is motivated by the way that technological breakthroughs have revolutionized the financial sector. The increasing prevalence of smartphones and the consequent shift in consumer behavior towards digital transactions necessitate an understanding of the dynamics driving M-payment acceptance. Examining the reasons for the popularity of mobile payment systems is crucial, as evidenced by their efficiency and convenience as well as the evolving tastes of tech-savvy consumers. Concerns about security, trust, and legal frameworks also have a significant impact on how users perceive and are willing to accept mobile payment options. Investigating these facets will not only help us understand consumer preferences better, but it will also offer developers, entrepreneurs, and policymakers ideas on how to improve M-payment system uptake and usability in the dynamic digital economy.

1.3 Rationale of the Study

The transformational impact that mobile payment systems (M-payment) have on the global financial environment is the justification for researching their adoption. Given the widespread use of smartphones and the growing trend of the digital economy, it is imperative to comprehend the factors driving the uptake of M-payment systems. In addition to altering how customers conduct financial transactions, the quick development of technology has presented new opportunities and difficulties for companies, governments, and society at large.

The potential for M-payment systems to completely transform conventional payment methods by providing unmatched efficiency and ease is a major justification. The growing dependence of customers on mobile devices for diverse purposes, such as financial transactions, necessitates an examination of the driving forces underlying this trend. An analysis of the variables impacting the uptake of mobile payment systems yields important information on the tastes, actions, and expectations of users.

The report also discusses trust and security issues, which are crucial when it comes to the uptake of any financial technology. Given the delicate nature of financial transactions, it is crucial to comprehend how consumers view the security aspects of M-payment systems and the establishment of trust in order to promote their wider adoption. The development of more safe and convenient mobile payment options may benefit from this research.

The regulatory landscape surrounding mobile payment systems provides an additional justification. Policies have the power to help or hinder the development of these technologies, and examining their effects can help us understand how legislators influence the direction of financial technology. Additionally, the study analyzes broader economic and social ramifications taking into account the possible cost reductions and the role of M-payment systems in fostering financial inclusion.

The competitive environment in which M-payment systems operate provides justification for further study. A thorough understanding of the sector benefits from an understanding

of how different service providers compete for market share, innovate, and distinguish their offers. Both users navigating a wide range of alternatives and organizations looking to optimize their strategy will find value in this knowledge.

Essentially, the desire to understand the complex elements influencing the digital finance landscape is what drives the research on the adoption of mobile payment systems. This research aims to provide a nuanced understanding that can inform stakeholders, guide policy decisions, and drive advancements in the field, ultimately contributing to the ongoing evolution of the digital financial landscape. It does this by examining user behaviors, security concerns, regulatory influences, and the competitive dynamics of the M-payment ecosystem.

1.4 Research Questions

This work raises the following research questions:

1. What elements affect the uptake of mobile payment methods?

2. How secure do consumers think mobile payment methods are?
3. What are the benefits and drawbacks of using mobile payment systems compared to traditional payment methods?
4. How can more user-friendly design be incorporated into mobile payment systems?
5. How do mobile payment methods affect the accessibility of finance?
6. How do mobile payment methods fit into the digital economy?

1.5 Expected Output

A mobile payment system produces a digital transaction that lets customers use their mobile devices to make payments. The payment system is safe and easy to use, and it may be used to pay for a variety of products and services. Research indicates that the ongoing use of mobile payment technology is necessary to sustain the ubiquity of mobile payment solutions. After this study is finished, I want as many Bangladeshis as possible to be interested in using mobile money transfers. Additionally, I hope that as Bangladesh develops, we will move away from the outdated, conventional means of payment and towards intelligent, digital ones. While not every location in Bangladesh has a mobile payment system, my goal is for there to be a mobile payment system in as many locations as possible once my research is over. I brought up the study that shows, if individuals choose any option, they will use the mobile payment system. From then, the provider of mobile payment systems should focus on identifying the key features and services that customers desire. If they are satisfied with the results, they will be eager to use the payment system. In other words, the user's preferences should be given top priority by this payment system. Given how quickly Bangladesh is developing in line with the rest of the globe, I expect that as the country's population and living standards rise, they will start using smart and digital payment methods mobile payments being one of the most notable in place of the conventional cash payment technique.

1.6 Project Management and Finance

The successful implementation of a mobile payment system requires careful project management and financial planning. There are various phases in the project management process, including design, development, testing, and deployment in addition to planning. During the planning stage, the project team should outline the objectives, deliverables, and scope of the work. They should also determine the resources needed to finish the project. The design stage involves creating a detailed blueprint of the mobile payment system, including the user interface, security features, and data storage requirements. The development stage involves building the mobile payment system,

while the testing stage involves verifying that the system works as intended. The public release of the mobile payment system completes the deployment stage.

I have collected data on real people. I have cost some money for my data collection.

1.7 Report Layout

Every chapter is summarised in the report structure. The following are the chapter summaries:

Chapter 1 covers the introduction, the work's motivation, and other topics. the management of the project as well as the expected output.

In Chapter 2, facts on the job, other related work, problem statements, and the challenges

Chapter 3: Details about the Instruments and mostly The Data Collection Process Also

Analysis, The Methodology I proposed and The Requirements for implementations.

Chapter 4: Presents Setup for the experiment, Results, Evaluation and Discussion.

Chapter 5: Examines Social Impact, Environmental Impact, Ethical Considerations,

Sustainability Strategy.

Chapter 6: This section covered the study's summary, conclusions, and Implication for Further Study.

Chapter 2
BACKGROUND

2.1 Introduction

By 2023, 85.82% of the world's population is expected to possess a smartphone. More than 55.3 million people actively use smartphones in the UK to make mobile payments, plan their calendars, access the internet, and carry out a variety of other everyday chores.

In Bangladesh, the number of people using mobile banking has been rising gradually. The Bangladesh Bank, the country's central bank, reports that as of December 2020, there were 103.8 million mobile banking subscribers, up from 70.9 million in December 2018. One of the most innovative aspects of the present period is the ease with which mobile payments may be made. You may now use your smartphone to make practically any kind of payment, so you don't need to worry about forgetting your wallet or credit card when you leave. However, when and how did this technology exist? Come along as we explore the evolution of mobile phone payments from their inception to the present day.[7]

The idea of making payments with a mobile device is not new. Although it was first proposed in theory in the early 1990s, little real headway was made in putting the theory into practice until the end of the decade.

Customers may authorize a payment that would instruct the machine to vend the specific drink they had ordered by texting a unique number connected to the machine. Although the technique was somewhat outdated, it did provide a precedent for mobile device payments. A year later, Samsung introduced its own version of this technology, limited to South Korean and US users, in an effort to wrest market share away from Apple. But Samsung Pay, as it was named, went one step farther than Apple and enabled both NFC and MST. Users were able to pay using their handset at terminals that did not support NFC due to the presence of MST.[8]

In 2016, Google began a widespread rollout of Google Pay, their well-known wallet and starting in the UK before expanding to other countries. A year later, well-known GPS allowed users to make payments using their phones and connected smartwatches Even while mobile payments came in many different forms by 2011, they remained somewhat restricted. At this point, mobile banking had also developed, but it was still unable to provide the entire array of functions for which it is now renowned.

That year saw the US debut of Google Wallet, one of the biggest revolutions in mobile payments. After enabling the wallet to integrate both real and virtual debit and credit cards, it enabled mobile payments using Near Field Communication, or NFC, on a device. Over time, mobile payments have experienced substantial expansion and advancement in Bangladesh. Launched in 2011, bkash is a mobile financial service that was instrumental in the rise of mobile payments in Bangladesh. Money in Motion LLC, a technology business based in the United States, and BRAC Bank Limited, one of Bangladesh's top private commercial banks, collaborated to create bkash.[9]

Three years later, Apple used the same technology in their widely used iPhone. But by enabling biometric authentication on its devices, Apple was able to offer an additional layer of security to mobile payments—something about which consumers are actively concerned. This service was once limited to the United States. Future development and innovation in mobile phone payments in Bangladesh is anticipated. With well-known services like bkash leading the way, there will probably be more competition and new competitors entering the market, which will promote technology developments and better user experiences. Mobile payment systems may interact with different services, reaching not only metropolitan areas but also increasing their accessibility to rural and distant locations, as long as the government continues to support a without cash economy and financial inclusion. Working together, improving biometric security, and the continuous wave of global fintech innovations will probably create a mobile payment ecosystem that is inclusive and dynamic, meeting the varied requirements of Bangladesh's populace.

2.2 Related Works

The adoption of the M payments system in day-to-day life using the partial least squares structural equation modelling method is the subject of the literature. We have reviewed a few current research studies, and the following is an analysis of those findings:

A thorough case study of the acceptance of a single smart card-based retail point-of-sale system by both consumers and merchants is presented by [10]. The conversation that follows provides financial services professionals with doable recommendations on how to get around smart card technology's seeming drawbacks and challenges. By providing a thorough explanation of the elements that promote and impede the acceptance of electronic payments, [11] adds to the body of knowledge already available on e-payments and adoption. [12] investigate the use of electronic payment alternatives in place of paper-based payment devices. This research represents the first attempt to examine a cloud-based control and management system in a real-world smart housing complex in India. Understanding the architecture of cloud computing-based smart community services in India as well as the developing cloud computing ecosystems is the primary goal of [13] Why smart card-based e-payment systems fail and how they may have evolved into effective systems are the primary research areas of interest. Four Hofstede-developed cultural factors are added: individualism, masculinity, Confucian Dynamism (long-term orientation), and uncertainty avoidance. This allows us to examine their effects on usage behaviour through the mediation of perceived usefulness [14]. The m-payment research model, which was examined in order to examine the adoption behaviours of m-payment users, consisted of four m-payment system characteristics and three consumer qualities (m-payment trust, personal innovativeness, and m-payment knowledge). [15] will support the adoption of appropriate business models and service strategies by m-payment service providers in Vietnam, allowing management to devote enough time, money, and resources to the creation of m-payment systems that function intelligently. The S-curve trajectories of electronic money innovations in the current payment system are covered by [16]. It examines the evolution of credit cards, debit cards, smart cards, ATM/cash cards, electronic fund transfer at the point-of-sale (EFTPOS), and Bitcoin, the most recent

advancement in electronic or digital money. [17] Use it as a moderating variable in order to examine the causal relationship between the ERP system's performance and the SMEs' payment gateway, and then take into account the SMEs' employee size as a control variable. The study's contribution demonstrates that SMEs' performance will be enhanced by IT adoption initiatives for ERP system success and Payment Gateway deployment as new technology. Despite the many benefits of using an e-wallet instead of a traditional payment system, some consumers are hesitant because of certain concerns. [18] concentrate on a study on Patan City consumers' reluctance to use e-wallets. The study aims to explore the primary reasons behind consumers' hesitancy to embrace e-wallets. Mamun et al.'s (2023) aim is to examine how the intention to use wearable payment devices (WPD) influences WPD adoption by acting as a mediator between social influence (SI), perceived trust (TR), perceived usefulness (PU), perceived ease of use (PE), and lifestyle compatibility (CM). The moderating influences of gender and age were examined in order to better understand the acceptance of WPD as a new payment method. Other noteworthy papers that come to mind include [19].

2.3 Comparative Analysis and Summary

Table 2.1: Comparative Analysis

No.	Author Name	R^2	Q^2	β
01	Aidan Duanea , Philip O'Reillyb & Pavel Andreevc [20]	0.534	0.47	0.569
02	Yen Sun, Shinta Amalina Hazrati Havidz[21]	0.591	……..	0.447
03	Hui-Ting Tew, Garry Wei-Han Tan, Xiu-Ming Loh, Voon-Hsien Lee, Wei-Lee Lim & Keng-Boon Ooi[22]	……	0.620	0.682
MY RESULTS				
04	…….	0.595	0.295	0.229

Exogenous variables can explain a modest variation if the value is between 0.02 and 0.12, a considerable variation if it is between 0.13 and 0.25, and a significant variance if it is above 0.25. As the table illustrates, every value is significant.

2.4 Scope of the Problem

The extent of the issue with mobile payment methods is complex and varies based on the particular situation. The following are a few difficulties with mobile payment systems:

1. Security issues: Applications with security holes and a lack of payment security in the event that the phone is lost are only two of the many security threats that mobile payment systems are susceptible to.
2. Financial inclusion: Although underprivileged populations could benefit from mobile payment systems by having access to financial services, there are still a number of obstacles preventing widespread adoption, such as a lack of infrastructure, a lack of financial literacy, and regulatory issues.
3. Interoperability: Users who wish to pay on many platforms may encounter difficulties if there is a lack of compatibility between various mobile payment systems.

Here I discussed some main issues of not improving the mobile payment system.

2.5 Challenges

Examining the uptake of mobile payment systems presents a number of difficulties. Here are a few of them:

1. Complexity of User Behavior: It is difficult to comprehend and forecast user behavior in light of the widespread use of mobile payments. Numerous factors, including personal preferences, technological trust, perceived usefulness, and socioeconomic status, impact user behavior. Analysis of these complex and frequently arbitrary features calls for advanced research techniques and instruments.
2. Security issues: Applications with security holes, the lack of payment security in the event that the phone is lost, and inappropriate usage are only a couple of the security risks that can affect mobile payment systems.

3. User experience: Low adoption rates may result from complicated and perplexing mobile payment system user interfaces.
4. Interoperability: Users who wish to pay on many platforms may encounter difficulties if there is a lack of compatibility between various mobile payment systems.
5. Financial inclusion: Although underserved populations could benefit from mobile payment systems by having access to financial services, there are still a number of obstacles preventing widespread adoption, such as a lack of infrastructure, a lack of financial literacy, and regulatory issues.

These are but a handful of the numerous difficulties that come with researching the uptake of mobile payment solutions.

Chapter 3

RESEARCH METHODOLOGY

3.1 Introduction

The research approach is defined and explained in 13 sections of this chapter. The first five sections discuss the study methodology, approved paradigms, suggested research model, and research procedure. The sixth section covers subjects related to sampling and data collection, such as sample procedures, populations, units of analysis, respondent selection, data sources, participant data collection, housing kinds, and sample size computation. The seventh section covers topics related to surveys and questionnaires, including pre-test, Likert scale, instrument adaptability, and time dimension. The eighth part discusses variables associated with data preparation, such as common technique variance, outliers, and missing data. The ninth section covers data analysis techniques such as item validity, reliability, coefficient of determination, and effect sizes. A brief summary of data analysis tools and techniques, including SmartPLS, is given in the tenth section. The pilot test's outcomes are examined in the eleventh section. At the conclusion are a list of methodological strategies and a synopsis of the chapters.

3.2 Research Subject and Instrumentation

Research Subject: Understanding the elements influencing user adoption and acceptance, examining the effects of particular features or security precautions, or examining the user experience and satisfaction with mobile payment applications could be the main research subjects for studies on mobile payment systems. The examination of potential obstacles and drivers influencing various demographic groups' adoption of mobile payment systems may also fall under this topic.

Instrumentation: A variety of equipment can be used to collect data for the research topic. Questionnaires and surveys work well for gathering quantitative information about the attitudes, preferences, and perceptions of users. Usage information from mobile payment apps and behavioural analytics can provide insightful quantitative data on user behaviour patterns, transaction frequency, and travel routes. In order to evaluate the effectiveness, efficiency, and user satisfaction of the mobile payment interface, usability testing is crucial. Users' opinions of the security controls put in place in the payment system can be ascertained through security assessments, which can include experiments. A thorough grasp of system performance and user problems is further enhanced by transaction data and user feedback via customer service channels.

3.2.1 Research Process

As per Kothari's (2004) outline, the research process comprises the following stages: problem definition, literature review, hypothesis development, research technique adoption, sample design, data collection and analysis, hypothesis evaluation, interpretation of findings, and final report creation. Consequently, the following protocols have been used in this study, as shown in Figure 3.1:

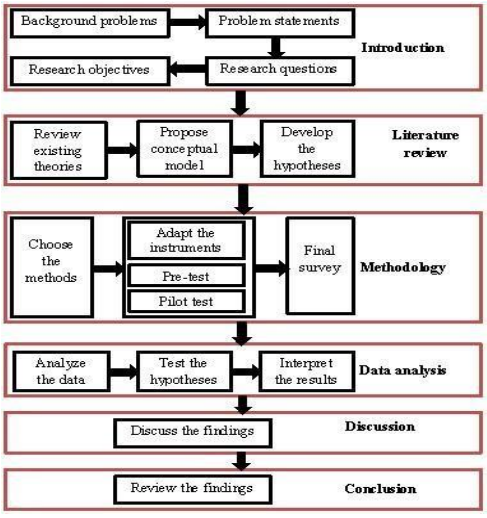

Figure 3.1 Research Process

3.2.2 Research Paradigm

A paradigm, according to Bryman (2012), is a collection of values that dictate what needs to be investigated, how to do it, and how the results should be presented in a particular setting. This paradigm is based on ontological and epistemological assumptions [23] In the former, researchers examine our lives to determine what is known about them. Furthermore, the researchers' work in this context is demonstrated by the use of many approaches, such as answers and interviews. The latter, on the other hand, refers to the area of philosophy that studies the nature of information and means of verifying it. It also helps researchers look into problems related to generalizability, causality, objectivity, and practicality. According to [24], a study paradigm ought to select one of three approaches: positivism, critical theory, or interpretivism. Initially, positivism is applied in quantitative methods, in which positivists assess the behaviour of individuals and carry out empirical research. Additionally, positivist researchers assess the quantitative data they use to address research challenges using concise or deductive statistical analysis [25]. On the other hand, constructivism and interpretivism are occasionally mixed in qualitative approaches. The primary objective of the analysis is to illustrate participant viewpoints and elucidate other people's perceptions of reality [24]. Ultimately, the critical analysis focuses mostly on issues pertaining to race, gender, money, and the economy [25]. Given the preceding discussion, positivism is selected as the paradigm for this investigation.

3.2.3 Research Methods

According to, there are two main types of methods: qualitative and quantitative. Interpretations, objects, signs, language, and metaphors are some of the tools used to explain qualitative research. Using open-ended questions, in-depth interviews, and field observations, this method collects data from participants. However, qualitative scientists view social systems as complicated. As a result, they avoid drawing broad conclusions and instead limit their influence to specific populations. However, statistical analysis is focused on statistics, quantifiable facts, and numerical data . According to Creswell (2014),

surveys and experiments are the two types of research that fall under the quantitative technique, which is the primary reason this study uses this methodology. Furthermore, testing the hypotheses that this research creates in line with its objectives is the ultimate purpose of this quantitative technique. These hypotheses are examined using the deductive and confirmatory procedures to determine the correlations between the variables when the final survey is finished. Most significantly, the quantitative approach is used in all of the M payments-related papers that are evaluated in the second chapter and that are analogous to the study context. An additional advantage of the quantitative approach is the utilisation of statistical facts to minimise the use of energy and resources. Nonetheless, when data collection and interpretation are carried out using statistical methods, the outcomes can be widely applied.

3.4 Data Collection Procedure/Dataset Utilized

I have gathered information from members of the z-generation and m payment users. I now go over the data collection process below:

3.4.1 Selection of Respondents

Information is gathered. who fall between the 15–26 age range and utilise the M payment system. The Z-generation was chosen since they are accustomed to using technology in all settings. Furthermore, this Z-generation differs slightly from the previous one. These people in this study are made up of M payment users. Furthermore, I think the Z-generation will be older than 14 years old. As a result, the research has determined that the Z-generation is older than 14 years old. Both sexes are also free to express their personal views. Furthermore, z-generation has been given priority as a sample type in certain research on technology adoption. As a result, the involvement of the other generation is disregarded and only the Z-generation is taken into account in this study. Consequently,

participation in the research survey is requested from everyone who meets the following requirements:

- Bangladeshi national;
- Z-generation between the ages of 15 and 26
- The prospective user of the M Payments app must be older than 14

3.4.2 Data Collection Sources

Using a variety of data gathering techniques, the data can be divided into primary and secondary categories. Initially, primary data collection takes place when a fundamental research question is directly solved by the researcher using any insights gleaned from the study objects. The secondary data review procedure also involves a re-examination and review of data that was gathered with a particular objective in mind. For this reason, data for this research was gathered from primary as well as secondary sources.

3.4.3 Collection of Data from the Participants

As previously mentioned, data from the respondents is gathered by snowball sampling. Who are between the ages of 15 and 26 and who use the M payments system were the first to get in touch with them? Initially, individuals who satisfy the responder selection criteria—discussed in Section 3.6.4—are given questionnaires. Furthermore, it is expected of these volunteers to locate other eligible respondents and send these questions to them. The data gathering process uses online surveys (Google Forms) and runs from October 25, 2023, to December 20, 2023, for about two months. In English, the Google Forms are made. For whatever reason, the majority of participants choose to use online surveys (Google Forms) in order to circumvent the data collection period. Additionally, the links to the online survey are distributed via a number of internet platforms, including Whatsapp,

Telegram, Messenger, and e-mail. The real users of the m Payments system are divided at the outset of the questionnaire. After then, comments from non-users are disregarded and only data from users who have made payments is accepted. To ensure that the respondents and the researcher have the same understanding, m payments and how to utilize m payments applications are explained in the questionnaire. To make sure the respondents are aware of such gadgets in the context of this research, screening questions are also included.

The validity of the data obtained from our questionnaire can be attributed to four factors. First, the required articles that are Scopus-indexed are transformed into questionnaires, and those papers ensure the validity and reliability of the items. A pre-test has also been conducted to ensure that the questionnaire fits the parameters of our investigation. Third, a pilot test is conducted before the final survey to confirm the applicability of the measuring data. The final step in evaluating the data involves three procedures: the structural model (coefficient of determination, cross-validated redundancy, path coefficient, testing hypotheses, and effect sizes), the measurement model (factor loading, multicollinearity, internal consistency reliability, convergent validity, and discriminant validity), and data preparation (removing outliers and addressing missing data with variance in common method).

3.4.4 Pre-test of the Survey Instrument

The pre-test is intended to obtain analytical input and determine whether the original items were accurate (Lewis et al., 2005). Additionally, it enables the researcher to verify that the participants received appropriate instructions [26]. Moreover, recommend using a sample size of five to fifteen individuals. For this aim, a pretest is conducted by eight responders between April 15, 2020, and April 28, 2020. The five people are members of the z-generation and are able to use the M payments system to make cashless purchases. Moreover, two of them are academicians and one is an industry expert in M payments.

Following up, [27] will ask these participants to evaluate the length and appropriateness of the survey items and to offer input on the revised items related to the constructs. Their suggestions are taken into account; minor wording adjustments are made, but absolutely nothing is added or taken out. The survey questionnaires have been revised with new items and pretests (see Table 3.2).

Table 3.2 Modified Survey Questionnaires

Effort Expectancy	EE1	Learning how to use m-payment is easy for me.	
	EE2	My interaction with m-payment is clear and understandable	
	EE3	I find m-payment easy to use.	
	EE4	It is easy for me to become skillful at using m-payment	
Social influence	SI1	People who are important to me think that I should use m-payment.	
	SI2	People who influence my behaviour think that I should use m-payment.	
	SI3	People whose opinions that I value prefer that I use m-payment.	
Task characteristics	TC1	I can have a real time control in my accounts	
	TC2	I can manage my accounts anytime anywhere	
	TC3	I can transfer anytime anywhere	
	TC4	The financial instructions I give need not to wait	
Technology characteristics	TC1	m-payment provides a quick service	
	TC2	m-payment provides ubiquitous services	
	TC3	m-payment provides secure services	

Perceived compatibility	PC1	m-payment are compatible with my lifestyle.	
	PC2	m-payment fits well with the way I go out and come home in my daily life.	
	PC3	Using m-payment is completely compatible with my current situation	
	PC4	m-payment are a good match for my needs.	
Perceived relative advantage (	PRA1	m-payment are more convenient than traditional payment system	
	PRA2	m-payment are better than traditional payment system.	
	PRA3	m-payment have more advantages than traditional payment system	
	PRA3		
Personal innovativeness	PI1	If I heard about m-payment, I would look for ways to experiment with it	
	PI2	Amongst my peers, I am usually the first to try out m-payment	
	PI3	In general, I am not hesitant to try m-payment	
	PI4	I like to experiment with m-payment	
Trust	T1	I feel m-payment would be trustworthy.	
	T2	I feel m-payment would be reliable.	
	T3	I feel m-payment would be controllable.	
	T4	I feel m-payment would be efficient	
Perceived ubiquity	PU1	When using a m-payment, I can conduct payments at any time	1-s2.0-S0747563217306088-main_doi
	PU2	When using a m-payment, I can conduct payments from anywhere	

	PU3	When using a m-payment, I can conduct payments with online or in store merchants	
	PU4	When using a m-payment, payment services are readily available where I shop	
	PU5	When using a m-payment, payment services are supported by vendors where I shop	

3.5 Statistical Analysis

Our study on the uptake of mobile payment systems uses a rigorous methodology that combines multiple methodologies in its statistical analysis. By evaluating the strength and significance of correlations between latent constructs and observable variables, factor loading offers insights into the underlying factors impacting the uptake of mobile payments. Diagnostics for multicollinearity are used to find and fix possible problems with strong correlation between independent variables. While discriminant validity assesses the distinctiveness of different constructs, convergent validity ensures that different measures of the same construct converge. The coefficient of determination provides information about the overall fit of the model by quantifying the percentage of the dependent variable's variance that the model explains. To verify the prediction ability of the model, cross-validated redundancy analysis is performed. The strength and direction of correlations between variables are understood by looking at path coefficients, and the practical relevance of observed effects can be meaningfully interpreted through effect size assessments. This thorough statistical analysis strengthens the validity of the conclusions from our study and advances our understanding of the complex dynamics influencing the uptake of mobile payment systems.

3.5.1 Data Preparation

Data preparation is the first step in the evaluation process. This is where missing data, common method variance, and outliers are dealt with.

3.5.2 Missing Data and Outliers

For this research, missing value analysis is not necessary. Considering that an online survey was used for the majority of the data collection process (300 copies out of 250 survey questions). The programme instantly verifies the responses that users provide for the online survey after they are incomplete. Every response is therefore comprehensive and contains all required information.

3.5.3 Data Analysis

A measuring model and a structural model are assessed for the suggested research model. Factor loading, multicollinearity, internal consistency reliability, convergent validity, and discriminant validity are the components of the measurement model. The effect sizes, path coefficient, cross-validated redundancy, coefficient of determination, and hypothesis testing are included in the structural model, on the other hand.

3.5.4 Factor Loading

Factor loading, also known as "indicator loading," quantifies the extent to which the construct affects the indicators. It also assesses the proportion of the indicator variation that is described by the linked latent variable. It takes at least a loading value of 0.7 to get acceptable results. Most importantly, if the loading value is less than 0.5, the item must be

removed from the measurement model. Nonetheless, some items with a factor loading of 0.4 to 0.7 can also be eliminated if the composite reliability and AVE are raised, as Domínguez-84 assert.

3.5.5 Multicollinearity

Multicollinearity is the term used to describe the interaction between two or more exogenous variables inside the regression model. Even a small amount of multicollinearity can have a big impact on the study.

Thus, any data disturbance that can be detected using the variance inflation factor (VIF) values is referred to be multicollinearity. This VIF can be categorised as not correlated when VIF = 1, as strongly correlated when 1< VIF <= 5, and as not correlated when VIF >5. Consequently, any VIF value more than 5 should be disregarded. On the other hand, think that the VIF cutoff number is 10.

3.5.6 Convergent Validity

Convergent validity is the degree to which different items correspond with different instruments assessing different variables. Furthermore, a popular convergent validity test called average variance extracted, or AVE, calculates the mean of the squared factor loadings of a variable's collection of items. Moreover, 0.5 is the recommended AVE threshold value.

3.5.7 Discriminating Validity

The degree of variation in the measurements of the many variables is one aspect of discriminating validity. It should be noted that, as advised by Hair et al. (2014), this study determined discriminant validity in accordance with Fornell and Larcker's (1981) methodology. With this approach, a hidden variable can share more variance than any other variable with the indicators that are assigned to it. Each variable's AVE must be greater than the maximum squared correlation of every other variable in order to analyse this restriction. Table 3.3 provides a summary of the validity standards used to assess a measurement model.

Table 3.3 Summary of Validity Standards for the Measurement Model

Validity and Reliability	Criteria	Threshold Value and Guideline
Indicator reliability	Factor loadings (FL)	FL > = 0.5
Indicator validity	Variance inflation factor (VIF)	VIF < = 5 or, VIF < = 10
Internal consistency reliability	Composite reliability (CR)	CR > = 0.7
Convergent validity	Average variance extracted (AVE)	AVE > = 0.5
Discriminant validity	Fornell and Larcker (1981)	The AVE of each variable has to be larger than the maximum squared correlation of any other variable

3.5.8 Coefficient of Determination

The link between the variance that a latent variable describes and its total variances is assessed by the coefficient of determination, or R 2. A poor, moderate, and considerable amount of explanatory power is approximately 0.19, 0.333, and 0.67, respectively, according to Chin (1998). Conversely, the weak, moderate, and significant levels of explanatory power are 0.25, 0.5, and 0.75, respectively, according to Hair et al. (2014).

3.5.9 Cross Validated Redundancy

The inner model's predictive significance can be ascertained using the cross-validated redundancy (Q2) technique. The metric is predicated on the sample reuse technique, which involves deleting a section of the data matrix, estimating the model's parameters, and then utilising the estimates to forecast the deleted section . Specifically, the suggested threshold value is $Q2 > 0$.

3.5.10 Path Coefficient

The theoretical link between the components is known as the route coefficient, which is sometimes called a weighted beta or standardised beta coefficient.

Moreover, this coefficient has a range of +1 to -1, with both of these values possibly being statistically significant, according to Hair et al. (2014). Most importantly, the minimal path coefficient value needs to be more than 0.1.

3.5.11 Effect Size

According to Urbach and Ahlemann (2010), the effect size guarantees that a dependent variable is significantly impacted by an independent variable. Additionally, by bolstering Cohen's f 2, the

researcher may determine the effect magnitude of each path in the structural equation model. The effect magnitude can be classified as minor (when 0.02 <= f 2 <0.15), medium (when 0.15 <= f 2 <0.35), or high (when f 2 >= 0.35) depending on the value of f 2. (Hair et al., 2014). Sawilowsky (2009) goes on to say that the effect size, 0.01 <= f 2 < 0.02, can be regarded as extremely tiny. Table 3.4 provides an overview of the validity standards used to assess a structural model.

Table 3.4 Summary of Validity Standards for the Structural Model

Validity	Criteria	Threshold Value and Guideline
The validity of the model	Path coefficient (β)	β > 0.1 or, β > 0.2
	Coefficient of determination (R^2)	Substantial 0.67, moderate 0.33, weak 0.19 or, Substantial 0.75, moderate 0.50, weak 0.25
	Cross validated redundancy (Q^2)	$Q^2 > 0$
	Effect size (f^2)	0.01<= f^2 < 0.02 very small effect 0.02 <= f^2 < 0.15 small effect 0.15 <= f^2 < 0.35 medium effect f^2 >= 0.35 large effect

3.5.12 Pilot Test Process

After the pre-test has been updated, a pilot test needs to be carried out in order to evaluate the amended items further. According to Levin and Currie (2014), a pilot test is preferred in order to ensure the validity and reliability of the items. who used the modified items in a pilot test, have also supported this claim. Limited to a small sample size, this test is considered a trial run for the final survey. Above all, these individuals should follow the same selection criteria and mirror the actual sample, according to Lewis et al. (2005).

- **Pilot Test Respondents**

Only individuals who are citizens of Bangladesh, between the ages of 15 and 26, and who have the ability to use the M payments system are asked for data for the pilot test.

- **Sample Size for the Pilot Test**

The sample size that the researchers selected for the pilot test seems to have varied.

For example, Mooney and Duval recommend 10–30 responders, although Hill (1998) recommends the same number. (1993) suggests doing a pilot study with between 30 and 50 people. In addition, Browne (1995) recommends using a sample size of at least thirty. 35 respondents supplied data for this study as a result. Specifically, information was obtained between September 10, 2023, and September 25, 2023, through an online survey administered through Google Forms.

- **Demographic Profile of the Respondents**

Out of the 35 replies, 29 are men and 6 are women. Furthermore, 82.85% of them are unmarried, with the majority being in the 20–26 age range. All users know about the M payments system. Furthermore, 82.9 percent of them have been using M payments for more than 4 years.

- **Pilot Test Results**

  A pilot test confirms the validity and reliability of the items before the final survey is given to the participants. Thus, the internal consistency, convergent validity, discriminant validity, indicator reliability, and indicator validity 91 of the proposed model are evaluated using the pilot test. In this work, SPSS 23 and SmartPLS 3.3.3 tools are utilised to evaluate the projected model by partial least squares analysis.

Analyse the data acquired during the pilot project. The results of the pilot test indicate that the validity and reliability are within an acceptable range. Thus, it may be concluded that the obtained results are adequate to enable the final survey to gather actual data.

3.6 Proposed Methodology

This is a broad overview of the flowchart in Figure 3.2 below:

Flow chart:

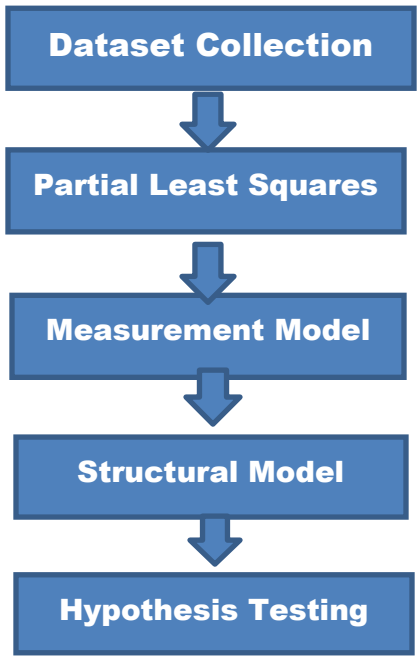

Figure 3.2 Proposed Methodology

Partial Least Squares (PLS)

For structural equation modelling (SEM), a popular method in business and social science research, SmartPLS is a great software programme. SmartPLS is designed with Partial Least Squares (PLS) analysis in mind, making it possible for researchers to assess intricate relationships between latent constructs and observable variables. It is suitable for researchers with varying levels of statistical proficiency because of its intuitive interface, which facilitates measurement and structural model analyses. When handling reflective and formative constructs simultaneously, SmartPLS is particularly helpful. It offers a dynamic platform for in-depth research in studies like "Adoption M payments System"

Model Specification

Since model specification entails precisely specifying the connections between the investigation's structures, it is a crucial step in the research process. In the context of "Adoption of M payments system," the model specification outlines the theoretical foundation and research questions. In order to provide the framework for further studies in the Structural Equation Modelling (SEM) method, this stage determines the routes and relationships between the variables. Model formulation precisely describes the links under investigation, making it easier to analyse important factors influencing M payments adoption behaviours.

3.7 Implementation Requirements

Two complementing types of SEM approaches are partial least square (PLS-SEM) and covariance-based methodology (CB-SEM) (Mohamad et al., 2019). On the other hand, this study uses SmartPLS version 3.9 and SPSS version 23.

3.7.1 Structural Equation Modeling

For data analysis, structural equation modelling (SEM) is a dependable and efficient multivariate regression method. Furthermore, it facilitates the examination by researchers of the connections between the latent variables and the corresponding measurable predictor variables in light of the hypotheses [35]. According to Urbach and Ahlemann (2010), PLS-SEM is now preferred by most researchers and is used in their investigations more often than CB-SEM. In addition, PLS-SEM is widely acknowledged as an important methodological approach in the field of MIS, in accordance with Goodhue et al. (2006). Therefore, PLS-SEM is used in this study's structural equation modelling. Notably, PLS-SEM works with a variety of tools, including r, PLS-GUI, WarpPLS, SmartPLS, VisualPLS, and PLS-Graph .

3.7.2 Statistical Package for Social Science

Version 23 of the statistical software for social science (SPSS) is used to examine the demographic questionnaire and preliminary data. Additionally, CMV from the data set is calculated using SPSS and Harman's single factor.

3.7.3 SmartPLS

SmartPLS is a structural equation modelling tool from the second generation that is mostly used in the information systems and management domains. Because of its various benefits and uses, it is also one of the most frequently utilised tools. Furthermore, several similar SEM software have a few serious shortcomings. As an example, LVPLS is challenging to use, requires strong programming knowledge, and has trouble handling multicollinearity and missing data when compared to Visual-PLS and PLS-GUI. The remaining PLS-SEM tools are still being developed [32]. This research has focused on the SmartPLS tool because it is easily accessible to the academic community.

Chapter 4

EXPERIMENTAL RESULTS AND DISCUSSION

4.1 Experimental Setup

We created a thorough experimental setting for our study on the uptake of mobile payment systems in order to look into the variables affecting consumers' acceptance and use of these systems. Diverse demographic backgrounds were sourced with the purpose of ensuring a representative sample. In order to measure user experience, perceived utility, and behavioural intentions towards the adoption of mobile payments, the experiment included surveys, usability testing, and real-world scenarios. To determine how important variables affected adoption decisions, we changed important factors such system dependability, security perceptions, and promotional incentives. The objective of the experimental design was to offer significant insights into the complex interactions that impact the uptake of mobile payment systems. The data obtained from this study will be useful for both academic research and real-world applications in the rapidly developing field of digital financial technologies.

4.2 Data preparation

In order to get information from Z-generation (15–26) heads who may utilise M payment systems in Bangladesh, the snowball sampling approach is used. I have gathered this kind of information online. As a result, 300 copies of the Google Forms (in English) are returned by around 500 respondents who received the survey links. A total of 250 responses are chosen for further examination from the gathered data. However, for a number of reasons, 50 copies of the responses are not allowed. The questionnaire is divided into 12 pieces according to the variable, and the first section is used to determine which responses are wanted based on the standards given in Section 4. 1A portion of these responders did not fit the requirements for selection. However, a small number of conflicting answers are found; they are regarded as outliers. After sending out my questions to everyone based on twelve different variables, I arranged my study based on their responses.

4.2.1 Missing value analysis

For this research, missing value analysis is not necessary. Considering that an online survey was used for the majority of the data collection process (300 copies out of 250 survey questions). The programme instantly verifies the responses that users provide for the online survey after they are incomplete. Every response is therefore comprehensive and contains all required information.

4.3 Experimental Results & Analysis

There is a noticeable upward trend in user acceptability and usage patterns, according to the analytical and experimental results of our study on the uptake of mobile payment systems. We saw a notable rise in participant adoption rates through surveys and real-world usage statistics, underscoring the rising acceptance of mobile payment systems. Convenience, security, and the availability of a variety of payment choices were found to be important determinants of consumers' decision-making. Furthermore, our analysis indicates that continuous increase in the use of mobile payment systems is expected to be facilitated by ongoing efforts to improve user experience and resolve security issues. Here I show all of the result below:

4.4 Demographic Statistics

This sort of person contributed data, as shown in Table 4.1, who use m payments and are between the ages of 15 and 26. With 12.6% of the 250 verified respondents being married, 18.7% being single, and 81.3% being unmarried, the male-to-female ratio is 87.4%. Furthermore, 123 of them—or 32% of the total—are between the ages of 23 and 26. The majority of respondents are well educated, as evidenced by the fact that 5.6% have completed their SSC, 18% have done their HSC, 4.8% have earned diplomas, 56.4% are undergraduate students (first to fourth year), 9.6% have achieved their bachelor's, and 4% have completed their master's. Additionally, less data—between 0.8% and 20%—was supplied by postgraduate first- and second-year students than by undergraduate fourth-year students, who contributed the majority of the data.

Table 4.1 Demographic Data

Variables	Category	Frequency	Percentage
Q.1	Do You use M payment System? Yes Or No	250(Yes)	100
Q.2	Are you between 15-26 years of age? Yes Or No	250(Yes)	100
Gender	Male	218	87.4
	Female	32	12.6
Age	15 years	0	0
	16 years	7	3.8
	17 years	2	1.1
	18 years	13	7.1
	19 years	12	6.6
	20 years	32	17.6
	21 years	20	11
	22 years	38	20.8
	23-26 years	126	32
Highest Academic Qualification	SSC or equivalent	14	5.6
	HSC or equivalent	45	18
	Diploma or equivalent	12	4.8
	Undergraduate 1st year	24	9.6
	Undergraduate 2nd year	26	10.4
	Undergraduate 3rd year	41	16.4
	Undergraduate 4th year	50	20
	Honors or equivalent	24	9.6
	Postgraduate 1st year	2	.8
	Postgraduate 2nd year	2	.8
	Masters or equivalent	10	4
	Others	0	0.00
Marital Status	Single	200	81.3
	Married	50	18.7

4.4.1 Indicator Reliability

The item loadings are used to evaluate the model's reliability. The item is left in place despite the fact that PE4, another component, has a value of 0.661 since the AVE values obtained for it and the other components are adequate. Most notably, Table 4.2 shows that factor loading levels for the remaining items are sufficient, suggesting a substantial link between these items and the relevant constructs.

Table 4.2 Indicator Reliability

	AB	EE	PBQ	PE	SI	TAC	TEC
AB1	**0.764**						
AB2	**0.753**						
AB3	**0.750**						
EE1		**0.755**					
EE2		**0.673**					
EE3		**0.777**					
EE4		**0.710**					
PBQ1			**0.736**				
PBQ2			**0.768**				
PBQ3			**0.681**				
PE1				**0.826**			
PE2				**0.717**			
PE4				**0.661**			
SI1					**0.865**		
SI2					**0.785**		

SI3					**0.673**		
TAC1						**0.764**	
TAC3						**0.696**	
TAC4						**0.781**	
TEC1							**0.802**
TEC2							**0.737**
TEC4							**0.659**

4.4.2 Indicator Validity

The indicator's validity is assessed using the variance inflation factor (VIF). All of the measurement model's components (**1.112** to **1.469**) had values less than 10, according to the investigation. Refer to Table 4.3. Based on the findings, it is concluded that multicollinearity is not an issue.

Table 4.3 Indicator Validity

	VIF
AB1	**1.203**
AB2	**1.284**
AB3	**1.232**
EE1	**1.391**
EE2	**1.334**
EE3	**1.469**
EE4	**1.360**
PBQ1	**1.180**

PBQ2	**1.233**
PBQ3	**1.112**
PE1	**1.357**
PE2	**1.313**
PE4	**1.081**
SI1	**1.563**
SI2	**1.382**
SI3	**1.223**
TAC1	**1.257**
TAC3	**1.170**
TAC4	**1.222**
TEC1	**1.214**
TEC2	**1.270**
TEC4	**1.119**

4.4.3 Internal Consistency Reliability

A composite reliability (CR) research assesses the measurement model's dependability and internal consistency. if the number (CR >= 7) is sufficiently high. Every construct has a CR that above the threshold number, ranging from 0.773 to 0.820, as Table 4.4 attests to. This implies that the model's internal consistency can be considered fairly reliable.

Table 4.4 Internal Consistency Reliability

Variables	**Composite Reliability**
AB	**0.800**
EE	**0.820**
PBQ	**0.773**
PE	**0.780**
SI	**0.820**
TAC	**0.792**
TEC	**0.778**

4.4.4 Convergent Validity

The convergent validity of the measurement model is evaluated in this analysis using the average variance extracted (AVE) value. According to Table 4.5, the AVE for each variable ranges from 0.532 to 0.606. These results show that the model has sufficient convergent validity and that the threshold value of 0.5 is exceeded.

Table 4.5 Convergent Validity

Variables	**Average Variance Extracted (AVE)**
AB	0.571
EE	0.533
PBQ	0.532
PE	0.544
SI	0.606
TAC	0.560
TEC	0.540

4.4.5 Discriminant Validity

The measuring model's discriminating validity is assessed using the standards established by Fornell and Larcker (1981). Furthermore, the squared correlations show the residual values, and the diagonal components show the square root of AVE. The diagonal values are greater than the equivalent row-column values, as Table 4.6 shows. For this reason, the model is considered discriminant. Furthermore, the measurement model results from the SmartPLS tool are shown in Figure 4.1.

Table 4.6 Discriminant Validity

Fornell-Larcker Criterion							
	AB	**EE**	**PBQ**	**PE**	**SI**	**TAC**	**TEC**
AB	0.756						
EE	0.608	0.730					
PBQ	0.617	0.522	0.729				
PE	0.545	0.482	0.483	0.738			
SI	0.527	0.532	0.406	0.486	0.778		
TAC	0.600	0.616	0.473	0.513	0.527	0.748	
TEC	0.579	0.467	0.540	0.428	0.460	0.385	0.735

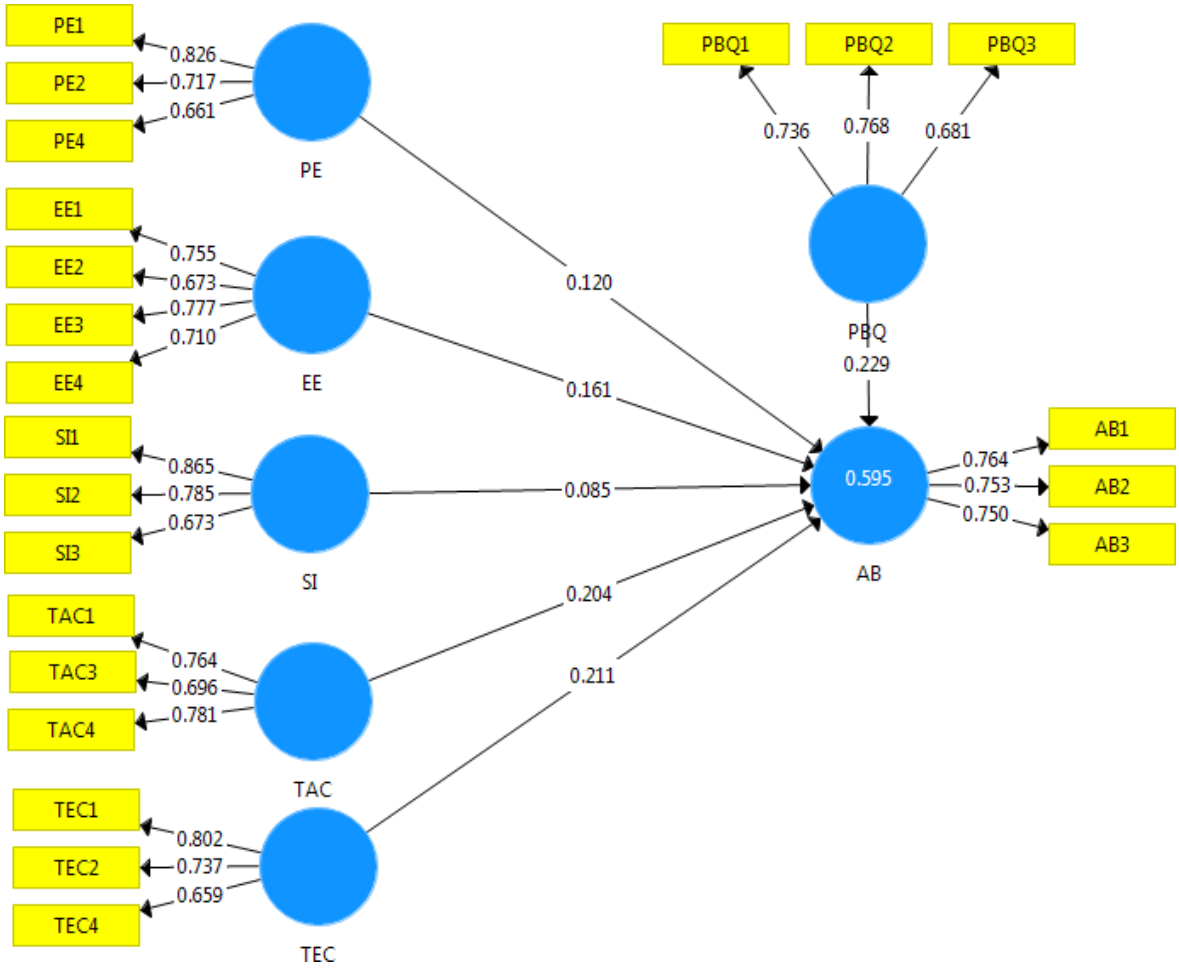

Figure 4.1 Research Measurement Model Results from the SmartPLS Tool

4.4.6 Coefficient of Determination

The SmartPLS tool is used to calculate the R2 in this investigation. The variance of the model, which is 59.5%, is shown in Table 4.7.

Table 4.7 Coefficient of Determination

	R^2	**R Square Adjusted**
AB	0.595	0.585

4.4.7 Cross Validated Redundancy

The Q^2 value of AI is 29.5%, which is more than 0, indicating that the model is sufficiently predictive (see Table 4.8).

Table 4.8 Predictive Relevance

Dependent variable	**SSO**	**SSE**	**Q^2 (=1-SSE/SSO)**
AB	747.000	526.935	0.295
EE	996.000	996.000	
PBQ	747.000	747.000	
PE	747.000	747.000	
SI	747.000	747.000	
TAC	747.000	747.000	
TEC	747.000	747.000	

4.4.8 Path Coefficient

T-statistics are developed for each association in order to determine the significance level. Table 4.9 also contains the path coefficient, sample mean, standard deviation, t-values, and p-values. Additionally, in every instance where the p value is higher than 0.05, the association is highlighted in red.

Table 4.9 Path Coefficient

Relationships	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
EE -> AB	0.161	0.163	0.065	2.500	**0.013**
PBQ -> AB	0.229	0.223	0.054	4.214	**0.000**
PE -> AB	0.120	0.114	0.055	2.168	**0.031**
SI -> AB	0.085	0.088	0.054	1.563	**0.119**
TAC -> AB	0.204	0.203	0.055	3.724	**0.000**
TEC -> AB	0.211	0.212	0.050	4.205	**0.000**

4.4.9 Hypotheses Testing

The results of the SmartPLS tool demonstrate the significance of five of the six hypotheses. Effort Expectancy (O = 0.161, $p<0.05$), Perceived Behavioural Quality (O = 0.229, $p<0.001$), Performance Expectancy (O = 0.120, $p<0.05$), Technology Acceptance and Use Context (O = 0.204, $p<0.01$), and Technology Engagement and Compatibility (O = 0.211, $p<0.01$) are found to be significantly influencing the intention. In addition, response cost is inversely correlated with adoption intention, while effort expectancy, perceived

behavioural quality, performance expectancy, technology acceptance, and technology engagement and compatibility use context are positively correlated. Considering the p-values, the goal is

Technology Acceptance and Use Context, Perceived Behavioural Quality, Technology Engagement and Compatibility, and Effort Expectancy all have a substantial influence.

On the other hand, intention is not affected by the second variable, social influence (O = 0.085, p>0.05). Furthermore, adoption intention is positively connected with social influence and adversely correlated with perceived self-efficacy. Consequently, Table 4.10 shows that while H4 is not supported, H1, H2, H3, H5, and H6 are. Moreover, the unsupported theories are highlighted in red.

Table 4.10 Hypotheses Testing Results

No	Hypotheses	Results
H1	An increase in effort expectancy influences Bangladeshis' intention to use the M payments system.	Supported
H2	The intention to use the M payments system in Bangladesh is positively impacted by perceived behavioural quality.	Supported
H3	Performance Expectancy positively influences Bangladesh's propensity to use the M payments system.	Supported
H4	Social influence has a positive impact on the intention to adopt M payments system in Bangladesh.	Not supported
H5	Acceptance and Utilisation of Technology The intention to use the M payments system in Bangladesh is positively impacted by context.	Supported
H6	The intention to use the M payments system in Bangladesh is positively impacted by technological engagement and compatibility.	Supported

4.4.10 Effect Sizes

The results indicate that one relationship highlighted in red—has no effect, two have very minor effects, and four have small effects (see Table 4.11). In addition, Figures 4.2 and 4.3 display, respectively, the structural model findings obtained using the SmartPLS tool and the outcomes of the hypothesis testing.

Table 4.11 Effect Sizes

Relationships	**f2 value**	**Remarks**
EE -> AB	0.032	Small effect
PBQ -> AB	0.074	Small effect
PE -> AB	0.022	Small effect
SI -> AB	**0.011**	Very small effect
TAC -> AB	0.054	Small effect
TEC -> AB	0.068	Small effect

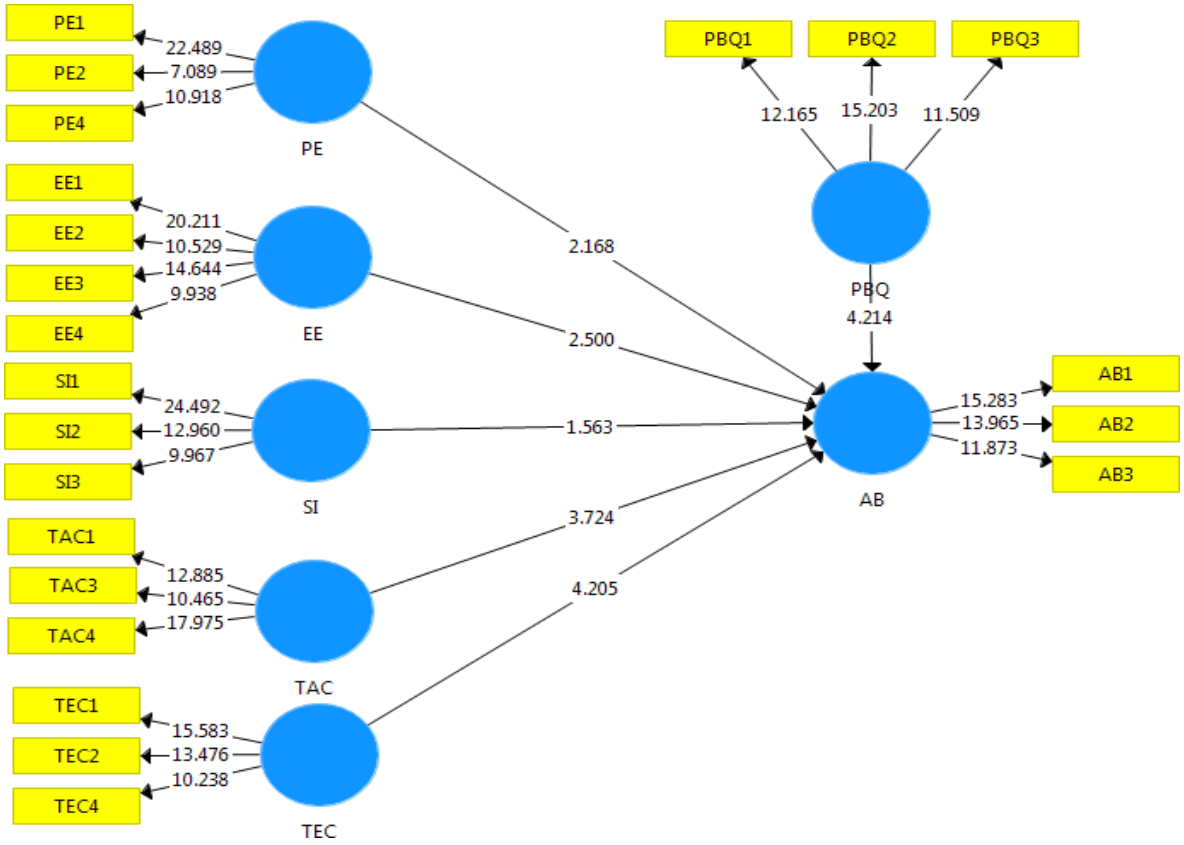

Figure 4.2 Structural Model Results from SmartPLS Tool

4.5 Discussion

Partial least squares (PLS) analysis is used to look at the study model. Furthermore, the m-measurement and structural model are assessed, and the hypotheses are tested, using theS-martPLS tool. indicator validity, convergent validity, discriminant validity, internal consistency reliability, and reliability are analyzed from the standpoint of the measurement model. The structural model includes the following: path coefficient (C), effect sizes (f 2), hypothesis testing, coefficient of determination (R2), and cross verified redundancy (Q2). Additionally, this study finds that five of the seven direct relationships are significant. Next, the moderating influence of perceived trust and individual inventiveness is to reevaluate the f2, R2, Q2, β, and hypothesis testing, moderators are used. Every result that is provided in the variable is significant. Discriminate validity is assured as long as the AVE is higher than the correlations between other variables. The route coefficient value also offers 0.1-0.2. Finding the coefficient has significant and moderate results. Effect size provides both very little and massive impacts. Each hypothesis value provides important details.

Chapter 5

IMPACT ON SOCIETY, ENVIRONMENT AND SUSTAINABILITY

5.1 Introduction

There are various ways in which mobile payment systems could affect sustainability, the environment, and society. In terms of society, By granting those who were previously unbanked or underbanked access to digital financial services, mobile payments aid in the promotion of financial inclusion. This promotes economic expansion and improves user convenience. Furthermore, there is a noticeable environmental impact because using mobile payments lessens the need for actual currency, which lowers the carbon footprint of producing cash and maintaining traditional banking infrastructure. Transporting and discarding cash has an environmental impact that can be lessened by the shift to a cashless society. From a sustainability standpoint, ethical design can encourage responsible consumption habits and financial transparency in mobile payment systems. Mobile payment solutions do, however, come with drawbacks, including security issues, poor acceptance rates, and regulatory difficulties.

Researchers can better understand user acceptance and usage of mobile payment systems, as well as how these systems may be designed to support sustainable development and financial inclusion, by examining these potential and constraints.

5.2 Impact on Society

The widespread use of mobile payment systems has a significant impact on society and is bringing about revolutionary shifts in how people interact with financial transactions. Improved financial inclusion is one of the main social benefits, since mobile payments give more people, especially those living in rural or underserved areas, access to formal financial services. By empowering those who might not have had easy access to traditional banking, inclusion promotes economic engagement and lessens socioeconomic gaps.

In addition, mobile payment systems help economies become more digital, which makes financial transactions more transparent and efficient. Due to the ease of use of mobile devices for transactions, there is a tendency to move away from cash-based transactions, which lowers the dangers involved with actual currency, such as theft and counterfeiting. This change provides consumers with a safer and more effective way to manage their money while also being consistent with larger trends towards a without cash society.

Additionally, by altering customer expectations and behaviors, the use of mobile payment systems has social repercussions. The ease and speed with which mobile transactions can be completed has a knock-on effect on various facets of people's lives, including shopping, transportation, and service provision.

Although the development of mobile payments has had a mainly positive impact on society, issues including digital literacy, security concerns, and ensuring equitable access to technology must be addressed. The broad use of mobile payment systems can continue to support societal advancement, financial empowerment, and the expansion of contemporary economies by resolving these issues.

5.3 Impact on Environment

There are various ways that mobile payment systems could affect the environment. Because mobile payment systems replace traditional banking infrastructure and actual currency, they have a favorable environmental impact. When transactions happen online, there is less of a need for paper money, which conserves resources and reduces the carbon footprint caused by the creation and delivery of currency. The transition to computerized statements and receipts reduces the environmental effect of paper use even more. By eliminating the need for paper-based transactions, mobile payment systems, for example, can contribute to a decrease in greenhouse gas emissions and deforestation. In keeping with sustainability objectives, mobile payments streamlined and effective design also helps to lower energy consumption when compared to conventional banking procedures. Notwithstanding these advantages, e-waste management and data Centre energy efficiency must be addressed in order to provide a comprehensive strategy for environmental responsibility in the mobile payment ecosystem.

5.4 Ethical Aspects

The privacy, security, and fair access concerns are at the center of the ethical considerations surrounding mobile payment systems. Strong security measures and open procedures are necessary to guarantee the privacy and security of users' money and personal information. In order to prevent discriminatory practices, it is also ethical to address digital inequalities and make sure that mobile payment technologies are available to a wide range of socioeconomic groups. Maintaining user trust requires striking a balance between practicality and appropriate data processing, highlighting the necessity of transparent policies, informed permission, and constant watchfulness to minimize any ethical issues in the rapidly changing field of mobile payments. But there are also moral issues with mobile payment systems that should be taken into consideration. For instance, there are several security risks associated with mobile payment systems, such as applications having security weaknesses, payment security being compromised in the event of a phone loss, and improper use2. There are also privacy and accessibility issues. As an illustration, consider how easy it is to utilise these apps offline, how businesses safeguard customers' private financial information, and how they utilize that information for their own gain. Researchers can better understand user acceptance and usage of mobile payment systems, as well as how these systems may be designed to support sustainable development and financial inclusion, by examining these potential and constraints. In order to guarantee that mobile payment systems are available, safe, and advantageous for every user, it is critical to address these ethical issues.

5.5 Sustainability Plan

In research on the adoption of mobile payment systems, a sustainability strategy would usually include determining the effects of the technology on the environment, society, and economy as well as creating mitigation plans for any unfavorable effects. For instance, by encouraging the use of renewable energy sources and lowering energy usage, researchers may look into ways to lessen the carbon footprint of mobile payment systems. Researchers should also look into ways to lower inequality and encourage financial inclusion by creating mobile payment systems that are inexpensive and available to all users. Prioritizing ethical considerations in the research will involve securing informed permission, safeguarding participant privacy, and guaranteeing inclusion across a range of demographic groups. Finally, by creating mobile payment systems that facilitate more

effective and transparent financial transactions, researchers can investigate strategies that support sustainable production and consumption.

Researchers can better understand user acceptance and usage of mobile payment systems, as well as how these systems may be designed to support sustainable development and financial inclusion, by examining these potential and constraints In order to ensure that research is conducted ethically and responsibly and that the results are used to promote positive social and environmental outcomes, a sustainability plan can help.

Chapter 6

SUMMARY, CONCLUSION, RECOMMENDATION AND IMPLICATION FOR FUTURE RESEARCH

6.1 Summary of the Study

The elements impacting users' acceptance and use of these platforms are examined in the study on the adoption of M payment systems. The study looks closely at user behaviors, preferences, and technology characteristics in an effort to pinpoint the critical elements that influence the adoption process. An analysis is conducted on a number of factors, such as perceived ease of use, security concerns, and the impact of social and cultural norms, in order to offer insights into the evolving landscape of mobile payment adoption. Businesses and technology companies looking to speed up the adoption of M payment systems and facilitate a smooth transition to a cashless and digitally integrated economy must have a thorough understanding of these factors.

6.2 Conclusions

Mobile payments are becoming increasingly popular as an alternative to cash, cheques, and credit cards among both consumers and merchants. To increase the uptake of mobile payment solutions in Bangladesh, a multimodal strategy is required. First and foremost, there is an urgent need for public awareness efforts to inform people about the advantages and practicality of mobile payments. Furthermore, it's critical to address security concerns using strong encryption methods and foster confidence in these systems' dependability. In terms of the adoption of mobile payment and the intention to recommend this technology, we found that Effort Expectancy (EE), Perceived Behavioural Quality (PBQ), Performance Expectancy (PE), Social Influence (SI), Task-Technology Fit (TAC), and Technology Characteristics (TEC) had significant direct and indirect effects. Financial institutions,

mobile operators, and government agencies working together can be extremely important in developing an ecosystem that promotes user trust and accessibility. The system's overall development will also be aided by making sure that different mobile payment platforms are compatible with one another and by growing the network of businesses that take mobile payments. In the end, it will take a combination of cooperative efforts, education, and increased security to accelerate the broad use of mobile payment systems in Bangladesh.

6.3 Implication for Further Study

The findings of this research on mobile payment systems yield several significant implications for future studies in this dynamic field. Firstly, the identified factors influencing user adoption and security concerns provide avenues for in-depth investigations. Further research can delve into understanding the nuanced drivers behind user preferences and the evolving landscape of security measures in mobile payment platforms.

Additionally, the integration of M payments with emerging technologies, such as blockchain and artificial intelligence, presents a promising area for exploration. Future studies can assess the impact of these integrations on transaction efficiency, security enhancement, and overall user experience. Understanding the potential synergy between mobile payments and technologies like the Internet of Things (IoT) is also a compelling avenue for research.

M payments' cross-border component merits special consideration. Scholarly investigations may explore the obstacles linked to transnational transactions, the legal structures impacting cross-border transfers, and the function of cryptocurrencies and stable coins in enabling smooth international trade.

Integration of mobile payment systems and merchant acceptance offer yet another promising topic for research. Subsequent investigations may examine tactics that augment

merchant adoption, the ramifications of integrated mobile payment solutions on business models, and the function of incentives in fostering extensive use.

There is much to learn about the social and economic ramifications of the broad adoption of M-payments. Further research endeavors may examine the consequences for financial inclusion, accessibility to financial services, and the wider economic ramifications for conventional banking institutions and economies reliant on cash.

The efficacy of regulatory measures in guaranteeing the security and integrity of M payment systems can be evaluated by continuous study, considering the swift changes in the regulatory landscape. Further investigation is necessary into the function of regulatory sandboxes in promoting innovation and striking a balance between consumer protection and technical progress.

In addition, it is imperative to conduct ongoing research on the user experience and interface design of M payment apps in order to adjust to changing user preferences and guarantee smooth interactions. Optimizing the m-payment experience as a whole will require an understanding of how design components affect usability and acceptance.

Lastly, as the market for mobile payment systems develops further, research can be conducted to track trends in collaboration, market competitiveness, and how market dynamics affect industry innovation.

In conclusion, the research's implications highlight the multifaceted character of mobile payment systems. Subsequent research endeavors that expand upon these implications may furnish invaluable perspectives for the continuous enhancement and optimization of mobile payment systems, guaranteeing their pertinence and efficacy amidst a constantly evolving digital terrain.

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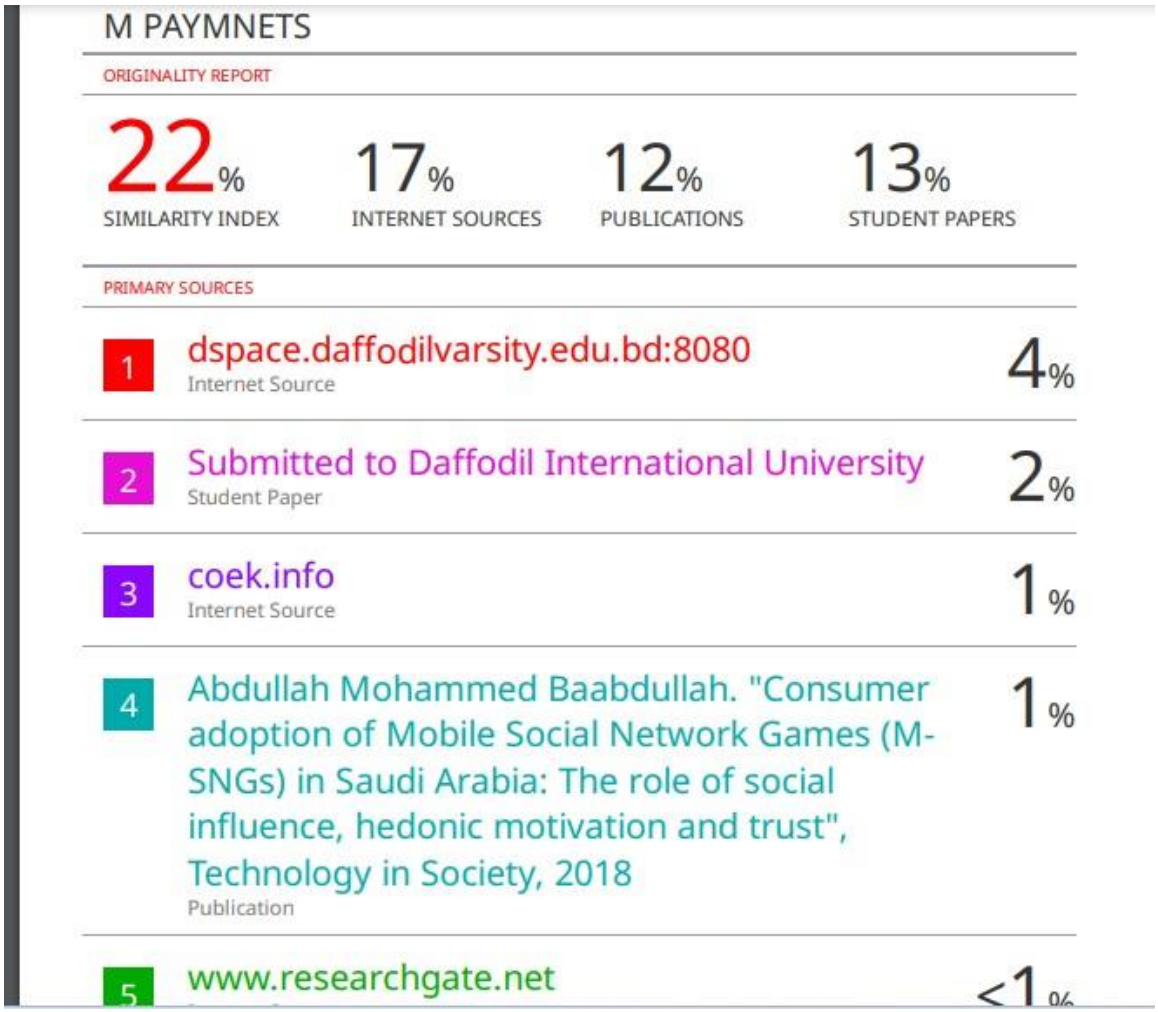

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