SIMON DIEDONG DOMBO UNIVERSITY OF BUSINESS AND INTEGRATED DEVELOPMENT STUDIES

EXPLORING THE IMPACT OF GAMIFICATION ON USER RETENTION IN MOBILE PAYMENT APPLICATION: A MEDIATING ROLE OF TRUST.

EDINA GALAA

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BY

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THESIS SUBMITTED TO FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY, SIMON DIEDONG DOMBO UNIVERSITY OF BUSINESS AND INTEGRATED DEVELOPMENT STUDIES, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF PHILOSOPHY IN INFORMATICS.

AUGUST, 2024

DECLARATION

Student

I hereby declare that this dissertation is the result of my own original work and that no part of it has been presented for another degree in this University or elsewhere:

Candidate's Signature……

Date……..

Name……

Supervisors

I hereby declare that the preparation and presentation of the thesis was supervised in accordance with the guidelines on supervision of thesis laid down by the SIMON DIEDONG DOMBO UNIVERSITY OF BUSINESS AND INTEGRATED DEVELOPMENT STUDIES.

Principal Supervisor's Signature: ……

Date: 26th August 2024

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ABSTRACT

This study explores how integrating gamification elements into mobile payment systems can enhance user engagement and retention, specifically focusing on Ghana. Despite the popularity of mobile payment applications, user retention remains a significant challenge. Studies have failed to demonstrate how trust mediates the relationship between gamification and user retention. Additionally, there is a lack of research on the post-adoption behaviours of mobile payment applications in developing countries, particularly Ghana. Gamification, which includes features like leaderboards and points, is suggested to build user trust and long-term commitment. The research aims to understand how gamification affects trust and how trust, in turn, influences user retention. Furthermore, the study aims to determine the game elements that significantly influence user trust in mobile payment apps. To achieve the study's objectives, the study leans on Social Exchange Theory. Using a quantitative research method, data was collected through questionnaires distributed to mobile payment users. The data analysis, conducted with Partial Least Squares Structural Equation Modelling (PLS-SEM), shows that gamification significantly improves user trust and retention. There is a positive correlation between gamification and trust. Also, there is a positive correlation between trust and user retention. Points are game elements that have a significant effect on trust among levels, badges, and leaderboards. The study also found that the impact of gamification varies by demographic factors such as age and education level, with younger and more educated users responding more positively. The study concludes that while gamification can effectively boost engagement and retention, its implementation should be tailored to different demographic groups for optimal results. These insights are valuable for developers and policymakers working to increase the adoption and continued use of mobile payment systems, contributing to financial inclusion and the digital economy in Ghana.

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DEDICATION

I dedicate this thesis primarily to myself, Edina Galaa, for the perseverance, hard work, and dedication that have supported my academic journey. This achievement showcases my commitment to learning and personal growth.

This work is also dedicated to my dear family. To my parents, Prof. and Mrs. Galaa, whose unflinching love and support have served as my beacon of hope. Thanks to my siblings, Yvon, Yvonne, and Ellen, for their support and faith in me.

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LIST OF ABBREVIATIONS

CB-SEM	Covariance Based Structural Equation Modelling
ECM	Expectation Confirmation Model
eWOM	Electronic Word of Mouth
FICT	Faculty of Information and Communication Technology.
FinTech	Financial Technology
IVR	Interactive Voice Response
M-banking	Mobile banking
Ms Excel	Microsoft Excel
MSN	Mobile Social networking
NFC	Near-Field Communication
NGO	Non-Governmental Organisation
PDA	Personal Digital Assistant
PLS	Partial Least Squares
PLS-SEM	Partial Least Squares Structural Equation Modelling
POS	Point of Sale
QR	Quick Response
RMP	Remote Mobile Payment
SDD-UBIDS	Simon Diedong Dombo University of Business and Integrated Development Studies
SEM	Structural Equation Modelling
SET	Social Exchange Theory
SMS	Short Message Service
SNS	Social Networking Site
TAM	Technology Acceptance Model
USSD	Unstructured Supplementary Service Delivery
USSD	Unstructured Supplementary Service Data
UTAUT	Universal Theory of Acceptance and Use of Technology
WAP	Wireless Application Protocol

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CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

The global market has been impacted by mobile payment applications, which are disruptive innovations by providing quick and effective ways for people to perform financial transactions (Humbani & Wiese, 2019; Jesslyn et al., 2023). It allows users to pay for bills, services, and goods digitally through wireless technology (Lai & Liew, 2021; Franque et al., 2023). It provides the opportunity for users to move from a cash-based transaction to a cashless transaction (Jesslyn et al., 2023). Therefore, payment can be made at any time and any place (Franque et al., 2023). Because of all of this, mobile payment apps have become increasingly popular (Jesslyn et al., 2023). Mobile payment is the act of initiating, authorising, and confirming the transfer of funds between users, the withdrawal of funds, and the exchange of money for products and services through phones, smartphones, or tablets (Shao et al., 2018; Bivar et al., 2021; Franque et al., 2023). There is a competitive market for mobile payment applications (Wang et al., 2019). A plethora of mobile payment apps are readily available, leading to an increase in the usage of mobile payment applications. Hence, ensuring user trust is paramount for their widespread adoption and retention (Sharma & Sharma, 2019). To encourage user engagement and usage in recent years, mobile payment technologies have included game-like features (Wong et al., 2022).

Gamification is the incorporation of features of games into non-gaming contexts (Deterding et al., 2011). It has emerged as a potential strategy to enhance user engagement, satisfaction, and ultimately user retention in various domains (Hamari et al., 2014). Gamification is influenced Mobile payment applications, which are disruptive innovations, have impacted the global market by providing quick and effective ways for people to perform financial transactions (Humbani & Wiese, 2019; Jesslyn et al., 2023). It allows users to pay for bills, services, and goods digitally through wireless technology (Lai & Liew, 2021; Franque et al., 2023). It provides the opportunity for users to move from a cash-based transaction to a cashless transaction (Jesslyn et al., 2023). Therefore, payment can be made at any time and any place (Franque et al., 2023). Because of this, mobile payment apps have become increasingly popular (Jesslyn et al., 2023). Mobile payment is the act of initiating, authorising, and confirming the transfer of funds between users, the withdrawal of funds, and the exchange of money for products and services through phones, smartphones, or tablets (Shao et al., 2018; Bivar et al.,

2021; Franque et al., 2023). There is a competitive market for mobile payment applications (Wang et al., 2019). A plethora of mobile payment apps are readily available, leading to an increase in the usage of mobile payment applications. Hence, ensuring user trust is paramount for their widespread adoption and retention (Sharma & Sharma, 2019). In recent years, mobile payment technologies have incorporated game-like features to encourage user engagement and usage (Wong et al., 2022). This is based on the concept that people find enjoyment in having fun (Baptista & Oliveira, 2017). As a result, users anticipate applications to be both functional and enjoyable (Putri et al., 2019). The collection of valuable user data and the provision of feedback to individuals are important for gamification (Deterding et al., 2011). Furthermore, by offering interactive and rewarding experiences, companies can foster brand loyalty or repeat purchases (Hamari & Koivisto, 2015).

Gamification elements can enhance the overall user experience of a mobile payment app (Deterding et al., 2011). Gamification is not just a game in mobile payment technology (Dzandu et al., 2022). It plays a significant role in promoting services and is becoming increasingly popular in finance (Baptista & Oliveira, 2017). It can increase the productivity of the financial sector as well (Webb, 2013). It has also gained significant attention in various industries, including education and healthcare, due to its potential to positively influence user behaviour and experiences (Hamari et al., 2014). The continuous use of gamified software is short-lived (Suh et al., 2017).

Organisations are keen on ensuring user retention (Olaleye et al., 2019). In the world of finance, it is an essential strategy (Boohene et al., 2013). A mobile payment application must already have a significant number of users for a user in the early stages to begin utilising it (Wang et al., 2019). As long-term relationships can boost financial gains, retaining existing users is more cost-effective than acquiring new ones (Aydinliyurt, 2018). Furthermore, returning customers are more likely to repeat purchases from the same company (Hamari & Koivisto, 2015). Trust encourages customer retention (Olaleye et al., 2019).

Maintaining user retention can be mediated by trust (Olaleye et al., 2019). The absence of trust results in an unwillingness to adopt mobile apps (Olaleye et al., 2019). Hence, for pre-adoption, trust is a necessary condition for initial use (Jesslyn et al., 2023). Increased usage and retention result from users feeling more confident and at ease when utilising the app for transactions and knowing that their financial and personal information is secure (Yuan et al., 2020). In the realm of mobile payment applications, trust is defined as the confidence and reliance that individuals

place on the trustworthiness, security, and authenticity of the mobile payment system (Nelloh et al., 2019). Applications that are deemed reliable due to their robust security features and clear policies inculcate confidence in users, thereby mitigating worries surrounding privacy, fraudulent activities, and unauthorised entry (Liu et al., 2020). However, establishing trust in the digital domain can be challenging due to concerns surrounding data privacy, fraud, and technical issues (Wang et al., 2019; Lu & Wang, 2021; Salimon et al., 2021). Trust is significant in retaining users in a gamified mobile payment system (Dzandu et al., 2022).

Gamification mechanics can be employed to enhance users' perceptions of security by providing visual cues, such as progress bars, badges, and levels, that indicate the app's reliability and transaction integrity (Aydin, 2015). Furthermore, these elements can enhance users' perceptions of transparency, motivate users to engage more with the app (Putri et al., 2019), and provide a sense of achievement and progress, thereby potentially increasing user trust (Mauroner, 2019). Interaction design and digital marketing professionals are quickly becoming interested in the idea of using gamification to inspire and boost user activity and retention (Deterding et al., 2011). Users' ongoing engagement and trust in mobile payment apps are essential for the sustained success and longevity of service providers. Understanding how gamification influences user trust is essential to inform app providers about designing and implementing effective gamification strategies that enhance user trust and retention.

In existing studies, gamification, mobile payment apps, retention, trust, and their relationship have all been investigated. According to studies, there is a difference between a mobile payment system and an online payment system (Franque et al., 2023). As stated by Kang (2018), mobile payment apps are specific applications installed on mobile devices that allow users to make payments using their smartphones, while online payment systems are platforms that facilitate online transactions (Moghavvemi et al., 2021). Studies indicate that gamification has been massively invested in with billions of dollars after gaining wider attention (Salimon et al., 2021). It was discovered that, despite the novelty of gamification in technology, it pre-exists in marketing (Prince, 2013). According to Kapp (2014), users do not play games just for points but for mastery and socialisation. The mobile payment system is known as the m-payment system and operates in real time (Al-Okaily & Alalwan, 2022). Mobile payment technology is almost as popular as debit and credit cards (Pal et al., 2021). Gamification design can be classified as gamification objects and mechanics (Tang & Zhang, 2019). There has been a sharp increase in the utilisation of mobile payment apps due to the COVID-19 pandemic (Dzandu et al., 2022).

Previous studies have provided insights into the potential advantages of gamification in several domains, such as e-commerce, education, and health. For instance, according to research by Hamari et al. (2014), gamification features improved user satisfaction and engagement with a mobile fitness app. Also, studies have highlighted that user engagement and motivation are closely linked to trust-building (Putri et al., 2019). According to studies, mobile payment software that is gamified includes enough security features to give users confidence while they complete their transactions (Lai & Liew, 2021).

1.2. Problem Statement

Mobile payment applications are currently experiencing significant growth in the market and are being utilised by an increasing number of individuals (Wang et al., 2019). Nevertheless, with the proliferation of mobile payment applications and users, coupled with the inclination of new users to join platforms with higher user bases, businesses encounter the obstacle of sustaining user loyalty to obtain monetary advantages over an extended period (Wang et al., 2019). Therefore, businesses must develop strategies to retain existing customers (Peng et al., 2016). Businesses invest huge amounts of money searching for new customers because it costs so much (Avornyo et al., 2019). The benefits of maintaining existing customers, however, are plentiful (Singh & Agrawal, 2021). Due to the competitive market for mobile payment applications, users' intentions to switch providers still pose a challenge for service providers (Peng et al., 2016). Furthermore, users do not only expect mobile payments to be useful to them, but they also expect them to be fun to use (Putri et al., 2019).

Moreover, a high level of user trust in mobile payment apps must be established and kept to promote long-term user engagement and loyalty (Yuan et al., 2020). However, the sheer existence of mobile capabilities is insufficient to secure customer trust given the persistent concerns about security, privacy, and dependability (Liu et al., 2020). If trust is not established at the outset, users can switch service providers for less money and more easily (Zhou, 2014). Despite the financial advantage of retaining existing customers (Boohene et al., 2013), attention is still focused on acquiring new ones (Avornyo et al., 2019). An issue with gamification is that game elements can only hold users' attention for a limited time (Suh et al., 2017). As a result, users tend to lose interest in a product or service after a short time (Hamari & Koivisto, 2015), making it difficult to maintain user interest.

Also, research on gamification in mobile payment apps is scarce (Putri et al., 2019; Dzandu et al., 2022; Wong et al., 2022). Scholars have primarily concentrated on the pre-adoption of

technology at the expense of post-adoption (Gupta et al., 2020; Singh, 2020). Dzandu et al. (2022) conducted a study on gamification in mobile payment systems in Ghana but failed to investigate the critical role of trust in maintaining user loyalty. Despite numerous studies conducted on mobile payment applications, adoption focus has been placed on developed countries at the expense of developing countries (Hubani & Wiese, 2019; Dzandu et al., 2022). Where differences exist between emerging nations' technology infrastructure, laws, cultures, and literacy rates (e.g., Ghana), it becomes evident that the conclusions drawn from these studies cannot be broadly applied to the context of developing countries. Bivar et al. (2021) encouraged studies to include other African countries to validate their findings. They also encouraged studies to include trust in their model. Humbani and Wiese (2019) encouraged scholars to expand their studies to other African countries to find factors affecting continued use, and factors like convenience and usefulness should also be examined. Consequently, future investigations must be conducted in developing nations to address this inequality.

In addition, the majority of recent studies have focused on the efficiency of gamification in various fields, including marketing, education, and health (Huotari & Hamari, 2012; Stott & Neustaedter, 2013; Johnson et al., 2016; Bitrián et al., 2020). Furthermore, most of the research on gamification concentrates on pre-adoption (Foroughi, 2023). Consequently, research has failed to demonstrate how trust mediates the relationship between gamification and user retention (Hamari & Koivisto, 2015).

According to Baptista and Oliveira (2017), studies should investigate the impact of trust on user retention in gamified information systems. In Suh et al. (2018), researchers are encouraged to explore the influence of trust on user retention or the continued use of gamified systems. Due to this, there is still a significant research gap regarding gamification's impact on user trust in mobile payment apps. A few theories have also been used in gamification and user retention (Aydinliyurt, 2018; Vanduhe et al., 2020; Foroughi, 2023). Various theories can be utilised to assess user retention in mobile payment applications. Nonetheless, certain theories have been extensively scrutinised, whereas others have been neglected in specific domains. Furthermore, certain theories have been employed to gauge particular factors, while other factors have not been thoroughly investigated. Despite the countless theories accessible for determining user retention through gamification, there remains an area that has been overlooked and requires further study.

Furthermore, the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) are the most commonly used theories, but the emphasis is on pre-adoption rather than post-adoption studies (Zhou, 2013). However, TAM may not encompass all the variables that influence a technology's usage behaviour since it primarily considers the perception of ease of use and usefulness among individuals (Rauniar et al., 2014). Hence, there is a need for the study to consider other theories that are best suited to investigating user behaviour.

Therefore, academically, there is a disparity between gamification and user retention of mobile payment apps. As service providers encounter challenges in engaging users to gain financial benefits through user retention, According to Li and Liu (2014), researchers are expected to investigate additional factors influencing continued use, such as the significance of trust and the impact of social influence in the post-adoption phase of information systems. According to Gupta et al. (2020), studies should be extended to other developing countries. Therefore, a limited study exists on the post-adoption of mobile payment apps in developing countries, especially Ghana.

1.3. Research Purpose

The aim of the study is to examine the effect of gamification on user retention in mobile payment apps, with trust as a mediating variable.

1.4. Research Questions

The study's primary research question is: What is the effect of gamification on user trust in mobile payment apps and its subsequent effect on user retention?

Specifically, the study sets out to question:

1. What is the association between the presence of gamification in mobile payment apps and user trust?
2. How does user trust influence user retention in mobile payment apps with gamification?
3. What are the specific gamification elements that significantly influence user trust in mobile payment apps?

1.5. Research Objectives

The main research objective is to examine the effect of gamification on user trust in mobile payment apps and its subsequent effect on user retention.

Its specific objectives are as follows:

1. To examine the relationship between gamification in mobile payment apps and user trust.
2. To assess the effect of user trust on user retention in gamified mobile payment apps.
3. To determine the game elements that significantly influence user trust in mobile payment apps.

1.6. Scope of the Study

The research will be conducted from a geographical standpoint in Ghana. It will focus on smartphones equipped with internet connectivity. The rationale behind this choice is the examination of specific game elements within gamification, which may necessitate internet access for optimal functionality. The primary emphasis lies on mobile payment applications, aligning with the study's objectives. This decision is based on the gamification of various applications, such as fitness and educational apps, on mobile platforms. Eligible participants are required to possess the capability to download these mobile payment apps on their devices and must have prior experience using such applications. It is essential that participants either currently own a smartphone or have done so within the past six months. The study will target respondents located in Wa and its environs. This is to circumscribe the study to a more manageable scope, allowing for a focused analysis of the specific socio-economic factors prevalent in the area.

1.7. Relevance of the Study

This study is significant for research as it investigates how gamification impacts user retention in mobile payment apps, with trust acting as a mediating factor. This aspect has been overlooked in prior studies, especially in Sub-Saharan Africa and Ghana. Findings from this study contribute to knowledge as it addresses a research gap. Researchers and academia can gain insights from this study.

The use of gamification in a variety of fields has produced encouraging outcomes in increasing user engagement and altering behaviour. Understanding how it affects mobile payment apps directly will help with understanding the most efficient ways to increase user retention. the adoption and sustained use of mobile payment apps depend heavily on trust. User trust is highly correlated with app security and dependability perceptions, and adding gamification features is

seen to have an impact on trust-building processes. Investigating how gamification affects user trust can provide useful tactics for fostering trust and improving user retention for service providers.

1.8. Organisation of Thesis

This study will consist of five (5) chapters. Chapter One introduces the study, presents the problem statement, research objective, research questions, the motivation behind the study, and highlights its significance. In the second chapter, a literature review is presented. There is a comprehensive review of the relevant literature on gamification, game elements, user trust, user retention, and mobile payment apps. Literature gaps in these areas are identified by examining previous studies and theories. Also, the chapter focuses on the theory used in the study. It presents the theoretical framework that guides the research, including the concepts and constructs used to investigate the impact of gamification on user trust and user retention in mobile payment apps.

The third chapter focuses on research methodology. It explains the philosophical worldview underpinning the study, the research design, the research approach, the data collection methods, sampling techniques, and analysis techniques employed in this study. It outlines the steps taken to address the research questions and achieve the research objectives. The fourth chapter discusses data analysis and findings. A description of the respondents' demographics is provided. An assessment of the measurement model is made, focussing on indicator reliability, convergent validity, and discriminant validity. In addition, the chapter discusses structural model assessment, with a focus on effect size assessment and multicollinearity assessment. This chapter scrutinised the study’s findings based on the research objective, research questions, and theoretical framework. During the discussion, key findings from the data analysis are presented and explored in depth. Last but not least, chapter five includes the conclusion and recommendations of the study’s findings. A general conclusion about the study’s findings was presented. Contributions and implications of the study’s findings were also presented in this chapter. Limitations concerning the study were presented, and recommendations for future research were also stated.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. Chapter Overview

This chapter presents a comprehensive review of existing research examining the relationship between gamification, user trust, and user retention in the context of mobile payment apps. By exploring these concepts and identifying gaps in current knowledge, this chapter establishes a foundation for understanding how gamification can influence user behaviour and loyalty within the mobile payment ecosystem. Furthermore, this chapter presents the theoretical framework for the study, focusing on Social Exchange Theory (SET) and its application to examine the relationship between gamification elements in mobile payment applications and user retention, with trust as a mediating variable. The chapter introduces testable hypotheses and a conceptual model guiding the investigation.

2.2.Mobile Phone Devices

Mobile devices have rapidly replaced traditional desktop programs in recent years (Gao et al., 2015). Which makes the mobile phone the most rapidly adopted innovation in history (Suri et al., 2023). This study defines a mobile device, according to Punja and Mislan (2008), as a cellular or mobile phone, portable digital, or smartphone. Users of mobile devices are using them for e-commerce and banking, hence the trust in these devices (Vasudevan et al., 2011). The fast increase in the ownership and usage of mobile devices in developing economies shows a greater opportunity for underprivileged people to be part of digital services (Nooren et al., 2021). Some drawbacks linked to mobile devices include having a small screen, cumbersome input methods, and sluggish response times (Abolfazli et al., 2014). They also have a limited central processing unit and memory, which can affect their performance and responsiveness (La Polla et al., 2012). Furthermore, these devices are susceptible to hacker attacks, viruses, and trojan horses (La Polla et al., 2012).

2.3. Mobile Phone Usage

Based on the 2021 Population and Housing Census, 73.1% of Ghanaians aged 12 years and above own a smartphone (GSS, 2022). There are more Ghanaians with a mobile phone than a bank account (Appiah-Gyamerah & Amoah, 2014). The utilisation of smartphones among Ghanaian cellular phone users started around five years ago, similar to other parts of the world (Okae, 2018). The use of smartphones is common among all income groups in Ghana for computing power and recognition (Okae, 2018). Sim connections were expected to increase

from 731 million to 1 billion in Africa by 2020 (Olaleye et al., 2019). Mobile phone usage in Sub-Saharan Africa is widespread, with a penetration rate of 76% (Lashitew et al., 2019). More mobile phones are in use than any other technical gadget that can be used to manufacture, promote, sell, or provide goods and services to customers (Dahlberg et al., 2007). As of 2017, smartphone users were around 3.7 billion globally (Foroughi et al., 2019). Mobile devices have rapidly replaced traditional desktop programs in recent years (Gao et al., 2015). Which makes the mobile phone the most rapidly adopted innovation in history (Suri et al., 2023). This study defines a mobile device, according to Punja and Mislan (2008), as a cellular or mobile phone, portable digital, or smartphone. Users of mobile devices are using them for e-commerce and banking, hence the trust in these devices (Vasudevan et al., 2011). The fast increase in the ownership and usage of mobile devices in developing economies shows a greater opportunity for underprivileged people to be part of digital services (Nooren et al., 2021). Some drawbacks linked to mobile devices include having a small screen, cumbersome input methods, and sluggish response times (Abolfazli et al., 2014). They also have a limited central processing unit and memory, which can affect their performance and responsiveness (La Polla et al., 2012). Furthermore, these devices are susceptible to hacker attacks, viruses, and trojan horses (La Polla et al., 2012).

2.4. Mobile Payment Applications

Barter was the first form of payment, and it progressed through money, checks, and credit before concentrating on mobile payments, which are now the centre of electronic and mobile commerce (Pooi et al., 2018). The telephone industry has been changed by mobile phones (Dahlberg et al., 2007). Mobile phones have features beyond telecommunication requirements, encouraging the creation of value-added mobile services (Dahlberg et al., 2007). By providing ubiquity, mobile payment systems have reshaped the traditional payment system (Zhou, 2013; Yamaguti Mondego & Gide, 2020).

Mobile payment applications are digital platforms that allow users to conduct financial transactions using their mobile devices (Tripathi, 2020). It enables convenient and secure transactions, offering individuals and businesses a streamlined way to exchange funds (Fokus, 2004). Examples of mobile payment applications include SlydePay, GhanaPay, MTN MoMo, etc. Mobile payment services eliminate the need for actual currency or card-based payment methods by enabling users to conduct financial transactions using mobile devices, such as smartphones or tablets (Furtado et al., 2020). Since mobile payment transactions are encrypted and require authentication, they provide a level of security that physical cash or credit cards

may not offer (Abolfazli et al., 2014). The types of mobile payment services include mobile banking, mobile wallets, QR code payments, cryptocurrency, and wallets (Ahmed et al., 2021). With the rise of e-commerce, the payment process has become more digital, with payment details being transferred over an open network without the buyer and seller having to interact in person (Valcourt et al., 2005). Also, the success of e-commerce lies in the successful implementation of mobile payment services (Fatonah et al., 2018). A range of stakeholders, including consumers, merchants, mobile network operators, financial institutions, and the government, work together to encourage the uptake and expansion of mobile payment services (Sahnoune et al., 2015).

It is growingly used by a large number of people who use mobile phones and easily have internet access (Al-Okaily & Alalwan, 2022). The popularity of mobile payment technology continues to spread globally (Pal et al., 2021). Given that it is a disruptive innovation with the potential to generate enormous value, it has the potential to become a major killer application (Hu & Li, 2008; Justin & Joy, 2019). Mobile payment platforms are created by an autonomous network of businesses that choose various market strategies and are subject to industry-specific regulations, such as those in the banking and telecommunications sectors (Albuquerque et al., 2014).

M-payment is an acronym for mobile payment (Al-Okaily & Alalwan, 2022; Franque et al., 2023) and is an example of an electronic payment (E-payment) system (Bram et al., 2017). Mobile payment applications are also referred to as mobile payment apps. Despite being different from online payment, m-payment and online payment are used interchangeably (Franque et al., 2023). Originally originating in the United States, mobile payment systems have spread across the globe (Bivar et al., 2021). Applications for mobile payments were developed for a variety of settings, demographics, and objectives (Bram et al., 2017). The environmental market of M-payment is most fiercely contested (Putri et al., 2019). In various countries, including developing countries, mobile payments are still breaking ground (Pal et al., 2021). Bearing in mind the huge capital and time required to make a mobile payment app, it is key to make certain that mobile users will use m-payment (Justin & Joy, 2019). The use of m-payments is anticipated to grow in importance as a means of completing financial transactions (Yang et al., 2012). Mobile payment technology is termed a self-service technology (Sinha et al., 2018). Mobile payments can be classified into two categories: originating from the mobile environment and evolving from PC-based internet services (Lu et al., 2017).

M-payment is a method of paying for goods, services, and bills via a mobile device, such as a phone (Bivar et al., 2021). Mobile payment means “that users adopt mobile terminals to conduct payment at anytime from anywhere" (Zhou, 2011, p. 1). It also refers to any kind of payment that requires initiating, approving, and confirming the money exchange for goods and services through the use of a mobile device, such as a tablet or phone (Shao et al., 2018). Furthermore, it can refer to services that allow users to withdraw money, pay for services and goods, and send money between users via a mobile phone (Franque et al., 2023). Mobile payments are “payments for goods, services, and bills with a mobile device (such as a mobile phone, smartphone, or PDA) by taking advantage of wireless and other communication technologies” (Dahlberg et al., 2007 p. 1).

The use of mobile phones, smartphones, or tablets to initiate, authorise, and confirm the payment for products and services, money transfers between users, and money withdrawals is referred to in this study as mobile payment (Shao et al., 2018; Bivar et al., 2021; Franque et al., 2023). The reason for this definition is mobile payment services are not only used to pay for products and services but can also be used to transfer money without paying for goods and services and also allow users to remove money when required.

In Africa, a mobile payment app called M-pesa was developed by Safaricom in 2007 in Kenya (Bivar et al., 2021). M-payment has several benefits, which include: it is best used for online buying and offline payment of goods and services (Bezhovski, 2016); it is convenient; and users can make financial transactions anywhere and at any time (Dzandu et al., 2022). It plays a crucial role in driving economic development in developing countries (Humbani & Wiese, 2019). It provides a more secure method of payment (Simanjuntak et al., 2020). It assists with checkless, cashless, and cardless payments (Saha et al., 2022). With mobile payment apps, there is no need for a customer to visit a physical location to make a payment (Pathirana & Azam, 2017). It also reduces the cost of transactions for the service providers by providing a cheaper choice than formal banking or cash (Bram et al., 2017; Pal et al., 2021). Moreover, it minimises the cost of printing paper money and manufacturing coins (Al-Okaily & Alalwan, 2022). It plays an important role in providing financial inclusion by creating opportunities for underserved populations that may not have access to traditional banking structures (Pal et al., 2020). Customers can access instant services like food delivery and public transit by using mobile payment services (Pietro et al., 2015; Kapoor & Vij, 2018). Global mobile payments are expected to reach $4.574 trillion by 2023 (Kuo, 2020). In 2027, it is estimated to reach $8.94 trillion (Kaewkitipong et al., 2022).

According to earlier research, mobile payments have a promising future, so businesses should invest in the development and expansion of this payment option (Tan, 2013). Owing to the benefits of mobile payment systems, agencies such as USAID, UNIDO, and Visa are advocating for their implementation in poor nations (Bram et al., 2017). Countries are recognising the advantages of mobile payment apps, leading to citizens being motivated to utilise these systems through incentives or scarcity of cash, thereby prompting users to engage with the platforms (Kuo, 2020; Yan et al., 2021). One relevance of mobile payment apps is their ubiquity (Zhou, 2013).

Mobile payment systems have sluggish growth in nations with varying economic conditions and client bases, notwithstanding their benefits (Saha et al., 2022). The unwillingness to accept the use of mobile payment apps is another challenge encountered by mobile payment systems because potential users are looking at their friends and family to use the app (Bram et al., 2017). Furthermore, consumers encounter service interruption and delay when utilising mobile-based services as a result of cellular network instability and capacity limitations (Zhou, 2014). Another challenge associated with its adoption is the perceived risk, as individuals have concerns about the technological and monetary issues associated with these systems (Saprikis & Vlachopoulou, 2021). Despite the popularity of mobile payments, it is not yet a preliminary payment method (Simanjuntak et al., 2020). Malaysia has a low adoption rate for mobile payment apps (Yan et al., 2021). 12% of internet users in the US choose mobile payment as their main method of payment (Putri et al., 2020). Despite a large number of internet and mobile users in Nigeria, the country lags in embracing mobile payments compared to other nations (Ajao et al., 2023). The adoption of mobile payments is slow in both developed and developing countries, despite their many benefits (Talwar et al., 2020). Mobile payment apps are fast growing in the FinTech services of developing economies, and a third of internet users use mobile payment applications (Alhassan et al., 2020). Literature presents varying perspectives on mobile payment app adoption. Some scholars find the adoption slow and unsuccessful, while others see rapid growth in mobile payment apps. The vulnerability of mobile devices to viruses and trojan horses may raise users' worries about payment security and reduce their intention to use the services, despite significant efforts to enhance security (Ahmed et al., 2021). To reduce perceived risk and make using mobile payment apps easier, trust is required (Zhou, 2014). One obstacle for organisations in mobile payment apps is maintaining user engagement to encourage continued usage (Justin & Joy, 2019).

2.4.1. Mobile Payment Technologies

Mobile payment usage can be categorised into two types: daily purchases and bill payments (Dahlberg et al., 2007). According to Bezhovski (2016), mobile payment is classified by payment cards, digital wallets, electronic cash, and contactless methods. It is also categorised by security features. Contactless and remote-based mobile payments are the two types of mobile payments available, depending on the supporting technology (Pooi et al., 2018). Chen and Li (2017) highlight Short Message Service (SMS), Near-Field Communication (NFC), Wireless Application Protocol (WAP), and Quick Response (QR) code as the four types of technologies for mobile payment apps. Contactless payment technology is a mobile payment type that enables transactions without card swiping. It uses NFC technology for tapping or waving devices near payment terminals (Wang et al., 2019). Contactless payment is also known as proximity mobile payment (Pooi et al., 2018). It uses encryption and authentication for transaction security (Ahmed et al., 2021). Contactless payment methods utilise NFC, sound waves, and QR code technologies (Bezhovski, 2016). A contactless mobile payment provides benefits such as convenience, speed, and increased security (Wang et al., 2019).

NFC facilitates wireless communication over short distances, typically within a few centimetres. It allows contactless mobile payments through a connection between a mobile device and a payment terminal (Karjaluoto et al., 2020). It enables the secure transmission of payment data to a POS terminal. Users can easily make payments by tapping or waving their devices near the terminal (Karjaluoto et al., 2020). The presence of both the client and merchant is required to complete the transaction (Tan, 2013). To facilitate the physical payment, there must be an interface between the mobile device and the merchant's payment terminal (Pooi et al., 2018). NFC technology is implemented as a built-in chip and is compatible with various devices and operating systems (Zolotukhin & Kudryavtseva, 2018). NFC has various communication modes, such as reader-writer mode and card emulation mode (Gupta & Narayan, 2020). NFC-based payment systems need NFC-enabled chips in phones and card readers at merchants for payment initiation processes (Singh, 2020). NFC facilitates quick and convenient transactions through mobile devices such as smartphones, tablets, and laptops, both online and offline (Zolotukhin & Kudryavtseva, 2018). It can also be used for mobile ticketing (Noh et al., 2014).

To swiftly obtain information or carry out a particular task, a smartphone or QR code reader can be used to scan a QR code (Rafferty & Fajar, 2022). It can hold alphanumeric data, characters, and symbols and has a pattern of black squares on a white background (Karniawati

et al., 2021). QR codes are utilised in different sectors such as mobile payments, advertising, inventory management, ticketing, and others (Nseir et al., 2013). It can store many kinds of data, including text messages, payment details, contact details, and website URLs (Bezhovski, 2016). QR codes can be readily scanned by the cameras of mobile devices, thereby enhancing accessibility to a diverse user base (Singh, 2020). Furthermore, they are secure and encrypted, ensuring the privacy and integrity of payment transactions (Karniawati et al., 2021). Moreover, QR codes are inexpensive, small, and have a large data storage capacity (Noh et al., 2014). QR codes are easy to generate and use and can be printed on various surfaces, making them accessible offline (Gupta & Narayan, 2020). QR codes are especially advantageous in scenarios necessitating prompt and reliable retrieval of data or the execution of financial transactions (Rafferty & Fajar, 2022).

Remote-based technology utilises telecommunication networks like the Internet, 3G, or GSM to enable transactions without direct interaction with a merchant's POS system (Leng et al., 2018). It uses mobile terminals for authentication and payment confirmation from anywhere (Liu et al., 2020). It allows users to interact with and manage devices or systems from a distance, without physical proximity (Noh et al., 2014). USSD, SMS, IVR, and WAP are the technologies that RMP relies on for payment initiation (Leng et al., 2018). Remote-based payment is important when the payer is not physically at the merchant's location or when buying from web merchants or digital goods (Raina, 2015). It provides a convenient and accessible method for customers to conduct transactions via their mobile devices (Li et al., 2010).

SMS is the simplest way of conducting mobile payment transactions (Bivar et al., 2021). It has existed since the late 1990s (Hu & Li, 2008). Making it the earliest mobile payment method (Zhou, 2013). It is the most commonly used and most adopted mobile payment service among users of mobile phones (Hu & Li, 2008). It involves initiating payments through SMS, and then payments are deducted from the user's account (Singh, 2020). Users also have the choice to check their balance (Bivar et al., 2021). It integrates the correctness and incisiveness of email and the suitability and immediateness of mobile phones (Hu & Li, 2008). SMS-based payments are authenticated through secret passwords, handset hardware information, or other personal information of the sender (Raina, 2015). Thus, SMS payments are secure due to manual activation or the user approaching the receiver, requiring proactive behaviour (Liébana-Cabanillas et al., 2017). The security of SMS payments is enhanced by user participation, reducing their vulnerability to fraud (Liebana-Cabanillas et al., 2020). SMS offers a convenient

method for transferring funds (Leng et al., 2018). SMS payments encounter various challenges such as storage problems, lack of coding, absence of delivery confirmation, and reduced transmission capacity due to a character limit of 160 (Liébana-Cabanillas et al., 2017).

WAP is a standard for mobile wireless network information access (Meng & Ye, 2008). WAP enables the creation of mobile apps and content tailored for mobile devices and supports various wireless networks (Fokus, 2004). It facilitates remote payments via mobile web browsers as it enables users to utilise mobile payment systems and conduct transactions with their mobile devices (Leng et al., 2018). It allows mobile devices to access internet-based services such as email, web browsing, and online banking (Meng & Ye, 2008). Additionally, an alternative option in WAP includes the in-app mobile payment method involving app downloads and linking bank accounts to the app (Singh, 2020). It is important for mobile payments due to its secure interface for user transactions (Patel et al., 2015). It offers infrastructure and protocols for secure wireless network transactions (Meng & Ye, 2008). Faster transaction times for interactive applications are enabled by it, making it ideal for real-time mobile payment transactions (Carr, 2007). Limited bandwidth and slower data transfer speeds compared to wired internet connections are some disadvantages of WAP (Fokus, 2004).

2.4.2. Mobile Payment Services

Users find that mobile payment technology offers low costs, easy installation, and operability. It allows for creative uses like reflecting on past expenses, especially in cases of differences in technological infrastructure, legislation, culture, and literacy levels among developing countries (Pal et al., 2020). Consumers engage in three distinct modes of payment through a mobile payment application: non-commercial transactions between individual consumers, commercial transactions from consumers to merchants, and payments for goods and services facilitated by a mobile device through online channels. Additionally, consumers conduct transactions at POS (Hayashi, 2012). In mobile payment applications, the most frequently used service is the payment of products and services online (Karsen et al., 2019). Transactions can be initiated through various means, such as SMS messaging, web, email, or mobile client applications (Ahmed et al., 2021). Payments can be made by users using tokens from banks, service providers, or telecom companies. Tokens can be transferred via SMS or mobile applications on mobile devices (Liu et al., 2020). Mobile payment applications allow users to save money, especially for low-income earners, due to the infrastructure they provide (Kyeyune et al., 2012). Users can make domestic or international person-to-person transfers using mobile payment applications (Merritt, 2011). Mobile payment allows the electronic

transfer of money, aiding in peer-to-peer transactions and remittances (Fokus, 2004). Mobile payment systems offer transaction history, notifications, and loyalty programs to improve the user experience (Patel et al., 2015). Mobile payments provide services such as ease of use, speed, and accessibility, making them a convenient alternative to traditional payment methods (Meng & Ye, 2008).

2.4.3. Mobile Payment Usage

The utilisation of mobile phones has significantly risen in recent years; a considerable number of mobile phone users utilise mobile payment systems (Al-okaily & Alalwan, 2022). According to Zhou (2013), mobile payment, as an emerging service, has not received wide adoption among users. Due to the emergence of COVID-19, the use of mobile payments has seen a sharp increase (Dzandu et al., 2022). Security and trust are the major factors that impact consumer adoption of mobile payment methods (Bezhovski, 2016).

While some countries can boast about an increasing number of mobile payment users, others cannot. M-Pesa, originating from Kenya and extending to other African countries, can now boast more than 29 million active users (Franque et al., 2023). Unlike China, where the stickiness of users is low (Shao et al., 2018), Aydinliyurt (2018) highlights how many mobile applications tend to be downloaded, but for some reason, they discontinue using most of them. Hence, this is this is a big challenge that needs to be overcome by these companies. Also, according to Pathirana and Azam (2017), despite Thailand having a high mobile payment penetration, user adoption and usage of this app are still low (Pathirana & Azam, 2017). In Malaysia, mobile payment is not regularly used, and it accounts for only 10% of Malaysia's total payments (Yan et al., 2021).

China has the highest number of mobile payment users. India ranks second. Many African countries also have a significant number of mobile payment users (Singh, 2020). The number of active mobile money accounts in Ghana rose to 13 million in 2018 from 11 million in 2017 (Alhassan et al., 2020). The use of mobile payment apps is less common in Europe and North America than in Asian and developing nations (Ślązak, 2014).

Adoption and usage of mobile payment apps are low in developing and developed countries, despite their many benefits (Talwar et al., 2020). Small displays, troublesome data entry, and sluggish reactions are limitations that could detrimentally impact users' interaction and hinder their continued usage (Zhou, 2013). The usage of contactless payment increased after COVID-19 by 79% of global consumers, according to a survey conducted by Mastercard (Kaewkitipong

et al., 2022). Individuals' post-adoption usage criteria for mobile payment services are primarily based on their experience (Yang et al., 2012). Factors like telecom infrastructure and internet connectivity affect the success and adoption of mobile money services (Lashitew et al., 2019).

When discussing information systems adoption, two types are involved: initial adoption and post-adoption (Chen & Li, 2017; Talwar et al., 2020). Pre-adoption of mobile payment is the time before employing mobile payment services when people are knowledgeable but have not chosen to utilise them yet (Tsai & Loncar, 2022). Post-adoption refers to the stage after users have adopted a mobile payment system and are actively using it for financial transactions (Kang et al., 2012). Service providers must succeed in the post-adoption phase if they hope to keep clients and ensure a steady flow of revenue (Kang et al., 2012). Pre-adoption is extensively researched by scholars, neglecting post-adoption (Singh, 2020). Studies underscore the significance of mobile payment adoption and the influence of post-adoption behaviours such as continuation intentions on user satisfaction and loyalty (Talwar et al., 2020). Understanding post-adoption behaviour is essential for the success of IT services and products. Users' continuance intentions and switching intentions affect their usage patterns, thereby impacting the overall outcomes (Peng et al., 2016). Therefore, the relevance of post-adoption in the study

Factors like security, convenience, accessibility, and technological infrastructure influence the use of mobile payments (Raina, 2015). Perceived usefulness, perceived ease of use, trust, and satisfaction with the payment system are factors that affect usage in mobile payments (Putri et al., 2020). Individual performance, use, and satisfaction are important predictors of continued intention to use mobile payment in Africa (Franque et al., 2023). Performance expectancy, social influence, compatibility, knowledge, and trust are crucial factors affecting consumers' intentions to utilise mobile payment systems in the United States (Jung et al., 2020). Compatibility, convenience, and perceived usefulness are factors affecting it (Wang et al., 2019). Factors such as complexity, costs, security risks, trust in service providers, and authentication impact the utilisation of mobile payment systems (Bezhovski, 2016). Factors affecting the usage of mobile payment systems include effort expectancy, performance expectancy, and social influence (Almazroa & Gulliver, 2018).

2.5. Gamification

Gamification has gained significant attention in various fields (Salimon et al., 2021), including education, business, and healthcare (Robson et al., 2015; Rohan et al., 2021), for enhancing

engagement and motivation (Jesslyn et al., 2023). Gamification has garnered considerable interest in education, business, and healthcare for enhancing engagement and motivation (Robson et al., 2015; Rohan et al., 2021; Salimon et al., 2021; Jesslyn et al., 2023). It became a popular topic around 2010 (Jesslyn et al., 2023). It was inspired by the fact that individuals like having fun in their lives (Baptista & Oliveira, 2017). Regarding the field of education, Bai et al. (2020) found that the purpose of the study was to investigate how gamification affects students' academic performance in different types of learning environments. According to study findings, students value gamification when it comes to generating excitement, providing feedback, satisfying their need for recognition, and promoting goal-setting. To investigate the effects of gamification on consumers' intentions to participate in the process and their perceptions of the brand, Yang et al. (2017) carried out a study. Perceived utility and enjoyment are supported by the study's findings as indicators of engagement intention and brand sentiment in a business context.

According to multiple studies, gamification boosts engagement and enjoyment by increasing experience quality and engaging users (Hamari et al., 2014). Gamification is the process of enhancing user engagement and motivation through the use of game dynamics, mechanics, and components (Morschheuser et al., 2017). Based on Deterding et al. (2011), gamification is the "use of design element characteristics for games in a non-game context." It is "all about changing how specific activities and processes operate, predominantly for users to have more fun and greater engagement in what they are doing" (Wood & Reiners, 2015, p. 3). Furthermore, it is termed a " process of enhancing a service with affordances for gameful experiences in order to support user's overall value creation" (Huotari & Hamari, 2012, p. 19). According to Mauroner (2019), gamification is when game elements are used in a non-game context with the aim of problem-solving. Gamification is a pedagogical strategy that integrates components of games, such as game elements, mechanics, and game-based cognitive processes, to foster learning and stimulate motivation (Kapp, 2012).

This study defines gamification in line with Deterding et al. (2011). This is because the study is focused on how the incorporation of game mechanics and elements can be used to attract and retain users of an information system (Webb, 2013). This study will focus on attracting and retaining mobile payment system users. The focus is on the experience it creates for users as if it were a game being played (Putri et al., 2019). These elements and mechanics are used in a non-game service and application, which is the mobile payment app in this study (Deterding et al., 2011), to motivate users to continue to use these services and applications

(Hamari & Koivisto, 2015). Through the implementation of gamification, a complete game is not created; instead, applications are structured to incorporate specific dynamics akin to those found in games (Suh et al., 2018). Gamification is designed to motivate, engage, and enhance performance among users while executing a task (Foroughi, 2023). The objective of gamification involves applying principles of game design in non-game scenarios to enhance users' engagement with goods or services (Zhao & Guo, 2019).

Gamification can be categorised into two distinct approaches: gamification by content and gamification by structure (Kim, 2015). Gamification by content integrates game elements into learning content, emphasising instructional aspects of game-based learning (Martens & Mueller, 2016). Gamification by structure, conversely, directs attention towards the architecture and dynamics inherent in the game itself (Kim, 2015). Gamification that involves adding a story is termed gamification by content, while structural gamification uses parts of a game like leaderboards, levels, points, badges, etc. It is mostly used for applications that involve work processes (Juliana et al., 2023). Based on Aparicio et al. (2021), gamification aims to boost users' positive motivations for their activities, thereby enhancing the quantity and quality of their outputs. Previous studies have highlighted gamification as a commonly employed approach for motivating users to participate in several types of activities (Hassan & Hamari, 2020). According to Dale (2014), trigger, motivation, and ability are the three pillars of gamification. The commonest features of gamified applications include rewards, points, badges, levels, and leaderboards (Aparicio et al., 2021). Previous studies highlight that by 2026, the gamification market is expected to grow to $38.42 billion from $10.19 billion in 2020 (Foroughi, 2023). Gamification helps enhance user efficiency and motivates them to engage in tasks in an enjoyable manner (Jesslyn et al., 2023).

Aydinliyurt (2018) highlights the advantages of gamification and how it enhances the core services of the organisation by adding additional features, letting them offer customers a brand-new experience. It assists organisations in offering and implementing solutions to problems confronting their customers (Salimon et al., 2021). The development and implementation of gamification must take into account the target group's incentives as well as the intended outcome. corresponds with fundamental business plans (Aydinliyurt, 2018). Gamification elements exert an impact on user behaviour within mobile applications, underscoring the significance and efficiency of integrating gamified components to enhance usage behaviour (Wut et al., 2021).

2.5.1. Gamification Elements

Users expect a certain gamification experience from a gamified system, but there isn't a well-defined set of game elements that make that happen (Garcia-Iruela et al., 2020). Games are intrinsically valuable to players because of their interactive and challenging nature (Aparicio et al., 2021). Effective design and implementation are critical for successful gamification. Gamification objects and mechanics are the two categories under which gamification design can be grouped (Tang & Zhang, 2019). Nicholson (2012) proposed a user-centric theoretical framework for meaningful gamification, highlighting the significance of taking into account users' intrinsic motivations, needs, and preferences. According to Law (2011), game mechanics and game dynamics are the two (2) important elements that are related to gamification. Based on Marque (2022), game dynamics, mechanics, and components are the three fundamental elements of game development and gamification study. Morschheuser et al. (2017) developed a method for designing gamification approaches and evaluating their practical utility. A game element can be classified into one of the following four categories: components, principles, dynamics, and aesthetics (Aparicio et al., 2021). Robson et al. (2015) proposed a framework using mechanics, dynamics, and emotions (MDE). This framework aims to highlight the relevance of emotional characteristics in motivating human behaviour. Users expect a certain gamification experience from a gamified system, but there isn't a well-defined set of game elements that make that happen (Garcia-Iruela et al., 2020). Games are intrinsically valuable to players because of their interactive and challenging nature (Aparicio et al., 2021). Effective design and implementation are critical for successful gamification. Gamification objects and mechanics are the two categories under which gamification design can be grouped (Tang & Zhang, 2019). Nicholson (2012) proposed a user-centric theoretical framework for meaningful gamification, highlighting the significance of taking into account users' intrinsic motivations, needs, and preferences. According to Law (2011), game mechanics and game dynamics are the two (2) important elements that are related to gamification. Based on Marque (2022), game dynamics, mechanics, and components are the three fundamental elements of game development and gamification study. Morschheuser et al. (2017) developed a method for designing gamification approaches and evaluating their practical utility. A game element can be classified into one of the following four categories: components, principles, dynamics, and aesthetics (Aparicio et al., 2021). Robson et al. (2015) proposed a framework using mechanics, dynamics, and emotions (MDE). This framework aims to highlight the relevance of emotional characteristics in motivating human behaviour.

2.5.1.1 Game Dynamics

Game dynamics is “users' behavioural patterns when they interact with game elements" (Suh et al., 2018, pp. 205). Findings from Suh et al. (2018) emphasise that gamification enhances user engagement by effectively meeting their psychological needs through game dynamics. Through the mobile application, the development of habits is affected by game dynamics (Çera et al., 2020). It shows how users engage with the experience based on the mechanics players utilise (Marques, 2022). The dynamics are the outcome interactions and behaviours among users incentivised by the components and mechanics outlined (Wood & Reiners, 2015). Constraints, emotions, narrative, progression, storyline, etc. make up the game dynamics (Wood & Reiners, 2015; Marques, 2022). According to Costa et al. (2017), relationships, constraints, and emotions makeup game dynamics. Gamification dynamics are difficult to predict (Broer, 2014).

2.5.1.2 Game Mechanics

Game mechanics are components of games that shape gameplay and impact player actions (Legner et al., 2019). Game mechanics define the rules and systems of a game, controlling player actions and interactions that shape core gameplay and provide methods for players to progress and achieve goals (Kim, 2015). They provide structure and guidelines for gameplay (Suh et al., 2018). Based on Webb (2013), the reason for using game mechanics is to attract and retain users in the consumer space. Where the game mechanics capture the benefits of the game while integrating those mechanics into the actual workflow. Challenges, competition feedback, rewards, transactions, etc. make up the game mechanics (Wood & Reiners, 2015; Marques, 2022). Points, levels, badges, and leaderboards are examples of game mechanics (Kim, 2015). According to Costa et al. (2017), examples of game mechanics are cooperation, challenges, resource acquisition, chance, and competition. According to Robson et al. (2015), game mechanics are constant and do change for players, and game mechanics are the foundational aspects of the gamified experience. Putri et al. (2019) identified feedback as the most suitable game mechanic for gamification in mobile payments. Game mechanics are relevant in gamification as they enhance user engagement, motivation, and enjoyment (Suh et al., 2018). They help in creating a sense of challenge, progression, and achievement (Kim, 2015).

2.5.1.3 Game Component

Game components refer to the elements of game design that are incorporated into a non-game context to enhance engagement and motivation (Wut et al., 2021). According to Costa et al.

(2017), game components include avatars, badges, levels, points, and quests. The game components in a gamified environment include points, badges, leaderboards, rules, and levels (Tolentino & Roleda, 2019). According to Jakubowski (2019), the most popular game components used on gamified platforms are leaderboards, points, badges, and levels. Different studies have given the same examples of game components and game mechanics. Game mechanics in gamification are badges and leaderboards (Morschheuser et al., 2017; Bevins & Howard, 2018). However, some studies state badges and leaderboards are game components (Martens & Mueller, 2016; Yang et al., 2017). The study integrates different types of elements from gamification and selects a few game elements to concentrate on within the time constraints of the research. This allows the researcher to accomplish the study's goals. The game elements selected for the study include badges, points, leaderboards, and levels.

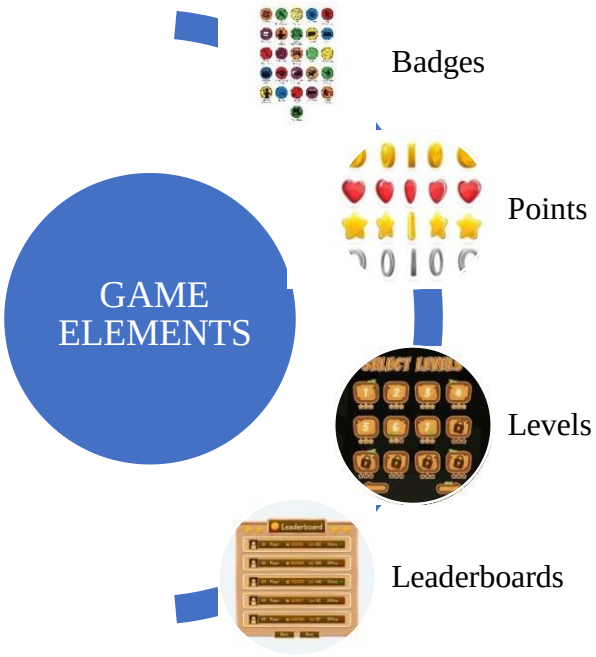

Figure 2. 1 Component of Game Elements

Rewards: Rewards are employed in gamification to encourage user involvement, inspire desired actions, and enhance user retention (Richter et al., 2015). Rewards include both tangible and intangible rewards (Meder et al., 2018). Rewards such as badges, points, and levels are commonly used elements in gamification (Mekler, 2016). They are incentives or benefits that are offered to individuals as they engage in gamified activities or complete specific tasks (Hwang & Choi, 2020). To motivate behaviour, rewards are commonly used in a gamified system (Lewis et al., 2016). It is also used to motivate user engagement and promote user

retention (Huang & Hew, 2015; Richter et al., 2015). Rewards can create a sense of competition among users, driving them to strive for more rewards and enhancing engagement (Hamari et al., 2014). Rewards in gamification play a significant role in motivating participants and driving their engagement (Attali & Arieli-Attali, 2015). According to Azmi et al. (2021), they are commonly used in e-commerce, motivating consumer behaviour and fostering engagement. It gives users a feeling of accomplishment and the drive to keep interacting with an e-commerce app (Meder et al., 2018). Lewis et al. (2016) encourages studies to evaluate the effects of gamified rewards on gamification across different populations and outcomes. Behl and Pereira (2021) encourage further research on integrating gamification rewards into diverse mobile applications.

Badges: Badges are commonly used elements in gamification and have been researched in various contexts (Hamari, 2017). It serves as a means of acknowledging users' accomplishments (Hamari et al., 2014). It is an intangible reward used in gamification strategies (Meder et al., 2018). Badges are given to users for accomplishing tasks or reaching milestones (Meder et al., 2018). It is a visual representation of the accomplishments or milestones (Hamari et al., 2014). Users may acquire badges through task completion, level achievement, or skill demonstration (Hamari et al., 2014). It is used to engage users and encourage specific behaviours (Azmi et al., 2021). Badges have been examined with gamification and their effect on user engagement and motivation (Mekler et al., 2017; Kyewski & Krämer, 2018). It is game elements in a gamified system that incentivise users to enhance user engagement and participation (Suh et al., 2018). For users to earn badges, they are encouraged to finish designated tasks or achieve particular goals. This leads to a boost in user activity (Hamari et al., 2014). It drives users to stay engaged with the gamified system (Hamari et al., 2014). In e-commerce, badges have a significant impact on consumer behaviour, particularly in terms of loyalty by encouraging consumers to repeat their purchases (Azmi et al., 2021).

Leaderboards: Leaderboards are commonly used in gamification (Jia et al., 2017). It has been extensively studied in the field of gamification (Jia et al., 2017; Landers et al., 2017; Ortiz-Rojas et al., 2019). This is a strategy of gamification employed to increase involvement by leveraging social comparisons (Jia et al., 2017). It displays and ranks the performance or achievements of individuals or teams in a competitive manner (Mekler et al., 2017). They provide a visual representation of how well participants are doing compared to others (Suh et al., 2018). It is often used to boost motivation and involvement (Fotaris et al., 2016).

Leaderboards facilitate social interaction by allowing users to compare their achievements and performance, thereby promoting a sense of community and friendly competition (Hamari et al., 2014). Social comparison on leaderboards may lead to a positive peer pressure effect, encouraging participants to equal or exceed their peers' performance (Landers et al., 2017). Leaderboards may motivate users to participate more by providing rewards and acknowledgement for their achievements (Suh et al., 2018). The display of rankings and scores on leaderboards generates a feeling of accomplishment and may motivate users to keep participating to enhance their position (Suh et al., 2018).

Points: Points are one of the basic game elements frequently utilised and extensively researched in gamification (Jakubowski, 2019). They are used to reward users for completing a task or achieving a milestone, or they can be given as a form of recognition for desired behaviours (Lewis et al., 2016). It can be accumulated over time and used to unlock additional features or rewards (Lewis et al., 2016). Points are used to track and measure users' progress and achievements within a gamified system (Hamari et al., 2014). It is the most popular game design element used in gamification systems (Jakubowski, 2019). Points can be used for user competition through leaderboards (Huang & Hew, 2015). Points in gamification can have a positive impact on motivation in various contexts (Attali & Arieli-Attali, 2015; Suh et al., 2018). Points can be used to motivate and encourage desired behaviours (Attali & Arieli-Attali, 2015). It contributes to users' sense of achievement and progress, motivating them to continue participating and striving for higher scores (Suh et al., 2018). Points in e-commerce can impact consumer behaviour, encouraging repeat purchases and fostering loyalty.

Levels: Levels in gamification refer to different stages or tiers that users can progress through based on their achievements and actions (Nah et al., 2014). They are the most common game elements in gamification (Mekler, 2016). They are designed to provide a sense of progression and achievement (Cheong et al., 2014). Users can achieve higher levels by completing specific activities or reaching certain milestones (Azmi et al., 2021). Levels serve as a form of reward to encourage players to continue using a gamified system (Kim, 2015). Levels can serve as a form of feedback indicating a user's current standing (Cheong et al., 2014). Levels contribute to the overall player experience in gamification and can enhance motivation and engagement (Mekler, 2016). The concept of progression and achievement motivates users to continue engaging with the gamified system (O'Donovan et al., 2013). Levels can foster motivation and engagement by providing challenges and excitement, encouraging individuals to strive for higher achievements (Cheong et al., 2014). The sense of unlocking new levels and facing new

challenges motivates players (Kim, 2015). This continuous engagement builds a long-lasting relationship between users and the application.

2.6. Trust

Trust plays a crucial role in decision-making (Yan et al., 2013). Trust is a complex concept that has been extensively studied in various disciplines, including economics, psychology, sociology, medicine, and information and computer science (Yan et al., 2013). It plays a vital role in research on information systems (Benbasat et al., 2010). Trust is important for building and sustaining relationships among people and institutions (Benbasat et al., 2010). Trust forms gradually over time as individuals or entities engage in ongoing interactions (Ashraf & Ahmad, 2022).

Trust refers to the willingness to accept a certain level of vulnerability or dependence on others based on the belief that they will act in a reliable and trustworthy manner (Chang et al., 2017). According to Gefen and Straub (2003), it refers to the belief or confidence that consumers have in their service provider or vendor. Furthermore, it is defined as the "confidence that the behaviour of another will conform to one's expectations and in the goodwill of another" (Choi et al., 2012, p. 15). In mobile applications, trust can be referred to as the user's confidence in the application's ability to perform as expected and protect their personal information (Yan et al., 2013). In a mobile payment application, trust is the belief and confidence users have in the dependability, safety, and integrity of the platform (Nelloh et al., 2019). Trust in technology pertains to an individual's belief in the dependability and safety of gadgets like smartphones and Internet payment platforms (Szumski, 2020). Trust in technology is essential, particularly in digital payment methods, where one must have confidence that their money is secure and transactions will proceed seamlessly (Szumski, 2020).

Continuous trust in a technology is the trust that forms over time due to ongoing interactions between users and the information system or e-vendor (Hoehle et al., 2012). The research is centred on continuous trust due to various factors. Initial trust is crucial when consumers buy products or services once, such as a car or TV. Continuous trust is highly applicable to recurring individual activities that occur over a prolonged time, like mobile banking or online shopping. In addition, people tend to change their initial evaluation of IS applications as they become accustomed to using them. This occurs during the post-acceptance stage when IS use becomes a regular part of their routine activity (Bhattacherjee, 2001). Continuous trust in technology is the optimal construct for examining consumers' intent to use gamified mobile payment apps.

Trust in mobile applications is categorised based on user behaviour, which includes using behaviour, reflection behaviour, and correlation behaviour (Yan et al., 2013). The relationship between information system acceptance and user satisfaction is mediated by trust (Kassim et al., 2012). Trust acts as an important predictor of user behaviour in adopting technology (Kassim et al., 2012). Consumers' subjective and hard-to-quantify trust in mobile apps has evolved and is impacted by a wide range of factors (Yan et al., 2013). The acceptance and use of mobile applications depend heavily on trust (Choi et al., 2012). It also affects the likelihood that users will stick with mobile payment services (Nelloh et al., 2019). Trust is a key factor in the success of online transactions, as it is essential for users to feel confident in sharing personal information and engaging in online activities (Benbasat et al., 2010). Positive experiences with a system can enhance trust over time (Hoehle et al., 2012).

Continuous trust in mobile banking applications is influenced by convenience and usefulness (Che et al., 2023). Usefulness, expectation confirmation, and positive experience are factors that influence continuous trust (Hoehle et al., 2012). Continuous trust is influenced by social influence (Pal et al., 2019). Several studies have been conducted in the area of trust and user adoption (Choi et al., 2012; Kassim et al., 2012; Nelloh et al., 2019). Prior research indicates that trust is linked to ongoing usage. In a study conducted by Hoehle et al. (2012), continuous trust is a key factor in users' ongoing intention to use Internet banking services. It's critical for maintaining a satisfying user experience and guaranteeing that citizens continue to use and benefit from government services (Almarashdeh, 2018). Yan et al. (2013) encourages studies to explore trust within the specific context of mobile applications, as existing studies have primarily focused on trust in organisational settings and electronic commerce.

2.7. User Retention

Maintaining a user base is essential to a mobile application's success and longevity (Aydinliyurt et al., 2021). Keeping a long-term relationship with customers is crucial, not only because they are more likely to be loyal users of the service, but also because keeping them around is far less expensive (Aydinliyurt et al., 2021). For mobile service providers to be successful, they must attract, retain, and guarantee users' continued usage (Yu et al., 2016). In this study, user retention, customer retention, continuance in use, continuance usage intention, and continuance intention will be used interchangeably.

The ability of a business or service provider to hold onto existing customers over time is referred to as user retention (Xiong et al., 2020). The intention or behaviour of users to stick

with a specific technology or service over time is referred to as continuation use (Alhassan et al., 2020). The continuous use of or intention to use mobile payment services are other names for it (Pal et al., 2019). Factors such as user satisfaction, enjoyment, and challenges affect user loyalty to mobile payment services. User loyalty is significantly impacted by the utility of mobile payment services (Xiong et al., 2020). According to Pal et al. (2019), convenience, security, and individual knowledge associated with mobile payment use are factors that impact the continued use of mobile payment technology. When used in conjunction with other strategies, gamification can significantly boost user satisfaction and engagement levels, which in turn can increase user retention in gamified mobile applications (Aydinliyurt et al., 2021). Prior research indicates that the retention of users in an information system is more important than their initial adoption (Foroughi, 2023).

2.8. Empirical Review of Mobile Payment, Gamification, User Trust and Retention

The expansion of mobile payment methods is projected to persist as mobile banking and contactless payment methods become more prevalent (Bezhovski, 2016). Despite the numerous platforms built on them, mobile technologies still face limitations such as small screens, inconvenient input, and delayed responses (Zhou, 2013). The unique and distinct nature of mobile payment arises from the challenges it presents, which set it apart from other types of applications. Additionally, its uniqueness stems from factors such as convenience, flexibility, low transaction and time costs, and its potential to replace traditional means of payment (Wang et al., 2019). In addition to location-free access, timely financial resource contact, several purchase options, and a simple cash payment substitute, it offers convenience (Bezhovski, 2016).

Misapplication of mobile payments has the potential to present a genuine risk to personal privacy (Sahnoune et al., 2015). Based on perceived utility and ease of use, consumers in developing economies are more likely to accept mobile payment services (M. Hassan et al., 2022). Technological advancements, environmental influences, and individual behaviour are some of the factors influencing the intention to adopt mobile payments (Fadhil & Subriadi, 2023). The long-term viability of an information system and its prosperity depend on its continued usage rather than its first-time adoption (Foroughi et al., 2019). When there is a higher rate of discontinuance by users, businesses lose much more compared to a lower initial adoption rate (Aydinliyurt, 2018). To find out why American consumers use mobile payment systems, a study was done (Jung et al., 2020). The study found that performance expectations, social influence, compatibility, expertise, and trust all had an impact on customers' intentions

to utilise these services. The study promotes additional research on the current status and acceptance of mobile payment apps in different populations and regions to fully comprehend their values and potentials in various contexts.

There is a positive correlation between continuation intention and perceived usefulness, a post-adoption construct (Talwar et al., 2020). In a mobile payment application, the effects of convenience and reflection are more pronounced in terms of future use intention (Pal et al., 2021). Strong determinants of the intention to continue using electronic money applications are perceived usefulness, satisfaction, and trust (Sasongko et al., 2022). The factors that impact the intention to continue using a mobile payment technology include cost, risk, compatibility, ease of use, usefulness, and convenience (Humbani & Wiese, 2019). The adoption of mobile payment services is determined by behavioural beliefs, social influences, and personal traits, which can also have an impact when the service is used after it has been adopted (Yang et al., 2012). Humbani and Wiese (2019) encouraged further studies to explore factors that may influence continuance intentions, such as usefulness, convenience, cost, and risk, across different cultures in Africa. Li and Liu (2014) looked at the variables affecting e-service users' post-adoption behaviour, particularly their intention to continue using the service and their word-of-mouth behaviour. The research findings indicate that satisfaction and perceived usefulness have a positive correlation with the intention to continue using e-services. The authors, however, advocated for the need for future studies to investigate the role of trust in shaping users' continuance intentions.

There is still a lot to learn about gamified mobile payment apps (Putri et al., 2019; Dzandu et al., 2022). Points, levels, and leaderboards contribute to students' extrinsic motivation (Zainuddin et al., 2020). Game elements in gamification platforms can impact users' motivation, engagement, and social influence (Zainuddin et al., 2020). According to Dzandu et al. (2022), it has been demonstrated that social influence is a reliable indicator of attitudes, user engagement, customer satisfaction, and loyalty. In the context of gamification, the study also highlights the effect that social influence within social circles has on people's adoption of gamified mobile money payments.

Aydinliyurt (2018), investigated the psychological motivations that influence individuals' intention to continue using information systems, specifically mobile applications with gamified features. Based on the study's findings, users' commitment to using gamified mobile apps is affected by rewards, reputation, social presence, and perceived enjoyment. However, the author

posits that further investigation is required to explore the competitive dynamics and social recognition elements of gamification. This includes examining the impact of scoreboards and rankings on user behaviours and their need for social recognition. According to Jesslyn et al. (2023), it has been emphasised that the existing research is scarce when it comes to investigating the correlation between gamification and user retention, with trust serving as a mediating factor. Therefore, encourage scholars to undertake studies in that regard.

The importance of consumer trust in mobile payment systems surpasses that of other factors that affect the adoption of technology (Chandra et al., 2010). When it comes to using mobile payment platforms, trust is a major factor. Several factors affect customers' trust in the payment platform, such as perceived usefulness, ease of use, personal attitudes, and knowledge (Wang et al., 2018). Kaewkitipong et al. (2022), conducted a study to investigate whether Human-Computer Interaction (HCI) or trust is relevant in retaining users of mobile payment services. From the findings, trust had a slightly higher influence than HCI. The acceptance and continuous use of mobile payment apps depend heavily on trust (Olaleye et al., 2019). Trust, as a mediating variable, can increase user retention (Zhou et al., 2018). Research has indicated that a gamified app's user retention may be affected by trust (Jesslyn et al., 2023). Poromatikul et al. (2019), conducted a study on a mobile banking app and found that trust and satisfaction played a significant role in ensuring continued intention to use the mobile banking app. Sreelakshmi and Prathap (2020), studied and discovered that, given that a third party is involved in the financial transactions in a mobile transaction, trust is thought to be a strong predictor of adoption and continuance intention, which leads to user retention. It was recommended that researchers include trust in mobile payments in their models of inquiry related to their study. Therefore, more research is required. Initial trust has been extensively studied at the expense of continuous trust, as it has been less frequently used in IS research (Hoehle et al., 2012; Ashraf & Ahmad, 2022). According to Zhou (2014), the study's goal was to find out what influences' consumers' initial trust in mobile payments and how that affects their adoption and usage of these services. Initial trust in mobile payment is influenced by factors like ubiquitous connection, effort expectancy, structural assurance, and trust in online payment, according to the findings.

There has been a successful implementation of mobile payment applications in Africa, which has resulted in several studies in that regard (Soutter et al., 2019; Dzandu et al., 2022; Franque et al., 2023). However, in Sub-Saharan Africa, few studies have been conducted (Boateng, Sarpong, et al., 2019). In Africa, emphasis has been placed on how mobile payment apps can

be used to provide financial inclusion to deserving populations (Lashitew et al., 2019; Mogaji et al., 2021). There is very little literature on gamification in developing nations. A majority of the few studies on the subject have come from developed countries, at the expense of sub-Saharan Africa (Humbani & Wiese, 2019). Countries that are predominant in the study of gamification include the USA, Spain, Germany, Canada, and Brazil (Aparicio et al., 2017). Previous studies have highlighted how gamification is fairly new in Africa despite the presence of existing literature. Underdeveloped research has been done in Africa on the gamification of mobile payment services (Putri et al., 2019; Dzandu et al., 2022). In Ghana, the study of gamification in mobile payment applications is limited (Dzandu et al., 2022). According to Dzandu et al. (2022), gamification can be used to create customers in a mobile payment application. Scholars in their study have recommended that their studies be limited to only the study area and encourage the same studies to be conducted in other areas (Tyni et al., 2022). As a result, more research is required, particularly in Ghana and other African countries, on gamification in mobile payment apps.

Research on mobile payment has mostly focused on the early adoption and usage of mobile payment, but the literature review for this study has identified a few gaps that require attention (Zhou, 2014; Phonthanukitithaworn et al., 2016; Gao & Waechter, 2017). As a result, there is a paucity of literature on post-adoption studies of mobile payments (Zhou, 2014). Very few studies were carried out outside of China on post-adoption behaviour towards mobile payment systems (Singh, 2020). Developed countries have given academic attention to consumers' continued use of information technologies, including mobile payment applications, but not in developing countries (Humbani & Wiese, 2019).

Research on the post-adoption of mobile payment apps in Ghana and throughout Africa is lacking (Hubani & Wiese, 2019; Dzandu et al., 2022). Dlodlo (2014), conducted a post-adoption study on mobile payment applications in South Africa. The study used the IS model. In the study, trust was measured, and it was found that the higher the trust, the higher the desire to continue using mobile payment services. In Ghana, research has concentrated on the initial adoption of mobile applications at the expense of post-adoption (Boateng, Afeti, et al., 2019). With a focus on public servants, merchant adoption of these apps as well as on SMEs (Narteh et al., 2017; Boateng, Afeti, et al., 2019; Kwabena et al., 2021; Akanferi et al., 2022). Even though the early adoption of mobile payment apps is relevant, businesses profit more if customers stick with the system (Foroughi et al., 2019). Further research on the post-adoption of mobile payment apps is therefore necessary.

The review of the literature showed that adoption theories like TAM and UTAUT have been heavily relied upon in numerous studies on the adoption of mobile applications (Appiah-Gyamerah & Amoah, 2014; Sinha et al., 2018; Al-Okaily et al., 2019; Patil et al., 2020). However, there is a limitation to the use of these theories in the study of motivation in human behaviour. Using TAM and UTAUT to study continuance intention in mobile payment apps comes with limitations that may lead to misunderstandings and misapplications of these theories (Bivar et al., 2021). TAM overlooks external factors like social influence and cultural differences, assuming users are rational decision-makers. It may not fully consider the emotional and subjective aspects of technology adoption (Rauniar et al., 2014).

Lule et al. (2012) applied TAM to examine M-banking adoption in Kenya. It focused on evaluating the M-Kesho application. The attitudes of customers towards mobile banking were largely influenced by factors such as perceived ease of use, perceived usefulness, perceived credibility, and perceived self-efficacy. However, the study recognised a limitation of TAM, as it was originally designed for organisational contexts and may not be as suitable for studying mobile-based technology in everyday life contexts. Social exchange theory has been extensively researched across different disciplines, such as social sciences, supply chain and marketing, tourism, online shopping, and workplace behaviours (Ertürk, 2014; Urbonavicius et al., 2021; Luqman et al., 2023). Nonetheless, there is a lack of understanding regarding the use of social exchange in mobile applications. Tan et al. (2018), used social exchange theory to investigate the impact of privacy concerns on the acceptance of MSN apps. Li (2015), examined the variables influencing information sharing in virtual communities using social exchange theory. The objective was to determine the influence of shared willingness, trust, reciprocity, and altruism on knowledge sharing. The study revealed that members' willingness to share was the primary factor influencing knowledge sharing in virtual communities, surpassing trust, reciprocity, and altruism.

2.9. Social Exchange Theory (SET)

Researchers studying the adoption of mobile payment systems have frequently employed several theories, most notably TAM (the most popular theory) and the Expectation Confirmation Model (ECM). Predicting adoption and use of technology has been done using the UTAUT/UTAUT2 model. However, the relevance of these theories in the field of IS cannot be underestimated. Scholars have criticised TAM for being overused in studying new technology adoption (Suroso et al., 2017). According to Bagozzi (2007), TAM lacks a unified approach to understanding and explaining technological adoption because perceived ease of

use and perceived usefulness, which are key variables in the theory, may not adequately analyse user behaviour. Also, it does not incorporate new variables grounded in social behaviour research. Hence, it is important to adapt other theories that can be used to study user behaviour appropriately in future studies.

In this study, the fundamental principles of SET were applied. It was formulated by George Homans. The theory is based on research and studies conducted in various behavioural sciences such as sociology, psychology, anthropology, and economics (Varey, 2015). Social exchange theory examines interactions as exchanges where individuals seek rewards while minimising costs (Homans, 1958). It provides a framework for understanding human behaviour in social interactions (Cook et al., 2013). It is one of the main theories used to explain human motivation (Li, 2015). Research suggests that individuals are motivated to take actions they think will be advantageous to them or satisfying. This implies that individuals have expectations about the value or benefit they will gain from their actions in social exchanges.

Rewards, cost, reciprocity, trust, commitment, and fairness are the variables of social exchange theory (Homans, 1958). The primary variables of social exchange theory include cost and rewards, as well as reciprocity, fairness, trust, and rewards (Cook et al., 2013). This study included additional variables not explicitly part of SET to help achieve its purpose. The main variables adopted by the study include reciprocity, trust, and reward. The study modifies the social exchange theory by incorporating expectation, utility, and social influence. However, studies have highlighted the relevance of social influence, utility, and expectation as important variables in social exchange theory (Cook et al., 2013; Cropanzano et al., 2017). Expectation, utility, and social influence serve as pivotal factors in this research, aiding in the achievement of its objectives. The significance of these elements lies in the correlation between social influence and individuals' ability to impact the behaviours of others (Cook et al., 2013). Understanding social influence is vital in comprehending the adoption and utilisation of technology (Venkatesh & Morris, 2000). Users' decisions to stick with a technology can be influenced by other people's thoughts and actions (Graf-Vlachy et al., 2018); therefore, technology plays a significant role in encouraging people to embrace and use it (Homburg et al., 2010). Hence, a comprehensive understanding of social influence is crucial to effectively fostering technology adoption and sustained usage. Expectation, as a variable, assumes a pivotal role in the attainment of the study's aims and objectives. Expectation proves to be a critical component, particularly within the realm of user engagement with technology (Cropanzano et al., 2017). It serves as a significant factor influencing the success of an

exchange relationship (Varey, 2015). The expectations of individuals can impact their behaviour concerning the acceptance and utilisation of technology (Venkatesh & Morris, 2000). Users with higher expectations of technology benefits exhibit greater engagement and retention. Thus, the relevance of expectations within the scope of this study is evident. Utility assumes a central role in motivating individuals. According to Cook et al. (2013), utility plays a crucial role in social exchange theory. The concept of utility elucidates the rationale behind individuals' choices and decisions. Understanding the utility individuals derive from social exchanges proves important in predicting and explaining their behaviour (Cropanzano et al., 2017). Additionally, it plays a crucial role in retention and trust. Individuals are more inclined to trust and continue engaging in relationships that provide substantial levels of utility. Therefore, the relevance of utility to this study is evident.

This study uses SET to comprehend motivation in a mobile payment application that has been gamified. Motivation is essential for keeping people engaged in social interactions (Cook et al., 2013; Fauziyah et al., 2023). The relevance of motivation to this study is to ascertain how game elements can motivate users of mobile payment applications to continue using the application. In SET, individuals are driven by the anticipation of receiving a reward when engaging with an application. The study provides insights into how reciprocity, reward, and expectation can drive motivation. SET is extensively utilised and implemented by numerous scholars across different IS disciplines. It has been applied by scholars to understand the concept of knowledge sharing in IT (Wu et al., 2006; Shiau & Luo, 2012; Tsai & Cheng, 2012; Cook et al., 2013; Yan et al., 2016). It has also been adopted to understand perceptions in customer relationship management adoption (Gefen, 2002). In gamification, this theory has also been adopted (Lambie, 2020; Leclercq et al., 2020). Several domains have studied SET, but there is a lack of research applying it to mobile payment and gamification.

2.10. Theoretical Justification

This study adopts social exchange theory as it focuses on examining the determinants that influence the motivation and decision-making processes of individuals concerning their choices (Cropanzano et al., 2017). Also, it provides the central lens through which the study can understand the complexity of user behaviour based on the principles of exchange and rewards (Mighfar, 2015). It has a significant influence on behavioural intention (Cook et al., 2013). The theory focuses on factors influencing individuals' behaviour and intentions. Understanding the influence of SET on behavioural intention is crucial in assessing individuals’

motivation, which is the aim of the study to determine the purpose of users continuing to use mobile payment applications. Furthermore, the theory is highly relevant in assessing long-term relationships (Cook et al., 2013). It provides a framework that allows the study to understand how individuals evaluate the benefits or losses of using a gamified mobile payment application. Thus, the incorporation of rewards as a game component has the potential to augment a long-term relationship with a mobile payment application. Moreover, the relevance of SET in the study is the crucial role trust plays in the theory. It provides the framework to help the study explore how rewards from gamification interact with trust to influence user retention. It provides a foundation for the study of user engagement and retention, as users may engage and retain a technology when they expect to receive certain benefits from using it. Because it will guide the study in achieving its goals, this theory is significant to the study.

2.11. Conceptual Model

Figure 2.1 illustrates the complex relationships influencing user retention in mobile payment applications, with trust serving as a key mediating variable. The model suggests that reward, expectation, social influence, reciprocity, and utility (denoted as H1 to H5) directly impact trust. Trust, in turn, mediates the effect of these factors on user retention (H6), meaning that the influence of these independent variables on user retention is channelled through trust. The diagram underscores that changes in these factors are expected to alter trust levels, which subsequently affect user retention.

Age and education are the moderating variables in the figure. In this study, it influences the relationship between the independent variables and the mediating variable. The diagram shows how age affects the independent variables' influence on trust. Same with education.

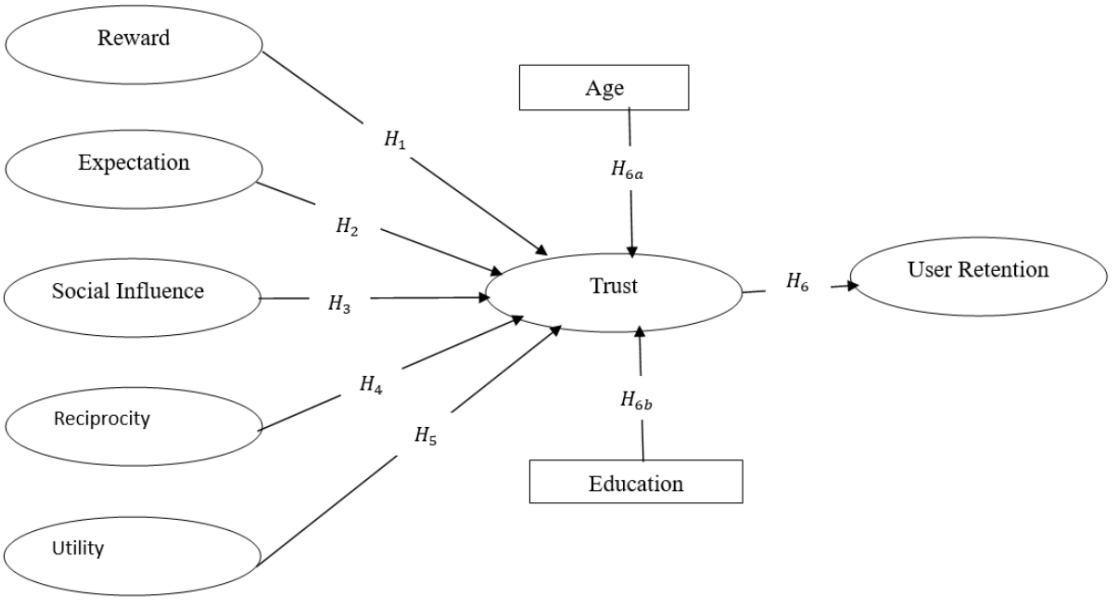

Figure 2. 2 Research Model for the study

2.12. Hypothesis Formulation

The hypotheses for this investigation were derived from the research questions using the theory adopted to guide the study. The investigation employs variables that have been linked in previous studies and also variables that are integral to the adopted theory to accomplish the main aim of the study. This study proposes that variables such as reciprocity, rewards, expectations, utility, and social influence within SET motivate individuals to engage in social exchanges. The study proposes that

2.12.1. Effects of Reward on Trust in a Gamified Mobile Payment Application

People are driven to act in ways that maximise benefits and minimise costs, according to this theory (Homans, 1958). Individuals participate in social interactions, anticipating reaping rewards and avoiding punishment for their actions. These benefits may take the form of social or financial gains (Cropanzano et al., 2017). Rewards may be both material and immaterial, among other types (Homans, 1958). Rewards play a crucial role in motivating and influencing user behaviour in the context of gamification (Mauroner, 2019; Zhao & Guo, 2019). Users of mobile payment applications are more interested in rewards (Aydinliyurt et al., 2021). Gamification uses rewards such as levels, points, and badges to enhance user engagement and motivation (Richter et al., 2015). Badges are used in gamified mobile apps to boost motivation through a sense of accomplishment and advancement (Bitrián et al., 2021). Levels in

gamification apps offer users a feeling of mastery and competence (Van der Lubbe et al., 2023). These rewards serve as a motivating factor for users to enhance their engagement levels on digital platforms (Anderson et al., 2013). The significance of earning a badge depends on its rarity, which influences levels of trust (Easley & Ghosh, 2016). Gamification elements can enhance trust in mobile applications (Hwang & Choi, 2020). Based on the SET, this means that once users are motivated by rewards, they will continuously engage with the mobile payment application. Gamification has the potential to enhance trust levels by fostering perceptions of equity and openness within the incentive structure (Rojo et al., 2019). According to Aparicio et al. (2021), the study aimed to understand the impact of gamification and reputation on repurchase intention in e-commerce. Findings from the study highlight a positive correlation between trust and rewards. Nobre and Ferreira (2017) examined the impact of consumers' motivations on engagement and brand experience based on brand-gamified experiences. According to the findings, trust and rewards are positively correlated. Based on these findings, the hypothesis is as follows:

H_1: Rewards positively affect trust in mobile payment applications.

2.12.2. Effects of Expectations on Trust in a Gamified Mobile Payment Application

Individuals have certain expectations about the outcomes they will receive from their social interactions. Expectations play a crucial role in SET. SET emphasises the role of expectation in motivating individuals to engage in social interactions and relationships (Homans, 1958). It suggests that individuals have expectations regarding the rewards or benefits they will receive from their social interactions, which influence their decision-making processes (Cook et al., 2013). Expectation plays a crucial role in shaping human behaviour. By introducing game-like elements, goals, or structures into non-gaming contexts and offering instant rewards, gamification shapes users' expectations and shapes their behaviour (Lambie, 2020). These behaviours can influence an individual's decisions to continue or terminate relationships (Cook et al., 2013). When using gamified applications, users expect specific results, such as intrinsic satisfaction (Bitrián et al., 2021). The foundation of trust is the conviction that others will behave ethically, and people are more inclined to view others as trustworthy when they have high expectations (Cook et al., 2013). Trust in social exchange relationships can be strengthened by having optimistic expectations about the actions and motives of others (Cropanzano et al., 2017). Ease of use positively affects trust in mobile payment systems (Jimenez et al., 2016). Security in mobile payment systems significantly affects trust in mobile payment systems (Sleiman et al., 2021). Enjoyment positively affects trust in a mobile payment

system (To & Trinh, 2021). Kim (2012), conducted a study to explore the relationship between trust and satisfaction in electronic commerce. The findings of the study suggest trust and expectation are positively correlated in the context of electronic commerce. Liu (2019), the study sought to assess the role of expectation, trust, and social status in influencing charitable giving. Based on these studies, the study hypothesises that:

H_2: Expectation positively affects trust in mobile payment applications.

2.12.3. Effects of Social Influence on Trust in a Gamified Mobile Payment Application

Social influence refers to how individuals are influenced by others in their attitudes, beliefs, and behaviours (Cialdini & Goldstein, 2004; Hsu & Lin, 008). It plays a significant role in various contexts, including technology adoption and acceptance (Venkatesh & Morris, 2000; Homburg et al., 2010; Vannoy & Palvia, 2010; Graf-Vlachy et al., 2018). Social influence can enhance trust in social exchange relationships (Cropanzano et al., 2017). Within a gamified application, social influence might arise from the opportunity to compete with other users. Users may become more trusting of an application when they witness other users interacting with it and profiting from its gamification features (Bitrián et al., 2021). It plays a significant role in motivating users in gamification as it shapes their behaviour and interaction within a system (Hamari, 2015).

Leaderboards are a common gamified element used to enhance user engagement and motivation by promoting competition and social comparison (Hall & Toke, 2018; Ortiz-Rojas et al., 2019). It can also create a sense of community (Ortiz-Rojas et al., 2019). It can potentially exert influence on the level of trust present in digital communities (Leung, 2019). When users see others engaging with the app and benefiting from the gamification elements, it can increase their trust in the app (Bitrián et al., 2021). Peer recommendations and shared experiences influence technology acceptance and usage behaviour. This impacts users' perceptions of trust and reliability in mobile payment applications (Kaewkitipong et al., 2022). Abbas Naqvi et al. (2020), The study aimed to measure the impact of social influence processes on intentions to use social networking sites (SNS) sustainably. Results from the study suggest a positive correlation between social influence and trust. Mkhize (2023), the study aimed to explore the link between health information exchange and social trust, particularly focusing on how social trust influences health information exchange. The results highlight the significant influence of social influence on social trust in SNSs. Based on these studies, the study hypothesises that:

H_3: Social influence positively affects trust in mobile payment applications.

2.12.4. Effects of Reciprocity on Trust in a Gamified Mobile Payment Application

Reciprocity is a fundamental construct in social exchange theory. It refers to the mutual exchange of benefits or favours between individuals. In reciprocity, individuals engage in social exchange with the perception and anticipation of receiving something in return. It is one of the most significant factors that drive motivation (Homans, 1958). It plays a significant role in gamification, influencing how individuals engage with game-like systems and motivating them to participate actively. For example, users may feel motivated to engage with a gamified service if they receive recognition from others. Hence, it creates a sense of reciprocity. It plays a crucial role in elucidating the impact of gamification on customer retention.

There is research to back up these findings in which reciprocity plays a role in customer retention in gamified loyalty programs, as consumers feel obligated to continue their engagement in return for the rewards received (Hwang & Choi, 2020). Reciprocity can build long-term trust (Haynes & Yoder, 2024). It can influence trust (Molm et al., 2007). It also plays a key role in enhancing trust and maintaining social interactions (Cook et al., 2013). That is, as individuals experience positive reciprocity, where their actions are reciprocated by the gamified mobile payment application, it can affect their trust in these mobile payment applications. In Hwang and Choi (2020), the long-term effects of gamification on consumer behaviour and retention were not examined.

Sánchez-Franco and Roldán (2015) conducted a study to identify the primary factors influencing perceived community support for online social services. The study found that reciprocity online affects trust and community support, encouraging participation in activities. Yang (2019) conducted a study to explore how perceived social distance impacts electronic word-of-mouth (eWOM) sharing intentions in social commerce settings. Findings from the study indicate that reciprocity positively affects trust in social commerce contexts. Lee et al. (2019), conducted a study to analyse the factors influencing the adoption of financial technology from the perspectives of both consumers and retailers. The study highlights how reciprocity enhances trust in mobile payment services. Gharib et al. (2020) researched to examine how reciprocity and trust affect eWOM participation in online review communities. Findings underscore that reciprocity positively affects trust in online review communities. Based on these results, this study hypothesises that:

H_4: Reciprocity positively affects trust in mobile payment applications.

2.12.5. Effects of Utility on Trust in a Gamified Mobile Payment Application

Social exchange theory focuses on the concept of utility. Utility is one of the main factors in motivating individuals to engage in behaviours (Homans, 1958). Utility refers to the value or satisfaction that individuals derive from consuming or using a particular good or service (Cook et al., 2013). It refers to the effectiveness and convenience of participants when using their own mobile devices (Walsh & Brinker, 2016). The greater the value of the outcome for an individual, the more likely the action is to be carried out (Wang et al., 2018). The output of utility is pleasure and happiness for the parties involved (Broome, 1991). Therefore, it enhances the general quality of life for those participating. In mobile payment applications, utility refers to the features and functionality that provide convenience and ease for users when making a transaction (Nimmi & Janet, 2018). Utility is key to the adoption of mobile technology (Teng et al., 2009). According to Walsh and Brinker (2016), convenience and effectiveness are factors in utility that can enhance the trust of users in a product. Convenience is a crucial factor that enhances the utility of mobile payment technology (Pal et al., 2019). Usefulness and trust are vital elements in the decision to continue using mobile payment services (Chen & Li, 2017; Talwar et al., 2020). Utility, in terms of convenience, is crucial for building trust in brand apps (Lambie, 2020). Utilities can enhance trust in mobile payment applications (Wang et al., 2019). Chen et al. (2021), the main goal of the study was to examine the relationship between trust and corporate social responsibility (CSR) from both the expected utility and social normative perspectives. Bitkina et al. (2020), the goal of the study was to explore users' trust perception, task complexity, and application performance when utilising AI technology. The study emphasises a favourable connection between utility and trust. Due to the relevance of convenience and usefulness as attributes of utility, the study evaluates utility based on these attributes. Based on these findings, the hypothesis states that:

H_5: Utility positively affects trust in mobile payment applications.

2.12.6. Effect of Trust on User Retention in a Gamified Mobile Payment Application.

Trust is recognised as a key factor in enabling user behaviour (Zhou, 2013; Kaewkitipong et al., 2022). It is an important determinant of user retention (Zhou, 2013; Aparicio et al., 2021). Trust is a crucial factor in social exchange theory (Cook et al., 2013). Trust is essential for retaining users in social exchange theory, serving as the foundation for successful exchange relationships (Varey, 2015). Studies indicate that gamification plays a part in fostering user trust in mobile payment apps, thereby aiding in user retention (Hall & Toke, 2018; Aparicio et al., 2021). Studies have shown a positive relationship between trust and user retention in mobile

payment applications (Gao & Waechter, 2017; Nelloh et al., 2019; Kaewkitipong et al., 2022). Establishing trust with users is crucial for service providers to maintain current users and entice potential ones (Wang et al., 2019). Trust is important in virtual communities, knowledge management, and IS adoption, impacting user behaviour and system retention (Gefen & Ridings, 2002). Kim (2012), a study was conducted to examine how online consumer trust impacts expectations, satisfaction, and post-experience in electronic commerce. Findings of the study highlight that trust has a positive impact on user retention in electronic commerce, ultimately influencing their intentions to repurchase. Based on these studies, the study hypothesises that:

H_6: Trust positively affects user retention in mobile payment applications.

When it comes to technology adoption decisions, age can operate as a moderating variable for trust, affecting how people view and depend on trust factors. Prior studies have indicated that an individual's age can positively influence trust in adopting technology (Liébana-Cabanillas et al., 2014; Acheampong et al., 2018; Merhi et al., 2021). Research indicates that various age groups may interpret trust differently depending on their experiences and level of technological literacy (Shao et al., 2019). Older individuals can have a stronger belief in the integrity and ability of service providers, leading to higher levels of trust in mobile payment services (Sleiman et al., 2021). According to Acheampong et al. (2018), younger users tend to have higher trust levels in new technological systems compared to older users. This study suggests that age plays a pivotal role in influencing a user's trust and intention to persist in utilising a mobile payment service, ultimately impacting user retention. Thus, the study hypothesises that:

H_{6a}: Age plays a significant role in moderating the correlation between trust and user retention in mobile payment usage.

Based on prior research, education plays a vital role in moderating the connection between trust and user retention in mobile payment usage (Shao et al., 2019; Lisana, 2024). Individuals' level of education can influence how one perceives trust in mobile platforms (Shao et al., 2019). Higher education levels can enhance comprehension of technology and its security features, thereby influencing perceptions of trust. An individual's educational level influences how trust affects one's intention to adopt m-payment systems, highlighting the importance of education in shaping people's behaviour (Park et al., 2019). Limited studies have explored the moderating role of education in mobile payment adoption (Park et al., 2019; Lisana, 2024). Therefore,

studies are needed to evaluate the impact of education on trust and user retention. The study hypothesises that:

H_{6b}: Education substantially moderates the correlation between trust and user retention in mobile payment usage.

2.13. Chapter Summary

This chapter provides a thorough review of how gamification influences user trust and retention in mobile payment apps. It clarifies key terms, highlights research gaps, and establishes a foundation for understanding the connections between these factors. It also outlines a theoretical framework to explore how gamification, through trust, influences user retention in mobile payment apps. It employs Social Exchange Theory, considers age and education moderators, and proposes hypotheses suggesting positive relationships between gamification, trust, and user retention.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Chapter Overview

The preceding section deliberated on the theories, constructs, and hypotheses that guided the study in attaining its objectives. Furthermore, it presented the conceptual framework of the study. This chapter outlines the research methodology employed in the study, detailing the research paradigm, development of questionnaires, survey design, sample size, sampling techniques, data types, data collection process, and analysis procedures. Ethical considerations are also discussed.

3.2. Research Paradigm

A research paradigm refers to a researcher's worldview or set of shared beliefs that shape their interpretation of research data (Kivunja & Kuyini, 2017). It includes ontological, epistemological, axiological, and methodological perspectives (Abdulkareem et al., 2018). Epistemology focuses on how knowledge is acquired and what constitutes valid knowledge (Kankam, 2019). Understanding the beliefs of the researcher regarding knowledge sources, knowledge acquisition processes, and knowledge evaluation criteria is involved in this (Abdulkareem et al., 2018). It guides the researcher in selecting appropriate methods and approaches for data collection and analysis (Aliyu et al., 2015). Ontology pertains to the researcher's understanding of the nature of reality and truth (Abdulkareem et al., 2018). It raises questions about the nature of reality, whether it is objective or subjective (Kivunja & Kuyini, 2017). It influences the selection of research topics, the formulation of research questions, and the interpretation of findings (Aliyu et al., 2015). Axiology is the study of values and ethics. It investigates inquiries concerning what is viewed as good, right, or valuable in a specific context (Al-Ababneh, 2020). It helps researchers recognise their own biases and positionality, ensuring transparency and integrity in research (Aliyu et al., 2015). Methodology refers to the systematic approach and techniques used in research to gather and analyse data (Khatri, 2020). It includes the research design, methods, approaches, and procedures employed to investigate a research problem (Khatri, 2020). It ensures the reliability and validity of research findings (Aliyu et al., 2015). Pragmatism, positivism, and interpretivism are the three research paradigms used in information system research (Kankam, 2019).

Positivism is a research paradigm that prioritises the examination of observable and measurable phenomena using scientific and empirical methods (Aliyu et al., 2014). It assumes reality exists

independently of the observer and can be understood through empirical investigation (Aliyu et al., 2014). Positivist research methods, such as experiments and surveys, allow for generalisation and prediction of phenomena (Aliyu et al., 2014). It focuses on objective facts and data (Alharahsheh & Pius, 2020). It relies heavily on quantitative methods to collect and analyse data (Abdulkareem et al., 2018). Positivist research is significant for clarifying conceptual definitions, formulating hypotheses, and validating them with empirical evidence (Shanks, 2002). Interpretivism is a research paradigm in philosophy that contends that knowledge and truth are shaped by culture and are subjective, depending on the experiences and perceptions of individuals (Ryan, 2018). Interpretivism emphasises the collection and interpretation of qualitative data (Alharahsheh & Pius, 2020). It uses qualitative research methods such as interviews, observations, and textual analysis (Weber, 2004). Researchers use interpretivism to explore complex social phenomena (Weber, 2004). It can capture rich and nuanced data (Weber, 2004). It emphasises that researchers cannot detach themselves from their values and beliefs, thereby impacting data collection, interpretation, and analysis (Ryan, 2018). An important aspect of pragmatic philosophy is emphasising the practical implications of ideas and actions (Morgan, 2014). Pragmatism is evident in research approaches using mixed or multiple methods (Kaushik & Walsh, 2019). Pragmatists recognise that reality is constantly changing and that actions have the power to shape experience and change existence (Kaushik & Walsh, 2019). It focuses on the practical consequences of ideas (Morgan, 2014). When researchers wish to combine qualitative and quantitative approaches to address research questions effectively, a pragmatic approach is appropriate, as is when researchers wish to promote methodological pluralism, which is often associated with better results in research (Johnson & Onwuegbuzie, 2004). The study follows a positivist paradigm among various research paradigms due to its emphasis on an objective reality. These realities can be measured and observed through the use of statistical methods and quantifiable data. The study aimed to identify relationships between gamification, user trust, and user retention. Additionally, it was adopted by the study to minimise bias in the study. This paradigm allowed the researcher to dissociate herself from the study. Therefore, it enhances the reliability and validity of the study's results. Furthermore, the study was interested in testing hypotheses. Therefore, the relevance of positivism to the study.

3.3.Research Methods

Research methods encompass specific techniques and procedures for collecting and analysing data in a systematic manner to address research questions (Singh, 2015). Selecting a research

methodology entail taking into account several variables, including the nature of the research question, the kind of data required, the resources at hand, and the preferences and experience of the researcher (Migiro & Magangi, 2011). According to Migiro and Magangi (2011), there exist three acknowledged methodologies for carrying out research, namely qualitative, quantitative, and the mixed-method approach. Quantitative study is a research method that concentrates on gathering and analysing numerical data to understand and explain phenomena (Choy, 2014). It is often associated with the positivist paradigm, which emphasises objectivity, measurement, and generalisability (Stockemer et al., 2019). Examples of quantitative methods include surveys, experiments, correlation, descriptive analysis, statistical analysis of existing datasets, and mathematical modelling (Migiro & Magangi, 2011; Choy, 2014; Stockemer et al., 2019). It provides precise and measurable data that can be analysed statistically, and it also allows for the generalisability of findings to larger populations (Choy, 2014). Hypotheses are generated and tested using this method (Boaduo, 2011).

A qualitative approach involves using non-numerical data to understand and interpret social phenomena (Hollstein, 2011). Qualitative research is guided by a constructivist or interpretivist research paradigm (Hollstein, 2011; Kahlke, 2014). It seeks to uncover the subjective meanings and experiences of individuals (Gerring, 2017). An ethnographic study, a phenomenological study, a grounded theory study, a case study, and a narrative study are examples of qualitative research (Singh, 2015). Theories and concepts are often derived from the data themselves rather than being based on preconceived assumptions (Hollstein, 2011). It enables a deeper understanding of complex social phenomena and opens up new research avenues (Singh, 2015). In a mixed-methods study, quantitative and qualitative methods are combined to obtain a more comprehensive understanding of the research problem (Migiro & Magangi, 2011). Convergent, explanatory, exploratory, and embedded designs are examples of mixed methods (Leech et al., 2010; Migiro & Magangi, 2011). Mixed-methods research is guided by pragmatism (Migiro & Magangi, 2011). Combining qualitative and quantitative methods enhances comprehension of the research problem (Leech et al., 2010). Also, it offers a comprehensive perspective, improves credibility, and permits data triangulation (Tashakkori & Creswell, 2007). A quantitative approach was chosen for the study due to the use of a survey and questionnaire.

This method was the most suitable, as it aimed to test hypotheses. The study is a cross-sectional study using questionnaires for data gathering. Furthermore, the study uses mathematical techniques to summarise, analyse, and interpret the data.

3.3.1. Questionnaire Development

Data can be collected through observation, tests, questionnaires, focus groups, and interviews. The technique used depends on the study's purpose and the data being collected (Taherdoost, 2021). Structured and unstructured data collection techniques are distinct methods employed in research (Vest et al., 2017). In this study, a quantitative approach was adopted because of the study's interest in presenting its findings numerically and mathematically modelling them (Lietz, 2010). Hence, a questionnaire was used as the main instrument for the data collection. The questionnaire was developed after a careful review of the extant literature on gamification, user trust, and user retention in mobile payment applications. Furthermore, the conceptual framework of the study also guided the design of the instrument. Items were constructed from each construct using SET. The questionnaire was made up of seven constructs and 44 items. This ensured that all items in a questionnaire covered all the relevant aspects of the study, as the construct was clearly defined by the study to avoid any form of bias from the researcher and enhance the reliability of the measuring instrument and hence the study's findings.

After the preliminary questionnaire was developed, a pre-test of the study instrument was conducted. The goal of the examination was to identify issues with the items within the questionnaire (Ikart, 2019). The test was conducted by seeking the views and opinions of experts regarding the test items used. A few perspectives from experts in the area under investigation and in the development of the questionnaire were sought to identify the issues present in the questionnaire items. Feedback derived from them was crucial in improving the wording, accuracy, and thoroughness of the final questionnaire (Ikart, 2019). Cronbach's alpha, composite reliability and average variance extracted were assessed in this phase to authenticate the instrument. After conducting a pretest of the instrument, a pilot test was performed to confirm the instrument's reliability and validity. A pilot test was conducted with a sample size of 90. The researcher administered the questionnaire to respondents online. Feedback from respondents was positive, which meant the questionnaire demonstrated a significant level of content validity (Shrotryia & Dhanda, 2019). The gathered data was analysed to ensure that the composite reliability, Cronbach's alpha, and average variance extracted from the indicators and constructs met the threshold value. Items that did not meet the threshold values were excluded to maintain the validity and reliability of the measuring tool.

3.3.2. Survey Design

A survey is a scientific inquiry that collects reliable and unbiased data from a sample of respondents (Nardi, 2018). It is used to gather information about respondents' opinions,

attitudes, behaviours, or characteristics (Nardi, 2018). Surveys allow researchers to collect data from a large number of respondents, providing a more comprehensive perspective (Mellinger & Hanson, 2020). Cross-sectional and longitudinal surveys are the two types of surveys (Creswell & Creswell, 2018). Surveys can be standardised for consistent data collection and analysis (Ahmad et al., 2019). It yields quantifiable data for statistical analysis, enabling rigorous analysis and inference (Mellinger & Hanson, 2020). The survey was conducted using a cross-sectional approach to collect data from a sample of respondents at a specific point in time. This was important because cross-sectional surveys are efficient and cost-effective, enabling researchers to quickly collect data from a large sample (Wang & Cheng, 2020). Furthermore, they are useful in identifying patterns or associations between variables (Mellinger & Hanson, 2020). The final questionnaire underwent a pilot test to enhance its content validity before the main data collection. Respondents were asked to provide feedback on item clarity, overall time required, and any issues encountered during the survey.

The questionnaire developed for this study consisted of three sections. Section A primarily addressed the demographic information of the participants, encompassing enquiries regarding gender, age, occupation, and monthly income. Section B exclusively focused on the utilisation of mobile payment services, encompassing queries about the specific service employed, frequency of usage, and duration of usage. The final segment, namely Section C, centred on the factors influencing user retention within a gamified mobile payment application, with trust serving as a mediating variable for payment use. This portion entailed the inclusion of five motivation constructs, namely reciprocity, utility, expectation, reward, and social influence. Furthermore, this segment incorporated questions relating to trust and user retention in mobile payments. The literature review identified constructs and indicators for measurement. Each construct was assessed using a five-point Likert-type scale, with 1 denoting strongly disagree and 5 denoting strongly agree. This scale is known for accurate and consistent results in multivariate analysis (Harpe, 2015). The constructs used in this study are summarised in Table 3.1.

Table 3. 1 The Number of Items Used in this Study and its Constructs

Constructs	Items Count	Adopted from
Reward	9	Suh et al. (2018).
Expectation	7	Researcher.
Social Influence	6	Vannoy and Palvia (2010), Bui and Bui (2018), Chen (2019).
Reciprocity	5	Researcher.
Utility	6	Zhou (2013), Alhassan et al. (2020).
Trust	5	Hoehle et al. (2012), Pal et al. (2020).
User Retention	6	Alhassan et al. (2020), Bhattacherjee (2001), Pal et al. (2020)

Source: Author

3.3.3. Respondents Setting

The respondents were individuals living in Ghana. To be eligible for the study, participants must possess a smartphone and have used a mobile payment app. Ownership and usage of a mobile payment app were the primary criteria for participant selection. It was not biased by sex or ethnicity. However, with age, respondents should be 18 years old or older. Any individual in Wa and its environs was eligible for the study as long as they met the study criteria.

3.3.4. Sample Selection

Sample size denotes the number of participants or observations involved in a study (Mohajan, 2020). The determination of the sample size should take into account the research objectives, population size, and analysis techniques utilised (Delice, 2010). To achieve consistent and reliable results, researchers must give significant consideration to the sample size in their study. Determining the right sample size was relevant for the study because its failure affects the quality and precision of the study, hence the reliability and validity of the results obtained (Singh & Masuku, 2014).

The Structural Equation Model (SEM) principles were observed to determine sample adequacy. The “10 times rule” is a principle commonly used in partial least squares (PLS)

analysis to approximate the minimum sample size requirement (Peng and Lai, 2012). The rule is frequently used in information systems research as a method for minimum sample size estimation in PLS-SEM (Kock & Hadaya, 2018). The rule stresses that the sample size should be a minimum of 10 times the most intricate relationship in the research model (Peng & Lai, 2012). That is, ten times the maximum number of predictors should be the minimum sample size (Rigdon et al., 2017). The relevance of the “10 times rule” to the study is that it provides a straightforward and easy-to-use guideline for estimating the minimum sample size (Peng & Lai, 2012). Furthermore, it assists in guaranteeing an adequate sample size for accurate parameter estimation in the model (Rigdon et al., 2017). In this research, the highest-ranking item scored a 9, necessitating a minimum sample size of 90 respondents following the "10-times rule."

However, 350 respondents are expected to make up the research's sample size. A larger sample size is essential for improving data precision since it lowers errors and makes it easier to generalise study findings. However, 319 respondents completed the questionnaire, providing a total sample size of respondents for the research study (Lakens, 2022). Due to the purposeful selection of respondents for the study, a purposive sampling technique was adopted. The study was interested in respondents with specific criteria, which included respondents 18 years of age and older, users of mobile payment applications, and located in Wa and its environs (Campbell et al., 2020). As a result of the study's inability to use random sampling techniques, the use of purposive sampling is vital (Rai & Thapa, 2015).

In terms of enhanced telecommunication and internet connectivity, Wa enjoys markedly better connectivity than rural areas in the region (Agbenyo & Etse, 2017). It is a cosmopolitan municipality made up of people from across Ghana and other countries (Osumanu et al., 2019). The study focused on Wa Municipal and its surroundings in the Upper West Region of Ghana due to financial and time constraints, as well as the sampling technique used. The investigation focused on a population of 33,548 individuals who use smartphones for financial transactions (GSS, 2022), from which the sample size was determined. Respondents aged 18 years and older were considered. Respondents who have access to a mobile phone and use a mobile payment system were also considered in the study.

3.3.5. Data Collection Process

In the field of research, various methods are present for data collection, categorised as primary and secondary data (Ajayi, 2017). According to the research objectives and questions, primary

data was mainly used in the study, and secondary data played a supplementary role. These data are termed primary data because the researcher takes the data directly from the source (Boaduo, 2011). The researcher took the responses of respondents' tailor-made responses to fit the objectives of the study. Due to the absence of data, to meet the study's goals, new data had to be collected. Primary data can be obtained from surveys, in-person interviews, experiments, observations, and questionnaires (Ajayi, 2017). Primary data provided the study with the opportunity to ensure the quality and accuracy of the collected data and was gathered in a way that helped the researcher measure the data quantitatively (Taherdoost, 2021). The primary data's importance in the study was to improve originality and uniqueness. It also ensured data quality and accuracy, collected through a quantitative method (Boaduo, 2011). Secondary data, collected by others and used for analysis, guides researchers in questionnaire development (Hox & Boeije, 2005). Sources include government publications, journal articles, organisations, and books (Ajayi, 2017). Secondary data is crucial for establishing historical context in research (Ajayi, 2017). It helps researchers ask appropriate questions to achieve study objectives.

Data was collected in three steps: survey design, sampling frame selection, and questionnaire administration to respondents. The data collected was obtained using the developed questionnaire following the study's hypothesis. This is to validate the study. This assignment was carried out by employing meticulous measurement of the variables, effectively capturing the underlying concept under investigation. This process ultimately aids in achieving the set goals of the research, devoid of any potential researcher prejudices, thus enhancing the construct validity of the study (Heale & Twycross, 2015). Since English is Ghana's official language, it was not necessary to use a back-translation technique when developing the questionnaire. Both online and offline methods were used in the data collection process. Face-to-face and Google Forms were used to administer the questionnaire to respondents. The relevance of Google Forms to the study is to help the researcher reach respondents who are eligible for the study but beyond reach. Face-to-face is to help the researcher reach more respondents. To enable the study to cover a larger sample area. The research prevented repeated responses by the same respondent by adjusting the Google form to allow each participant to submit only once. Consent was obtained from respondents online before filling out the questionnaire. Before administering the questionnaires, respondents were required to give verbal consent before completing the questionnaire.

Some respondents did not return printed copies of the questionnaire, while others did not fill out the electronic version. Additionally, some did not provide consent online or offline, resulting in non-compliance with completing the questionnaire. A total of 319 responses were gathered as a result; 204 of these were electronic copies, and 115 were printed copies. Of the electronic copies, five did not provide consent and thus did not finish the questionnaire. The data was collected in June 2024. Through purposive sampling, the researcher selected individuals with experience using mobile payment systems. The sample chosen had similar attributes, such as owning a mobile phone and using mobile payment apps (Etikan et al., 2016). Printed questionnaires were administered by the researcher. Using the snowballing technique, the researcher and respondents administered the online questionnaire.

3.4. Reliability and Validity of Data

For any study to be considered credible, individuals always look at a study's methodology to measure the validity and reliability of the data before its collection and also during the analysis of the data. Hence, the basis for ensuring the validity and reliability of the study is its credible data. Reliability pertains to the constancy and durability of a measuring instrument over time (Sürücü & Maslakçi, 2020). Internal consistency is a type of reliability (Kimberlin & Winterstein, 2008). The degree to which every item on a scale measures the same construct is known as internal consistency (Heale & Twycross, 2015). It assumes that items assessing the same construct should correlate (Kimberlin & Winterstein, 2008).

Validity evaluates whether the data collected truly represents the phenomenon being studied (Heale & Twycross, 2015). Discriminant, convergent, and construct validity are examples of validity (Sürücü & Maslakçi, 2020). The degree of correlation between various measures of the same construct is evaluated by convergent validity (Shrestha, 2021). It is evaluated using the average variance extracted (AVE). Discriminant validity examines whether constructs that are meant to be different are different (Mohamad et al., 2013). A construct is considered distinct from others in the model when its AVE is larger than the squared correlations between it and the other constructs (Shrestha, 2021). The relevance of discriminant validity is ensuring that constructs are distinct from each other in a study (Shrestha, 2021). Moreover, the relevance of discriminant validity is to enhance the credibility and robustness of the research findings by demonstrating that the variables under study are distinct and not redundant (Mohamad et al., 2013).

The study made a significant effort to guarantee that the appropriate methodology was used in the study to assure the study's reliability. The questionnaire was carefully designed by employing factor analysis. To accomplish its aim, the study constructed a pool of questionnaire items derived from theoretical frameworks outlined in existing literature. The primary aim of factor analysis in a study is to condense a large number of interconnected variables into a smaller set of uncorrelated factors. This simplifies the interpretation of the data gathered from respondents, making it easier to achieve the study objectives (Shrestha, 2021). This was done by removing irrelevant questions from the final questionnaire. Thus, reducing the number of items makes analysis and interpretation easier.

Cronbach alpha (CA) was considered in determining the reliability of a questionnaire. The relevance of CA to the study is that it is the most commonly used in measuring reliability (Kember & Leung, 2008). It is also used to measure internal consistency (Kimberlin & Winterstein, 2008). Furthermore, the relevance of CA in the study is to help identify redundant items (Sharma, 2016). A Cronbach's alpha result falls between 0 and 1, and a reliability score of 0.7 or higher is considered acceptable (Heale & Twycross, 2015). Any that records a score less than 0.7 will be discarded. Composite Reliability (CR) was also considered to measure the reliability of the questionnaire.

The study considered average variance extracted (AVE). It measures how much of the variance caused by measurement error is captured by a construct in comparison to the variance itself (Shrestha, 2021). AVE results are a number between 0 and 1, and values above 0.5 are generally considered acceptable for convergent validity (Sürücü & Maslakçi, 2020). Because it guarantees that all of the items in a construct are accurately measuring the same underlying concept, AVE is relevant (Shrestha, 2021). Moreover, it measures how much variance is captured by a construct in relation to measurement error (Shrestha, 2021).

3.5. Method of Data Analysis

Responses received. Checks were made for incomplete questionnaires. Incomplete surveys were completed by the study. The completed questionnaire was coded for easier analysis. The coded data was ready for analysis. MS Excel was used for descriptive data, and SmartPLS 4 was used to analyse the data.

3.5.1. Partial Least Squares- Structural Equation Modelling

SEM is a multivariate statistical analysis method used to explore complex relationships between observed and latent variables, allowing researchers to investigate causal models,

assess the impact of variables, and evaluate how well the model fits the data (Hair et al., 2019). It is extensively utilised in diverse areas, such as research in IS (Kwok et al., 2018). Measurement and structural models are the two main components of SEM. In the measurement model, observed indicators are related to latent variables, while in the structural model, latent variables are related to observed indicators (Hair et al., 2019). SEM includes several methods, such as path analysis, confirmatory factor analysis, and regression (Jenatabadi, 2015). SEM can be divided into two main approaches: the covariance-based structural equation model and PLS-SEM (Hair et al., 2011). CB-SEM focuses on reproducing the theoretical covariance matrix and is suitable for theory testing and confirmation. On the other hand, PLS-SEM is designed to maximise the explained variance of the dependent latent constructs and is therefore better suited for prediction and theory development (Hair et al., 2011). The PLS-SEM approach was adopted by the study. It was applied to establish the study's sample size (Kock & Hadaya, 2018). Also, the relevance of PLS to the study was dealing with a complex model with multiple constructs (Hair et al., 2019). Furthermore, it provides estimates of both direct and indirect effects, allowing for a comprehensive understanding of the relationships between variables (Kock & Hadaya, 2018).

Three main steps are involved in assessing results in PLS-SEM: describing the initial data, assessing the measurement model, and assessing the structural model (Sharma, 2016). It starts with an initial data description to understand the dataset’s characteristics and ensure its suitability for analysis. This step involves examining the data distribution, identifying missing values, checking for outliers, and assessing the overall quality of the dataset (Sharma, 2016). It assists researchers in understanding how well the measurement instrument measures the intended constructs (Sharma, 2016). In PLS-SEM, the last stage of assessing results is the structural model assessment (Hair et al., 2019). Evaluating the structural model aims to determine how well the model fits the data and to appraise the quality and validity of the hypothesised relationships.

3.6. Ethical Consideration

Researchers must comply with ethical principles to safeguard the rights and well-being of respondents and uphold research integrity. The study strictly adhered to the highest standards of research ethics. Ethical clearance was obtained from the SDD-UBIDS Graduate School Ethics Board, following established rules and regulations to ensure study validity and protect all involved parties. Before data collection began, participants were given detailed information about the study, including its purpose, procedures, risks, and their rights (Benatar, 2002).

Informed consent was obtained from each participant to ensure voluntary participation and respecting their autonomy (Fujii, 2012). No participant was forced to participate in the study (Benatar, 2002). Respondents had the right to stop participating in the questionnaire at any time. The study respected cultural and social differences in the area to prevent biases during data collection, analysis, and reporting (Benatar, 2002). The data collected was anonymised to protect privacy. Personal identifiers were removed, and security measures were implemented. Ensuring confidentiality was a top priority for the researcher (Rhodes, 2010). The study took all these measures to ensure the well-being of its respondents throughout the study process. This was done to minimise any potential risks to respondents (Dooly et al., 2017).

3.7. Chapter Summary

The chapter provides an overview of the research methodology, discussing theoretical constructs, hypotheses, the research paradigm, methodology, questionnaire development, and survey design. The survey design section emphasises the use of cross-sectional surveys to gather data at a specific point in time. The chapter details the data analysis method, using partial least squares structural equation modelling (PLS-SEM) to study complex relationships between variables. Ethical considerations are also addressed, emphasising adherence to ethical standards, obtaining informed consent, and ensuring the anonymity, confidentiality, and cultural sensitivity of the respondents to the study.

CHAPTER FOUR

DATA ANALYSIS AND RESULTS

4.1. Chapter Overview

The previous chapter provided a thorough overview of the methodology and method of analysis employed in the study. This chapter presents and analyses data gathered from respondents, aligning with the study's objectives. The chapter is divided into several sections: demographic characteristics of respondents, usage of mobile payment applications, assessment of the measurement model, assessment of the structural model, and evaluation of moderators' effects. This chapter delves into the study's findings in line with the conceptual framework that served as a guide for the study.

4.2. Demographic Characteristics of Respondents

Table 4.1 implies that the viewpoints that are expressed in the study predominantly represent those of males. A younger sample population is indicated in the study, as there is a decline in representation in older age groups. Also, from the table, it can be implied that the sample population is relatively educated. Furthermore, it can be suggested that the sample population is predominantly unmarried.

This section presents and discusses background information concerning respondents. These include age, gender, marital status, income, education, and primary occupation. Table 4.1 details the background information of the 319 respondents involved in the research. In the study, over two-thirds of the participants were unmarried male students. In the study sample, 242 male respondents accounted for 75.9% of the sample, while 77 female respondents represented 24.1% of the sample. Almost half of the respondents were aged 26–35 years. People aged 56 or older did not respond to the survey. Individuals aged 18–25, totalling 123, comprised 38.6% of the respondents. Those aged 26–35 numbered 157, accounting for 49.2% of respondents. Moreover, 35 individuals aged 36–45 constituted 11% of the participants, while 4 individuals aged 46–55 represented 1.3% of the respondents.

31 respondents had an educational level of SHS or lower, accounting for 9.7% of the sample size. The educational levels of diploma and degree were 38 and 185, respectively, making up 11.9% and 58% of the sample size. Additionally, there were 56 respondents with a master's degree and 9 with a PhD, comprising 17.6% and 2.8% of the sample size, respectively. Out of

the respondents, 138 were students, representing 43.3% of the sample size. There were also 47 entrepreneurs, making up 14.7% of the sample. Additionally, 90 individuals worked in the public sector, accounting for 28.2% of the sample. Those in the private sector, including NGOs, totalled 43 respondents, or 13.5% of the sample. Lastly, one person was a national service personnel, amounting to 0.3% of the sample.159 respondents earn a monthly income of GHC0.00–GHC1,000, representing 49.8% of the sample. Additionally, 40 earn GHC1001–GHC2000, accounting for 12.5% of the sample. Moreover, 46 earn GHC 2,001–GHC 3,000, comprising 14.4% of all respondents. In addition, 30 and 44 earn GHC 3,001–GHC 4,000 and above GHC 4,001, respectively, representing 9.4% and 13.8% of the total respondents. Out of 319 respondents, 247 were single, which represents 77.4%, and 68 were married, accounting for 21.3%. Additionally, 3 were separated, making up 0.9%, while 1 was divorced, comprising 0.3%.

Table 4.1 Demographic Distribution of Respondents

Demographic	Characteristics	Frequency (N=319)	Percentage (%)
Gender	Male	242	75.9
	Female	77	24.1
Age	18-25 years	123	38.6
	26-35 years	157	49.2
	36-45 years	35	11.0
	46-55 years	4	1.3
	56-65 years	0	0.0
	Above 65 years	0	0.0
Education	SHS and below	31	9.7
	Diploma	38	11.9
	Degree	185	58.0
	Masters	56	17.6
	PHD	9	2.8
Occupation	Student	138	43.3
	Self-employed/Entrepreneur	47	14.7
	Public service worker	90	28.2
	Private service worker/NGO	43	13.5
	National Service	1	0.3
Monthly income	GHC 0.000-GHC1,000	159	49.8
	GHC1,001-GHC2,000	40	12.5
	GHC 2,001-GHC3,000	46	14.4
	GHC 3,001-GHC4,000	30	9.4
	above GHC 4,001	44	13.8

	Single	247	77.4
	Married	68	21.3
	Separated	3	0.9
Marital Status	Divorced	1	0.3
	Widowed	0	0.0

Source: Author

4.3. Usage of Mobile Payment Application by Respondents

Data collected shows that most of the respondents who make mobile payments primarily use mobile money, including MTN Mobile Money, AT Cash, and Telecel Cash. 173 participants exclusively utilised mobile money, constituting 54.2%, whereas 17 respondents opted for mobile banking solely, representing 5.3%. 129 individuals made use of both mobile money and mobile banking, accounting for 40.4% of the total sample. 82 participants have used a mobile payment system for under 4 years, constituting 25.7% of the sample. 80 individuals have utilised it for 5–10 years, accounting for 56.4% of the sample, while 57 have employed it for over 10 years, making up 17.9%. Out of 319 respondents, 201 use the mobile payment system daily, representing 63%. 64 respondents use it weekly, equivalent to 20.1%, while 20 use it monthly, making up 6.3% of the total. 30 respondents use the system occasionally, which accounts for 9.4% of the sample, and 4 of them rarely use it, amounting to 1.3%. Table 4.2 indicates that mobile payment systems have become a key aspect of the respondents' financial habits, with over 50% of the survey group utilising them daily.

Table 4.2 Usage of Mobile Payment Application by Respondents

Mobile Payment Usage	**Characteristics**	**Frequency (N=319)**	**Percentage (%)**
Mobile payment utilised	Mobile money	173	54.2
	Mobile banking	17	5.3
	Both	129	40.4
Duration of using a mobile payment	Below 4 years	82	25.7
	5-10 years	180	56.4
	Above 10 years	57	17.9
	Daily	201	63.0
	Weekly	64	20.1
	Monthly	20	6.3

Frequent usage of mobile payment	Occasionally	30	9.4
	Rarely	4	1.3

Source: Author

4.4. Assessment of Measurement Model

The assessment of the measurement model is a crucial step in PLS-SEM analysis, which is the second step in results assessment (Hair et al., 2014). It involves evaluating the reliability and validity of construct measures, which can be reflective or formative, using appropriate measures like convergent validity and multicollinearity assessment (Ali et al., 2018). This study consists of reflective constructs. A reflective construct is a type of measurement model used in research to assess the correlations between latent constructs and their indicators (Hair et al., 2011). In a reflective measurement model, a change in the latent construct can cause a change in the indicators (Hair et al., 2011). The relevance of a reflective measurement model in the study is the vital role it plays by simplifying the measurement model by assuming that indicators are caused by an underlying latent variable, making it easier to analyse the relationship between constructs (Hair et al., 2019). Using the measurement model evaluation criteria, the quality of the constructs was evaluated. The study examined measurement reliability, convergent validity, and discriminant validity.

4.4.1. Indicator Reliability

Evaluating the indicator loading is the first step in reflective measurement model assessment (Hair Jr et al., 2014). Indicator loading should be greater than 0.7 to ensure indicator reliability (Ali et al., 2018). Indicator reliability is the consistency and accuracy of the indicators used to measure constructs within a model (Hair et al., 2019). It is assessed through the outer loadings, which indicate the factor loading for each indicator included in the measurement model (Mohamad et al., 2013). In this study, not all indicators were significantly loaded on their corresponding latent variables. Hence, it was omitted from the model (Hair et al., 2019). Thus, during the initial analysis, one indicator did not meet the threshold value. RW1 did not meet the minimum threshold value of 0.7 as its indicator loading was 0.679. This was done to ensure that the indicators adequately capture the constructs they intend to measure. After the omission of RW1, the model was re-run. Similarly, the other latent variables had a significant impact on the remaining indicators. As a whole, the instrument presents good indicator reliability. Based on the results of the model rerun using PLS, Figure 4.1 shows the indicator loadings after RW1 was deleted. Meeting the threshold value shows reliability and effective measurement of

intended constructs by the indicators. Eliminating RW1 enhances reliability and accuracy in representing the constructs.

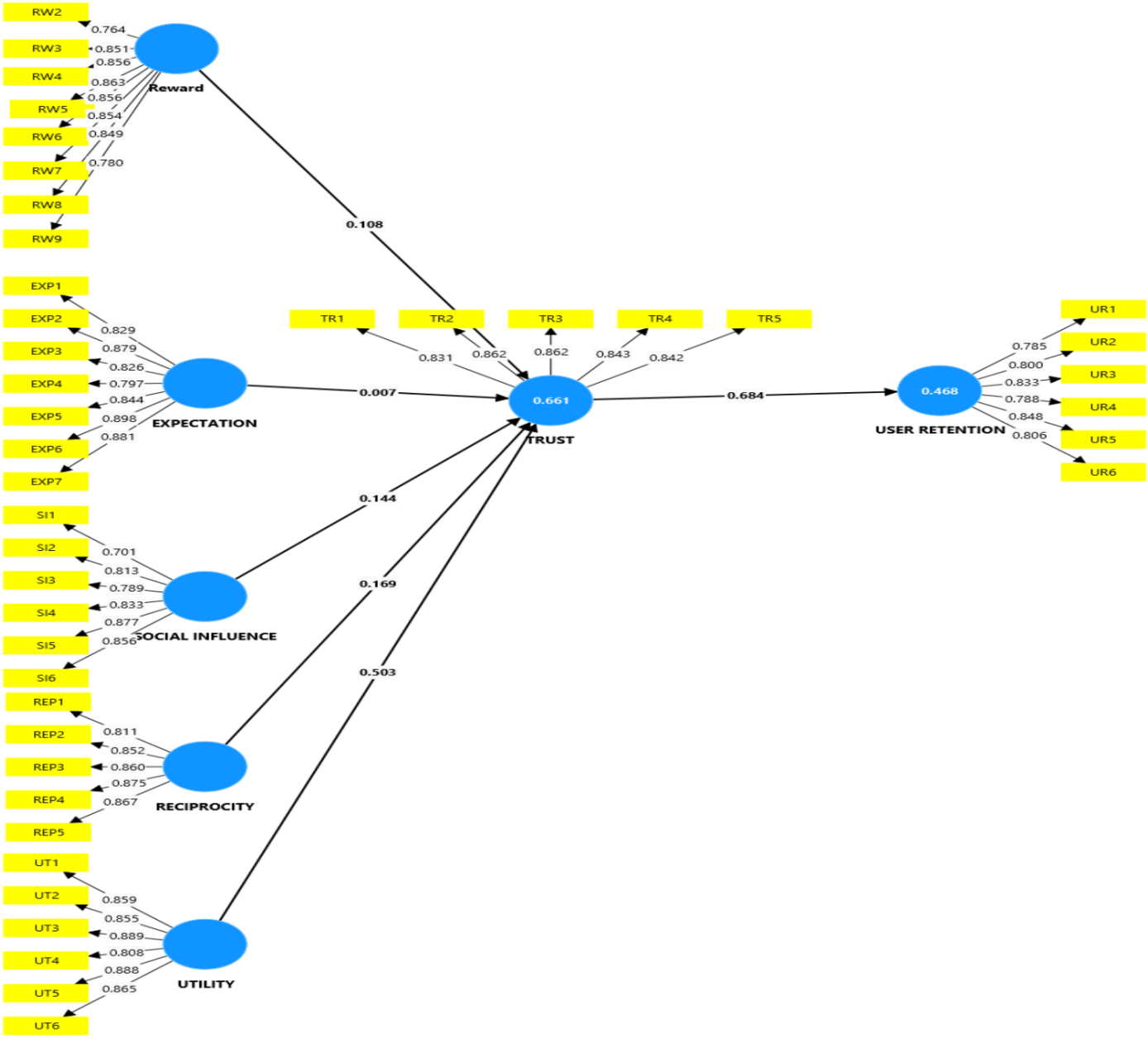

Figure 4. 1 Results of PLS Algorithm Analysis.

4.4.2. Internal Consistency Reliability

After examining the indicator loadings, the next step is assessing the internal consistency and reliability (Hair et al., 2019). Cronbach alpha is a statistical measure used to assess the internal consistency of a set of items within a scale or questionnaire (Taber, 2018). It provides an estimate of how well the items measure the same underlying construct. The threshold value for CA is 0.7 and above. A high alpha value indicates that the measuring instrument is trustworthy,

consistent, accurate, and reliable (Kennedy, 2022). An alpha value between 0.60 and 0.70 is considered acceptable, while values between 0.70 and 0.90 range from satisfactory to good. A value of 0.95 or higher indicates that the items are redundant, thereby reducing construct validity (Hair et al., 2019). All latent variables in the study had an Alpha value of over 0.70 for Cronbach's, as seen in Table 4.3. The alpha values for expectation, reward, and utility constructs are 0.937, 0.938, and 0.930, respectively. Based on this high value, the items used to measure it are very consistent with each other. Trust and reciprocity constructs have alpha values of 0.902 and 0.907, demonstrating strong correlations and consistent measurement of these constructs. The alpha values for social influence and user retention are 0.897 and 0.896, respectively, indicating that the items measure the constructs consistently. The high values reported for all constructs in Table 4.3 indicate a well-designed measurement tool with reliable constructs.

Composite reliability (CR) is an extension of CA. The relevance of composite reliability in this study is to address the shortfalls of CA. CR is more robust than CA (Shrestha, 2021). It offers a more advanced assessment of internal consistency compared to CA by taking into account factor loadings and error variance for a more accurate estimation of reliability (Shrestha, 2021). CR considers individual indicator reliabilities and does not assume equal loadings (Hair et al., 2019). CR values typically range from 0 to 1. The acceptable CR value is 0.7 and above. In this study, constructs have a CR value greater than 0.7, as shown in Table 4.3. The composite scores exceed 0.9, indicating outstanding internal consistency and reliability. This suggests a well-structured measurement model where the constructs are consistently assessed by their items. A higher level of reliability improves the accuracy of the measurement model, thereby reducing measurement errors or inconsistencies (Hair et al., 2014).

Table 4.3 Construct Reliability and Validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Expectation	0.937	0.944	0.948	0.725
Reciprocity	0.907	0.908	0.931	0.728
Reward	0.938	0.940	0.948	0.697
Social Influence	0.897	0.904	0.921	0.662
Trust	0.902	0.903	0.928	0.720
User Retention	0.896	0.902	0.920	0.657
Utility	0.930	0.935	0.945	0.741

Source: SmartPLS 4

4.4.3. Convergent Validity

In the reflective measurement model assessment, the third step involves evaluating the convergent validity of each construct measure using AVE (Hair et al., 2014). In this study, the AVE values exceed the minimum threshold of 0.5, indicating that the construct explains at least 50% of the variance in the indicators (Hair et al., 2019). Hence, adequate convergent validity was achieved. Table 4.3 shows the AVE for each construct. From the table, all the constructs have a value above 0.5. A high AVE shows the validity of the study's measurement instrument and analysis results. This means that the items used to measure a construct are indeed measuring that construct and not something else. Hence, constructs are accurately measured in this study.

4.4.4. Discriminant Validity

Discriminant validity assessment is the fourth step (Hair et al., 2019). Two measures are frequently used in PLS-SEM to assess discriminant validity. Cross-loading is the first calculation of discriminant validity. It is the evaluation of how an indicator loads on its intended construct compared to its loadings on other constructs in a structural equation model (Hair Jr. et al., 2014). In cross-loading, items should load higher on their respective constructs compared to other constructs, which confirms discriminant validity (Hair et al., 2014). The data presented in Table 4.4 indicates that the constructs exhibit good discriminant validity. Each construct is distinguishable from the others, and the items show stronger correlations with their respective constructs than with other constructs. This confirms the validity and reliability of the measurement model.

Table 4.4 Indicator Item Cross Loading

	EXP	REP	RW	SI	TR	UR	UT
EXP1	0.829	0.546	0.577	0.476	0.497	0.454	0.534
EXP2	0.879	0.582	0.553	0.412	0.522	0.512	0.551
EXP3	0.826	0.500	0.369	0.292	0.383	0.441	0.462
EXP4	0.797	0.415	0.317	0.228	0.360	0.438	0.447
EXP5	0.844	0.553	0.502	0.494	0.505	0.487	0.547
EXP6	0.898	0.576	0.479	0.441	0.503	0.508	0.595
EXP7	0.881	0.590	0.525	0.465	0.536	0.526	0.592
REP1	0.522	0.811	0.414	0.522	0.562	0.594	0.685
REP2	0.518	0.852	0.505	0.621	0.650	0.538	0.663
REP3	0.564	0.860	0.486	0.526	0.618	0.574	0.602
REP4	0.590	0.875	0.567	0.567	0.605	0.489	0.640
REP5	0.527	0.867	0.540	0.596	0.587	0.488	0.608
RW2	0.476	0.473	0.764	0.475	0.391	0.346	0.368
RW3	0.466	0.502	0.851	0.501	0.487	0.337	0.425
RW4	0.554	0.505	0.856	0.475	0.489	0.366	0.491
RW5	0.481	0.573	0.863	0.516	0.494	0.389	0.503
RW6	0.382	0.445	0.856	0.429	0.446	0.283	0.413
RW7	0.432	0.449	0.854	0.483	0.471	0.269	0.432
RW8	0.470	0.465	0.849	0.427	0.437	0.285	0.404
RW9	0.527	0.512	0.780	0.429	0.513	0.392	0.512
SI1	0.366	0.414	0.406	0.701	0.443	0.330	0.431
SI2	0.307	0.487	0.404	0.813	0.482	0.347	0.407
SI3	0.316	0.447	0.379	0.789	0.408	0.346	0.397
SI4	0.414	0.558	0.454	0.833	0.522	0.330	0.458
SI5	0.446	0.631	0.503	0.877	0.524	0.362	0.512
SI6	0.484	0.663	0.558	0.856	0.559	0.432	0.550
TR1	0.483	0.566	0.402	0.480	0.831	0.598	0.691
TR2	0.461	0.601	0.473	0.478	0.862	0.598	0.688
TR3	0.450	0.615	0.518	0.573	0.862	0.533	0.611
TR4	0.543	0.605	0.544	0.536	0.843	0.566	0.627
TR5	0.454	0.623	0.448	0.510	0.842	0.602	0.660
UR1	0.451	0.434	0.219	0.261	0.477	0.785	0.515
UR2	0.409	0.488	0.315	0.351	0.550	0.800	0.557
UR3	0.440	0.487	0.289	0.261	0.499	0.833	0.532
UR4	0.466	0.486	0.349	0.398	0.522	0.788	0.521
UR5	0.521	0.573	0.418	0.435	0.655	0.848	0.661
UR6	0.463	0.562	0.328	0.406	0.588	0.806	0.593
UT1	0.584	0.658	0.459	0.450	0.618	0.629	0.859
UT2	0.569	0.685	0.449	0.528	0.621	0.625	0.855
UT3	0.545	0.652	0.480	0.512	0.684	0.600	0.889
UT4	0.477	0.553	0.345	0.351	0.583	0.581	0.808
UT5	0.515	0.615	0.465	0.514	0.705	0.587	0.888
UT6	0.571	0.698	0.543	0.560	0.760	0.605	0.865

Source: SmartPLS 4.

A popular technique for evaluating discriminant validity is the Fornell and Larcker criterion. It is the second method of determining discriminant validity (Hamid et al., 2017). By ensuring that each latent variable in the model is sufficiently different from the others, the criterion helps to avoid construct overlap and confusion (Fornell & Larcker, 1981). It is measured by comparing the square root of the AVE with the correlations between latent constructs (Fornell & Larcker, 1981). Table 4.5 demonstrates that the constructs meet the Fornell-Larcker criterion. This implies that each construct is distinct and measures what it is intended to measure, without significant overlap with other constructs.

Table 4.5 Discriminant Validity (Fornell-Larcker Criterion)

	Exp	Rep	Rw	Si	Tr	Ur	Ut
Expectation	**0.851**						
Reciprocity	0.638	**0.853**					
Reward	0.569	0.590	**0.835**				
Social Influence	0.484	0.665	0.560	**0.813**			
Trust	0.564	0.710	0.562	0.607	**0.848**		
User Retention	0.568	0.628	0.401	0.441	0.684	**0.810**	
Utility	0.631	0.749	0.535	0.569	0.774	0.701	**0.861**

Source: SmartPLS 4

Heterotrait-Monotrait (HTMT) is another criterion for measuring the discriminant validity. A comparison is made between the average correlations within a construct and the average correlations between constructs (Franke & Sarstedt, 2019). Lower HTMT values show better discriminant values (Franke & Sarstedt, 2019). It provides a stringent measure to detect potential issues that could affect a study's outcomes (Hamid et al., 2017). The threshold value for HTMT is 0.90 (Hamid et al., 2017). Table 4.6 reveals that all constructs have good discriminant validity. Also, each construct is distinct from the others, as shown by the HTMT values below the 0.90 threshold. This indicates the reliability and validity of the measurement model employed in the research. The relevance of including the HTMT ratio in the study is to cover the shortfall of the Fornell and Larcker criterion as it is more robust compared to the Fornell and Larcker criterion and easier and simpler to calculate (Franke & Sarstedt, 2019).

Table 4.6 Discriminant Validity- Heterotrait-Monotrait Ratio (HTMT)

	Exp	Rep	Rw	Si	Tr	Ur	Ut
Expectation							
Reciprocity	0.685						
Reward	0.593	0.637					
Social Influence	0.509	0.727	0.605				
Trust	0.603	0.783	0.608	0.671			
User Retention	0.615	0.692	0.429	0.483	0.752		
Utility	0.670	0.815	0.564	0.614	0.838	0.763	

Source: SmartPLS 4

HTMT does not provide an estimate of its standard error, making bootstrapping a useful technique to formally test whether the HTMT value is significantly lower than 1 (Franke & Sarstedt, 2019). Bootstrapping also helps to estimate the confidence intervals of the HTMT values (Hamid et al., 2017). It provides a more comprehensive evaluation of the HTMT criterion, which makes it a more reliable method to test the validity of construct correlations (Franke & Sarstedt, 2019). From Table 4.7, the results of the HTMT values provide robust evidence of validity among the constructs. The values are below the threshold of 0.90, and the confidence intervals support the conclusion that the constructs are distinct. Hence, confirming the reliability and validity of the measurement module.

Table 4.7 Discriminant Validity: Bootstrapping for Heterotrait-Monotrait Ratio (HTMT)

	Original sample (O)	Sample mean (M)	Bias	2.5%	97.5 %
Expectation -> Trust	0.006	0.008	0.002	-0.104	0.110
Expectation -> User Retention	0.004	0.006	0.001	-0.071	0.076
Reciprocity -> Trust	0.168	0.169	0.001	0.019	0.310
Reciprocity -> User Retention	0.115	0.116	0.001	0.012	0.216
Reward -> Trust	0.114	0.114	0.000	0.019	0.223
Reward -> User Retention	0.078	0.078	0.000	0.013	0.151
Social Influence -> Trust	0.144	0.144	0.000	0.041	0.247
Social Influence -> User Retention	0.098	0.098	0.000	0.027	0.168
Trust -> User Retention	0.683	0.685	0.002	0.601	0.750
Utility -> Trust	0.500	0.499	-0.002	0.360	0.642
Utility -> User Retention	0.342	0.342	0.000	0.245	0.454

Source: SmartPLS 4

4.5. Structural Model Assessment.

After successfully validating the measurement model, the subsequent phase involves assessing the structural model (Hair et al., 2019). The PLS-SEM structural model involves evaluating the relationship between constructs within the model to understand how well the model predicts the endogenous constructs based on the exogenous variables (Hair et al., 2014). The relevance of it is that it contributes to the overall validity of a study, leading to more robust and reliable findings in the study (Hair et al., 2014). The evaluation of the structural model was conducted using five critical steps proposed by Hair et al. (2019). The following section will delve into a discussion of these steps:

4.5.1. Assessing the Structural Model for Multicollinearity Issues

Multicollinearity must be examined as the first step before assessing the structural relationship. This is done to make sure it does not bias the regression results (Hair et al., 2019). It is a phenomenon where the independent variables in a regression model are highly correlated with each other (Purwanto & Sudargini, 2021). Multicollinearity can be assessed using the variance inflation factor (VIF) (Purwanto & Sudargini, 2021). VIF quantifies how much the variance of an estimated regression coefficient is inflated due to multicollinearity in the model (Hair Jr. et al., 2014). Higher VIF values indicate stronger collinearity issues that may need to be addressed (Kock, 2015). Hence, a minimum threshold of 5 or less is necessary to avoid issues, as adhering to a minimum threshold can help mitigate the effects of common method bias (Kock, 2015). From Table 4.8, the results indicate that the constructs are sufficiently independent of each other, making it easier to assess their individual effects in the regression mode.

Table 4.8 Multicollinearity Statistics (Inner VIF)

	Exp	Rep	Rw	Si	Tr	Ur	Ut
Expectation					2.005		
Reciprocity					3.093		
Reward					1.826		
Social Influence					1.962		
Trust						1.000	
User Retention							
Utility					2.550		

Source: SmartPLS 4

4.5.2. Assessing the Structural Model for the Significance of Path Coefficient

The significance of path coefficients in the structural model in SEM indicates the strength and direction of the relationships between the latent variables (Shrestha, 2021). Thus, it is used to ascertain the effect of one variable on another within the model. To evaluate the significance of the path coefficient between the latent variables in the model, a bootstrapping technique is utilised with 5000 subsamples in SmartPLS, based on a 0.1 (10%) two-tailed distribution.

The bootstrap algorithm is a non-parametric resampling technique used in statistics to estimate the sampling distribution of a statistic by generating multiple samples from the original data (Mohamad et al., 2013). It provides more reliable estimates of parameter significance, aiding in the interpretation of results in PLS-SEM (Hair Jr. et al., 2014). Its method is used to produce t-statistics for analysing both direct and indirect effects (Purwanto & Sudargini, 2021b). The findings are presented in Table 4.9. Assuming a 97.5% confidence interval, a minimum critical

value of 1.65 is required for a 10% significance level (two-tailed) (Hair et al., 2011). A two-tailed test was used to state whether there is an association between the two constructs. It was used to measure the t and p values of the constructs (Kock, 2015). It allows for a more robust analysis by accounting for all possible outcomes of the relationship being studied (Kock, 2015). A t-value of 1.65 or more shows statistical significance in PLS-SEM. It is often used to assess if model coefficients are significantly non-zero (Hair et al., 2014). The study adopted the critical t-value of 1.65 as its threshold value. The study used a two-tailed statistical test with a t-value of 1.65 to test its hypotheses. From Table 4.9, it is evident that out of the six hypotheses, five are supported, meaning they possess a critical t-value of 1.65 or higher. Similar results are depicted in Figure 4.2.

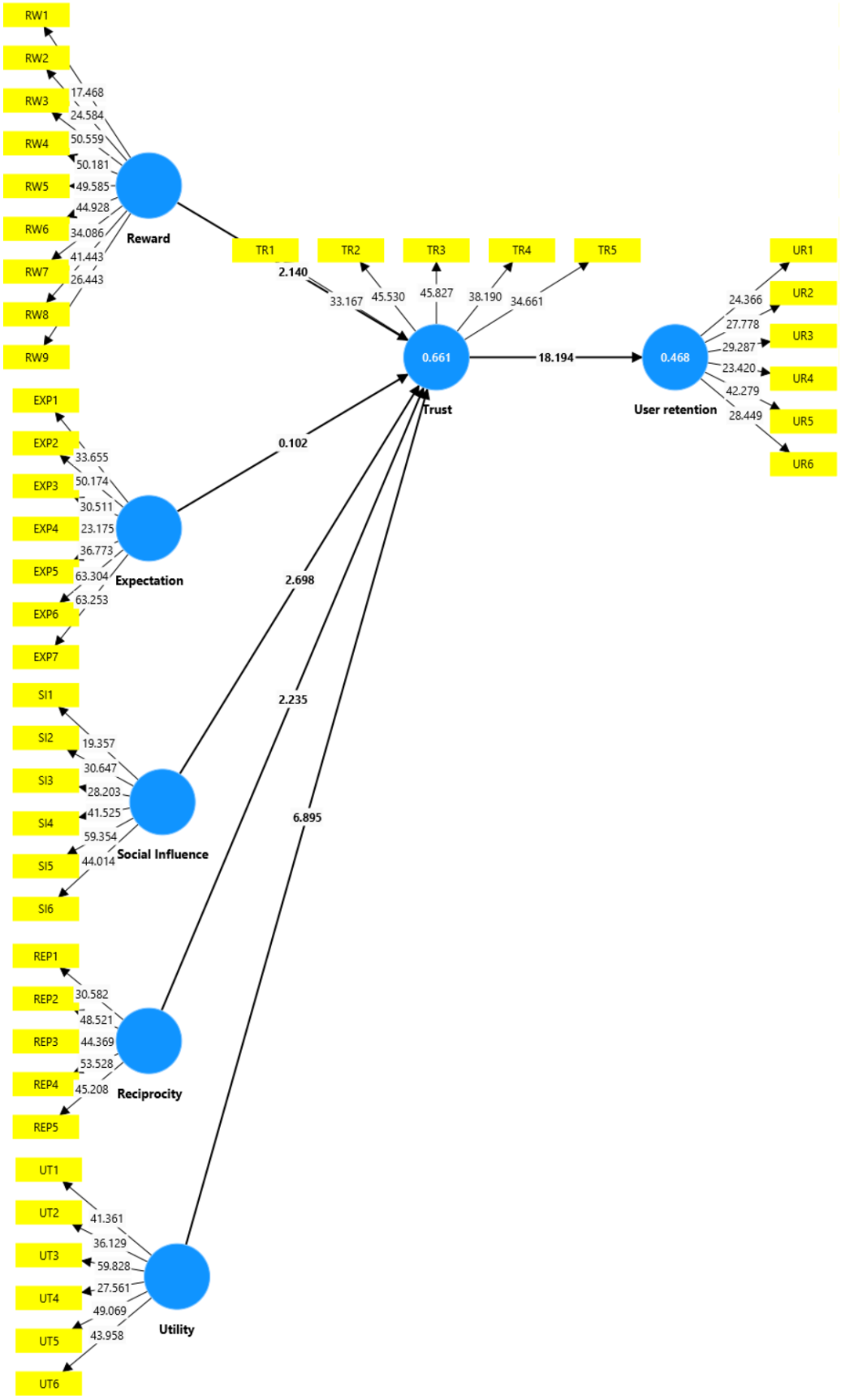

Figure 4. 2 Hypothesis Testing for Direct Effect

Table 4.9 Summary of the Model Path Coefficients from the Hypotheses Testing

Hypothesis	Path	Std Beta	Stdev	|T-Values|	P-Value	Decision
1	**Reward -> Trust**	0.214	0.052	2.140	0.032	Supported
2	**Expectation -> Trust**	0.102	0.055	0.102	0.919	Not supported
3	**Social Influence -> Trust**	0.269	0.053	2.698	0.007	Supported
4	**Reciprocity -> Trust**	0.225	0.075	2.235	0.025	Supported
5	**Utility -> Trust**	0.689	0.073	6.895	0.000	Supported
6	**Trust -> User Retention**	0.684	0.038	18.194	0.000	Supported

Source: Author

4.5.3. Assessing the Goodness of Fit

An examination was carried out to determine the model's goodness of fit (GOF). The test is performed to determine how well a model fits the data (Putri et al., 2022). The R square determination coefficient (R^2) is the most widely used criterion in assessing GOF (Hair et al., 2019). It shows the proportion of variance in the dependent variables explained by the independent variables (Hair et al., 2019). Values range from 0 to 1. Higher values indicate a better fit (Hair et al., 2019). Values of 0.75, 0.50, and 0.25 are considered substantial, moderate, and weak, respectively (Hair et al., 2019). Nevertheless, according to Chin (1998), values of 0.190 or lower are deemed weak, around 0.333 are viewed as moderate, and approximately 0.670 are considered significant. From Table 4.10 it can be inferred that the R^2 of 0.661 means that 66.1% of the variance in the dependent variable. Trust is explained by the independent variables (EXP, REP, RW, SI, UT) in the model.

Table 4.10 R Squared (R^2)

Dependent Constructs	R-square	R-square Adjusted
Trust	0.661	0.656
User Retention	0.468	0.466

Source: SmartPLS 4

Standardised Root Mean Squared Residual (SRMR) is used in SEM to assess the GOF of a model (Kock & Lynn, 2012). It is used to assess the discrepancy between the observed correlations in the data and the correlations implied by the model (Hair et al., 2019). SRMR is calculated by dividing the square root of the difference between the model-implied covariance matrix and the observed covariance matrix by the square root of the observed covariance matrix (Hair et al., 2019). SRMR values range from 0 to 1, with lower values indicating better model fit (Kock & Lynn, 2012). In SEM, a commonly accepted threshold for SRMR is typically below 0.08 to indicate a good model fit (Purwanto & Sudargini, 2021b). From Table 4.11, the SRMR value of 0.062 for the saturated model indicates a good fit, and the value of 0.072 for the estimated model also indicates a good fit.

Table 4.11 Goodness of Fit (SRMR criteria)

	Saturated model	Estimated model
SRMR	0.062	0.072

Source: SmartPLS 4

4.5.4. Assessing the Effect Size

After examining the structural model's GOF, the study evaluated the effect size of each path in the SEM through Cohen's F^2. (HairJr.r et al., 2014). Effect size quantifies the strength of the relationship between variables in a study, indicating the practical significance of the results (Hair et al., 2019). It also2. helps to determine the relative importance of predictor constructs in explaining the variance in the dependent construct (Hair et al., 2019). Values of 0.02, 0.15, and 0.35 represent small, medium, and large effect sizes, respectively. These values indicate the magnitude of the relationship between variables (Hair et al., 2019). In Table 4.12, the independent construct of trust does not affect trust, while the independent constructs of reciprocity, rewards, and social influence have a small effect on trust. Utility has a large effect on trust, and trust has a large effect on user retention.

Table 4.12 F-Square (F^2)

	Exp	Rep	Rw	Si	Tr	Ur	Ut
Expectation					0.000		
Reciprocity					0.027		
Reward					0.020		
Social Influence					0.031		
Trust						0.879	
User Retention							
Utility					0.295		

Source: SmartPLS 4

4.5.5. Assessing the Predictive Relevance

It is important to evaluate both the impact of individual factors on the outcome and the predictive relevance of the structural framework (q^2). Predictive relevance refers to the model's ability to ability to accurately predict endogenous constructs based on exogenous variables (Hair et al., 2014). It is assessed using the cross-validated redundancy measure, q^2, which evaluates the predictive accuracy of the path model by comparing predicted and original values (Hair et al., 2014). It involves omitting a part of the data matrix, estimating the model parameters, and predicting the omitted part using these estimates (Hair et al., 2014). q^2 values span from 0 to 1, with higher values indicating better predictive relevance (Kock & Lynn, 2012). Small, medium, and large path models are indicated by q^2 values above 0, 0.25, and 0.50 respectively (Hair et al., 2019). From Table 4.13 the values indicate a large and medium predictive relevance respectively.

Table 4.13 Q square (Q^2)

	Q^2predict	RMSE	MAE
Trust	0.644	0.601	0.438
User Retention	0.462	0.740	0.551

Source: SmartPLS 4

4.6. Moderating Variables

The study examined how moderating factors influence the relationship between trust as the mediating construct and user retention as the dependent variable. The model considers age and education as moderating factors.

4.6.1. Age

Multigroup analysis is a statistical method used to compare and assess disparities among subgroups in a broader population (Koufteros & Marcoulides, 2006). This study aimed to assess how age moderates the link between the mediating factor (trust) and the outcome variable (user retention). An error occurred during the execution of Multigroup analysis (MGA) on the distinct age categories hence the need for dividing the groups into two. Thus, individuals aged 25 and below and those aged 26 and older. In table 4.14, 1 represents 25 and below and 2 represents 26 and above.

Table 4.14 Multigroup Analysis Results for Age

	Path Coefficients Original (1)	**Path Coefficients Original (2)**	**t-Values (1)**	**t-Values (2)**	**97.5%CI (1)**	**97.5%CI (2)**
Reward -> Trust	0.205	0.058	0.591	2.704	0.387	0.177
Expectation -> Trust	0.133	-0.068	0.446	1.103	0.296	0.058
Social Influence -> Trust	0.123	0.149	2.239	1.009	0.292	0.270
Reciprocity ->Trust	0.065	0.244	1.581	1.035	0.279	0.419
Utility -> Trust	0.438	0.514	3.695	6.095	0.682	0.671
Trust -> User Retention	0.719	0.674	12.794	14.098	0.808	0.752

Source: Author

4.6.2. Education

Education was divided into two categories for the initiation of MGA: individuals with undergraduate and below qualifications, and those with postgraduate and above qualifications. The results of the MGA implementation are presented below in Table 4.15, where 1 signifies undergraduate and below, and 2 signifies postgraduate and above.

Table 4.15 Multi-group Analysis Results for Education

	Path Coefficients Original (1)	Path Coefficients Original (2)	t-Values (1)	t-Values (2)	97.5%CI (1)	97.5%CI (2)
Reward -> Trust	0.094	0.104	1.619	0.814	0.209	0.385
Expectation -> Trust	0.034	-0.103	0.551	0.813	0.155	0.116
Social Influence -> Trust	0.162	-0.009	2.776	0.062	0.274	0.250
Reciprocity ->Trust	0.173	0.208	2.304	0.947	0.319	0.674
Utility -> Trust	0.466	0.666	5.841	3.844	0.616	0.985
Trust -> User Retention	0.685	0.696	15.711	11.174	0.758	0.795

Source: Author

4.7. Relationship between Game Elements and Trust

To increase user engagement and retention, service providers of mobile payment applications often incorporate game elements. These elements not only enhance app enjoyment but also play a vital role in establishing user trust, vital for the success of any financial application. In Table 4.16, the association between leaderboards and trust is deemed statistically significant, as indicated by a t-value of 1.768 surpassing the threshold of 1.65. This implies a positive correlation between the two variables. The relationship between position and trust has a t-value of 2.465, indicating a strong positive correlation. There is a strong positive correlation between badges and trust, as indicated by a t-value of 2.267. Like other elements, levels and trust positively correlate with a T-value of 1.996. In terms of t-values, points have a stronger relationship with trust, followed by badges, levels, and leaderboards, which have the weakest relationship.

Table 4.16 A Summary of the Relationship Between Game Element and Trust

Relationship	Original Sample	T-value	97.5 CI
Leaderboard -> Trust	0.103	1.783	0.211
Points -> Trust	0.124	2.465	0.224
Badges -> Trust	0.123	2.267	0.232
Levels -> Trust	0.109	1.996	0.220

Source: Author

4.8. Discussions of Results

The use of gamification by mobile payment service providers is quickly gaining attention. However, how gamification can help service providers remains unclear. This study provides insights into how a game element in a mobile payment system leads to trust and how trust leads to user retention. This study fills the gap by presenting how game elements affect trust and how that trust affects user retention in a mobile payment system in Ghana. The study aims to identify and explore the link between gamification elements and trust, as well as between trust and user retention in mobile payment systems in Ghana. The study explored how age and education affect trust and user retention in mobile payment systems. Out of the six hypotheses, five were supported, and one was not. The outcomes of the supported hypotheses can be seen in Table 4.9.

Analysis of the results showed that the first hypothesis, stating a positive association between reward and trust, was significantly supported. An increase in rewards is linked to an increase in trust (Hsu & Chen, 2018; Aparicio et al., 2021). Findings from the study indicate that game elements positively affect trust. Offering rewards such as badges and points through gamification strategies can enhance the perceived value of the platform, subsequently building trust with users of mobile payment systems (Aparicio et al., 2021). This means that if users perceive more rewards in the form of points, levels, and badges in mobile payment systems, they are likely to trust more (Bùi & Bùi, 2018; Zhang et al., 2023). According to the results, despite a positive relationship between reward and trust, this relationship is weak compared with the other constructs. This contradicts existing literature, which suggests that reward is a strong determinant of trust (Bitrián et al., 2021; Zhang et al., 2023). This does not, however, diminish the value of reward as a factor in user retention. For gamification to significantly affect trust in a mobile payment system, providers should integrate several game elements instead of a few (Hall & Andersson, 2018). Findings from the study show that rewards

associated with an IT innovation, such as ease of use and usefulness, have been shown to positively influence users' intentions to adopt the technology. This improves users' attitudes towards the use of a technology, which in turn can enhance their trust in the technology (Wells et al., 2010). This means that earning rewards alone is not sufficient to enhance trust in a mobile payment system. While service providers aim to make mobile payments fun, they should not overlook its functionality.

In the MTN Mobile Money payment system, users are rewarded with points when they continuously use their mobile payment for transactions. These points accrued by users can be used to purchase airtime, data, etc. The accumulation of points in the MTN Mobile Money payment system motivates users to keep using the service and fosters trust, encouraging user retention. Findings from the study show that, despite points playing a significant role in enhancing trust, other game elements should be incorporated into the system. When users are rewarded for their loyalty and engagement, it creates a sense of value and reliability, ultimately fostering a stronger sense of trust and satisfaction in the mobile payment system. Telecel Cash awards points for purchasing airtime through mobile payment apps, while MTN rewards any transaction, including airtime purchases on the mobile app. Most mobile payment providers are using only points at the expense of other game elements to enhance trust.

The second hypothesis of expectation being positively associated with trust was not supported. The minimal effect of expectations on trust suggests it is not a significant driver of trust in this study's context. This, however, does not align with existing literature that suggests a positive correlation between expectation and trust (C.-J. Liu, 2019; Liu & Shah, 2019). Table 4.9 suggests that meeting users' expectations may not be enough to build trust with users of gamified mobile payment systems. This finding implies that service providers cannot solely rely on meeting users' expectations to build trust in gamified mobile payment systems. They need to consider other factors that contribute to trust, such as rewards, usefulness of the system, ease of use, and user experience, to establish a strong foundation of trust with their users. The study's findings indicate that adding gamification elements to the mobile payment system does not affect trust. The findings of this study suggest that meeting users' expectations alone may not be sufficient to build trust in gamified mobile payment systems. Instead, service providers should focus on factors such as transparency, security, and user experience to establish a strong foundation of trust with their users. This contradicts the existing literature that suggests a positive correlation between expectation and trust, highlighting the need for further research to understand the specific dynamics at play in the context of gamified mobile payment systems.

Furthermore, the third hypothesis, that social influence is positively associated with trust, was supported. This indicates a strong positive correlation between social influence and trust. This implies the significant role of social influence in building trust. This is supported by existing literature (Widyanto & Kusumawardani, 2021). The findings of the study indicate that users of a gamified mobile system are influenced by individuals who are important to them to use the system (Wut et al., 2021). This means that users are more likely to adopt payment behaviours if they see others doing so, especially those they respect. Findings also show that social approval plays a key role in the use of technology. Displaying the ranks of users of mobile users' payment systems and allowing them to compare their progress with others improves their social approval, which in turn increases their trust in the system. Existing literature highlights that leaderboards in a gamified system can significantly enhance social influence (Wut et al., 2021). The study's results supported this. This finding means that when individuals see their peers using a system and benefiting from it, they are more likely to trust and try it themselves (Wut et al., 2021). This can create a positive feedback loop, where the more users there are, the more attractive the service becomes to new users, resulting in a thriving user community. By including leaderboards in their mobile payment system, service providers can create a sense of transparency and accountability (Wut et al., 2021). Users will be able to see how they rank compared to others, which can inculcate confidence in the fairness and reliability of the system. This can ultimately strengthen trust between the users and the service providers.

The fourth hypothesis, that reciprocity is positively associated with trust, was also supported. There is a positive relationship between reciprocity and trust. It can be concluded from Table 4.9 that, although the correlation is positive, it is moderate. Existing studies have indicated a positive correlation between reciprocity and trust (Hwang & Choi, 2020; Haynes & Yoder, 2024). This was also proven by the study. However, the moderate relationship does not undermine the importance of reciprocity in establishing trust among users of mobile payment systems. Using a gamified mobile payment app can build trust and loyalty by offering rewards and promoting active participation. The study suggests that a gamified mobile payment system's secure experience strengthens user trust, leading to a stronger connection with the app. Furthermore, the study highlights the importance of reciprocity in building trust among users of mobile payment systems. It suggests that when a gamified mobile payment app provides rewards and benefits to users, it fosters a sense of reciprocity and enhances trust (Hofacker et al., 2016). This not only encourages loyalty and engagement but also reinforces user trust through a secure experience, leading to a deeper feeling of security and a stronger relationship

with the app. Overall, these findings emphasise the significant role of reciprocity in building trust and sustaining the success of mobile payment systems. These findings emphasise the importance of reciprocity not only for users but also for service providers in the mobile payment system. By offering rewards and benefits, service providers can foster a sense of reciprocity, enhance trust, and ultimately encourage loyalty and engagement from users. This highlights the mutual benefits of implementing a gamified mobile payment app that prioritises a secure and rewarding user experience.

The fifth hypothesis, which is that utility is a positive predictor of trust, was supported. From Table 4.9, compared to other positive predictors of utility and trust, utility is the strongest. This shows that users are more likely to trust a mobile payment system that they find useful and convenient to use. Therefore, focusing on utility and m-payment platforms can build and sustain user trust (Chen & Li, 2017; Wang et al., 2019). These findings have important implications for service providers in the mobile payment industry. By prioritising utility and ensuring that their platforms are user-friendly and convenient, they can not only attract more users but also build and maintain trust among their existing user base (Evans & Krueger, 2016). This, in turn, can lead to increased adoption and usage of their mobile payment system, ultimately benefiting their business and contributing to the overall growth of the industry. Findings from the study indicate that gamified mobile applications improve users' overall quality of life. These findings suggest that incorporating gamified elements into mobile applications can have a positive impact on users' overall quality of life. By making the experience more enjoyable and engaging, gamification not only enhances the utility of the app but also contributes to building trust and sustaining user engagement (Hofacker et al., 2016). This has important implications for m-payment platforms, as they can leverage gamification strategies to create a more trusted and satisfying user experience.

The sixth hypothesis, which is that trust is significantly correlated with user retention, was supported by the study’s findings. This finding corroborates extant literature, which suggests that trust is a significant predictor of user retention of information systems (Nelloh et al., 2019; Silitonga et al., 2020). It can be inferred from the findings that when users trust a gamified mobile system, they are more likely to continue using the system than use an alternative. Users are required to develop continuous trust in an IS to continue using it. This is also supported by existing studies, which indicate that initial trust is not sufficient for users to continue using a gamified mobile payment system; rather, continuous trust is required (Ashraf & Ahmad, 2022). Trust plays a mediating role in this study. Trust is therefore influenced by rewards, utility,

expectation, social influence, and reciprocity. This implies that if service providers need to foster trust and enhance user retention aside from expectation, which does not affect trust, they should incorporate rewards into the system. Also, the system must be functional to build trust in mobile payments and improve user retention.

In this research, two moderating factors were incorporated to analyse their impact on the mediating variable (trust) and the dependent variable (user retention). These factors include age and level of education. In the study age was divided into two groups, that is, individuals who are aged 25 and below and those who are aged 26 and older. This was done to ease the study for seamless multi-group analysis. The analysis results are presented in Table 4.14. The hypothesis that age significantly moderates the trust relationship and user retention towards mobile payment usage was confirmed across all age groups. An individual's age has a significant influence on the relationship between trust and user retention. The results obtained can be explained based on the fact that trust has a meaningful effect on user retention among younger users (25 years and younger). This suggests that when younger users trust a platform, they are more likely to remain engaged with it. For older users (26 years and older), trust also has a strong impact on user retention. However, the effect of trust is slightly less pronounced in older users than in younger ones. This indicates that while trust is important, other factors can also play a significant role in retaining older people. When service providers are implementing strategies to enhance user retention, they should consider the age of users.

Education was divided into two groups for a multi-group analysis, just like age. Specifically, people with an undergraduate degree or less and people with a postgraduate degree or more were divided into the education categories. The multi-group analysis was carried out, and the results are presented in Table 4.15. Firstly, the hypothesis that education significantly moderates the relationship between trust and user retention is not supported by both groups. Thus, an individual's education level does not affect the relationship between trust and user retention. Both educational groups (undergraduate and below, postgraduate and above) exhibit a highly significant relationship between trust and user retention. This suggests that once trust is established, it will robustly influence users to stay, irrespective of their educational attainment. For users with an educational level of undergraduate and below, trust is an important determinant of user retention. This strongly significant relationship suggests that any effort to build and sustain trust will have a great impact on retaining users with the group. This also applies to individuals with a postgraduate degree and above, as efforts to build and maintain trust are likely to be highly effective in ensuring long-term retention with the group.

This finding implies that when service provider providers are implementing strategies to enhance user retention, the educational background of the individual does not affect trust and therefore user retention. Other factors should be considered.

4.9. Chapter Summary

The chapter provides a comprehensive analysis of the collected data, illustrating the demographic characteristics of the respondents and their usage patterns of mobile payment systems. It also showed a significant uptake of mobile payment systems among respondents, with mobile money being the most commonly used method. The correlation between the dependent construct (user retention) and the mediating construct (trust) was analysed in the last section of the chapter concerning age and education. A thorough discussion of the study's findings was presented. The discussion of the study's findings highlighted the importance of trust as a mediating factor in user retention for mobile payment systems, particularly among respondents of younger age and higher education levels.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1.General Conclusion

This study examined the effect of gamification on user retention in mobile payment systems, with trust as a mediating variable. To answer the research questions, the study leaned on the foundation of SET to draw insights. The first question was interested in ascertaining whether there exists a relationship between gamification and user trust. Findings indicate a positive correlation between gamification and user retention. Findings show that users will continue to trust a mobile payment system as long as they continue to receive rewards whenever they use a gamified mobile payment system. Therefore, the study concludes that gamification fosters trust in mobile payment applications.

The second question aimed to determine whether or not a correlation exists between trust and user retention. The results of a gamified mobile payment system indicate that there is a significant correlation between trust and user retention. To eliminate the switching intention of users in mobile payment systems, this implies that, along with the integration of game elements into these applications, trust is fostered, which in turn enhances user retention. The study concludes that trust is a crucial factor influencing user retention in mobile payment systems.

In the third inquiry, the main objective was to identify the game element that has the greatest impact on user retention. The results of the study indicate that among leaderboards, badges, levels, and points, it is the points that have a significant influence on user engagement. This implies that when integrating gamification into mobile payment systems, it is essential for service providers to focus on incorporating points, as they play a crucial role in improving user retention.

5.2.Answers to Research Questions

The study results are presented according to the research objective. The first consideration is the relationship between game elements and trust. Secondly, it examines the relationship between trust and user retention. Finally, the game elements significantly influence user trust and, thus, facilitate their retention in mobile payment applications.

5.2.1. The Relationship between Gamification and Trust in a Mobile Payment System

Existing literature exhibits a significant relationship between game elements and trust (Nicholson, 2015; Feng et al., 2018; Hall & Toke, 2018). There are several examples of game

elements in gamification, which include avatars, levels, points, leaderboards, and badges (Deterding, Sicart, et al., 2011; Johnson et al., 2016). This study, however, focused on points, levels, badges, and leaderboards. Results from the data indicate game elements have a positive relationship with trust in a mobile payment system. Rewards, expectation, social influence, reciprocity, and utility were the constructs used to measure the game elements. Aside from expectation, which did not correlate with trust, the rest did. Findings suggest that rewards such as badges, points, and levels foster trust in the mobile payment system. Thus, individuals will continue to trust a mobile payment system as long as they keep receiving rewards. Moreover, users find a gamified mobile payment system mutually helpful. Also, individuals being recognised on the leaderboards significantly affects their trust in a mobile payment system. The social approval users associate with the use of mobile payment systems enhances their trust in the system. Furthermore, the usefulness of a gamified mobile payment system improves the quality of life of its users. The findings show the study objective was achieved as there is a positive link between game elements and trust in a mobile payment system.

5.2.2. The Relationship between Trust and User Retention

Trust is very crucial in the adoption of technology. Before users use and continue to use a mobile payment system, they need to trust them. Users of technology are required to develop continuous trust to continue using a system (Ashraf & Ahmad, 2022b) (Ashraf & Ahmad, 2022). The relevance of trust in enhancing continued usage of a mobile payment system cannot be underestimated. Therefore, there is a need for further studies in that regard. The relevance of the study findings in that regard.

The second objective of this study was to ascertain the relationship between trust and user retention in a gamified mobile payment system. The findings of the study indicate a strong positive relationship between trust in a gamified mobile payment system and user retention. Thus, it can be inferred that higher levels of trust are associated with higher rates of user retention (Zhou, 2013; Nelloh et al., 2019). When users trust a mobile payment system, they are more likely to continue using it. This study finds trust to be a stronger predictor of user retention in a gamified mobile payment system. This is supported by literature that suggests trust is a stronger predictor of user retention (Nelloh et al., 2019; Yuan et al., 2020). From the analysis of the data, to establish and maintain trust in a gamified mobile payment system, there is a need to pay attention to factors such as rewards, social influence, reciprocity, and most importantly, utility. By focussing on these areas, mobile payment systems can enhance user trust, leading to higher retention rates and sustained growth. Users who trust the platform are

more likely to continue using it for various transactions. This finding, therefore, reveals an alternative viewpoint: when determinants such as rewards, social influence, utility, and reciprocity are satisfied when using a mobile payment system, users' trust in the system is increased, which is intended to have a positive impact on their continued use of the system. Users of a gamified mobile payment system prefer to use it rather than an alternative, and they also find mobile payment worthy to use, hence their continued usage of it. The significant correlation between trust and user retention achieves the study's objectives, indicating the significance of fostering trust in a mobile payment system to enhance trust.

5.2.3. Game Elements Affect Trust in a Mobile Payment System

The third objective of the study is to ascertain which game element significantly influences user trust and, hence, user retention in mobile payment systems. Points, levels, leaderboards, and badges were the game elements used in the study. From the analysis, it can be deduced that there exists a positive correlation between game elements and trust (Thiel, 2016; Hall & Toke, 2018). Thus, integrating game elements into a mobile payment system effectively can increase trust, which in turn promotes user retention. Findings from the study show a weak positive correlation between leaderboards and trust; with levels, there exists a slightly stronger relationship with trust compared to leaderboards. Badges show a stronger correlation with trust than both leaderboards and levels, and points exhibit the strongest correlation with trust among the four game elements analysed.

Despite the relevance of the leaderboard in enhancing trust, for it to be effectively implemented in a gamified mobile payment application, it has to be implemented in conjunction with other game elements like points and badges (Nicholson, 2015). The recognition on leaderboards and the social approval users obtain from gamified mobile payments are not enough to enhance trust in a mobile payment system and must therefore be implemented with other game elements. Levels are also integral to enhancing trust in a gamified mobile payment system by providing a sense of achievement and progression to users (Hamari et al., 2014). Additionally, levels can serve as a measure of reputation and credibility, further strengthening trust between users and service providers (Hofacker et al., 2016). While badges are impactful, combining them with other game elements such as points and levels can create a more robust and engaging user experience, further enhancing trust (Zichermann & Linder, 2010). For maximum effectiveness, incorporating levels with other gamification elements like points and badges can create a more engaging and trust-building user experience. While points are highly impactful on their own, combining them with other elements like badges and levels can further enhance user

engagement and trust, providing a more comprehensive gamified experience (Hamari, 2017). According to studies, points are the most popular game design element used in a gamification system (Cheong et al., 2014; Jakubowski, 2019). Since the study was able to identify the game elements that have a significant impact on users' trust in mobile payment apps, its goal was accomplished. Points have the strongest correlation, followed by badges and levels. The weakest correlation is leaderboards. Meaning that for service providers to enhance trust in a gamified platform, points have to be implemented. This supports studies that state points as the most popular game element in a gamified platform.

5.3. Research Contributions and Implications

5.3.1. Implications for Research

First, this study contributes to knowledge by using social exchange theory, which has rarely been used to assess gamification in mobile payment systems. The SET theory was modified by the study by incorporating additional variables such as expectation, utility, and social influence. Gamification elements within mobile payment applications add a valuable dimension to SET, demonstrating how they can enhance user motivation and engagement through a variety of constructs. By integrating these two elements, we gain a deeper understanding of how gamification can be used effectively to boost user retention. Social influence, expectation, utility, and trust play significant roles in information systems and technology adoption, presenting valuable insights for future research and practical applications. Also, gamification in mobile payments has been understudied in Ghana and Sub-Saharan Africa. The study contributes to knowledge in that regard. Also, the research underscores the importance of user motivation in the adoption and continued use of mobile payment systems. By applying SET, the study shows that users are motivated not just by the immediate utility of the application but also by the gamified experiences that offer additional rewards. This dual layer of motivation (functional and experiential) provides a more comprehensive understanding of what drives user engagement in digital payment systems.

Secondly, previous studies have focused on users' initial adoption and usage of mobile payments at the expense of post-adoption usage. Rather than focussing on initial adoption, the study emphasises the need for continuous engagement after adoption. This has significant theoretical implications, as it suggests that the determinants of initial adoption may differ from those influencing continued usage. For example, while initial adoption might be driven by perceived usefulness and ease of use (as per TAM and UTAUT), continued usage is more

influenced by ongoing satisfaction, trust, and engagement strategies such as gamification. This highlights the need for a dual focus in theoretical models that address both adoption and retention.

5.3.2. Implications for Practice and Policy

This study offers practical insights for m-payment service providers to improve decision-making processes. Implementing gamification elements, such as rewards, points, and leaderboards, can significantly boost user engagement. This study offers numerous valuable insights for service providers in the field of mobile payments to bolster and improve their decision-making processes. User engagement can be greatly increased by implementing game elements like leaderboards, points, badges, and rewards. Service providers should design gamification strategies that are dynamic and evolve to maintain user interest. Regularly updating challenges and rewards can keep the experience fresh and engaging for users. Also, the demographic data can help identify which age groups and educational levels are most responsive to gamification. Marketing strategies can then be tailored accordingly. Social approval and competition are important, and mobile payment service providers can leverage community-building strategies to enhance user acquisition and retention. Furthermore, service providers should provide a seamless, enjoyable user experience for users, as this can foster long-term commitment. This includes intuitive interfaces and easy navigation. Mobile payment systems in Ghana primarily utilise points. However, the study suggests that incorporating additional game elements such as levels, leaderboards, and badges would enhance the mobile payment experience.

Concerning policy, policies that prevent the exploitation of gamification features should be developed. This will ensure fairness and transparency in rewards and achievements. This will increase user confidence in the service providers, therefore enhancing trust and sustained usage of the gamified mobile payment system. Also, a mandatory disclosure policy is required of mobile payment service providers to disclose how gamification elements work, their purpose, and the risks and benefits involved. Policymakers should ensure that mobile payment systems comply with stringent data protection regulations to safeguard user information. This includes implementing standards for data encryption, secure authentication, and privacy policies.

5.4. Limitations of Study

Every study comes with its challenges, and this study is no exception. Firstly, the study was limited to Ghana. The study's findings can only be applied to countries with similar

characteristics and mobile payment users. Due to their limited scope, the findings may not be relevant to other contexts. It is important to consider whether mobile payment users in Ghana have the same characteristics and behaviours as those in different countries. Secondly, this study looked at some selected game elements to evaluate gamification. However, there are numerous game elements that the study could have adopted. The study focused on mobile payment platforms. However, it is important to note that the study's findings cannot be generalised to other types of digital platforms. The specific dynamics and user behaviours associated with mobile payments might not be fully representative of broader trends in online services. A cross-sectional design was adopted. It offers a snapshot of a phenomenon at a particular point in time, providing valuable insights into relationships between variables. However, they have limitations when it comes to establishing causal relationships.

5.5. Recommendations for Future Research

i. Future studies can expand their geographical scope. By conducting investigations in varied cultural, economic, and technological frameworks, prospective studies can discern worldwide patterns and discrepancies in the correlation between gamification, user confidence, and retention in mobile payment applications. This will empower scholars to formulate more efficacious and culturally attuned gamification methodologies that can be implemented across diverse territories.

ii. In future research, avatars, storyboards, and other game elements can be examined for their impact on user trust and retention in mobile payment apps. Future research could explore how personalised avatars can increase user engagement and trust by helping users feel more connected to the app and their digital identity.

iii. This study primarily focused on male respondents, highlighting the need for future research to include more females. This would provide a better understanding of how gamification influences trust and its impact on user retention in mobile payment systems from a more comprehensive perspective.

iv. While the investigation concentrated on mobile payment applications, subsequent enquiries could examine the relevance of gamification methodologies to alternative digital platforms. This would expand the comprehension of how gamification can be proficiently utilised to augment user engagement, confidence, and retention across diverse digital environments.

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APPENDIX

APPENDIX 1: Sample Questionnaire

Dear Respondents,

Greetings and thank you for considering participation in this questionnaire, which is an integral part of a Master's thesis being conducted by Edina Galaa at S.D.D University of Business and Integrated Development Studies. Your contribution to this research is invaluable, and your insights will significantly contribute to the academic exploration of gamification elements in mobile payment systems.

Confidentiality and Ethical Considerations:

Rest assured that all information provided will be treated with the utmost confidentiality. This research adheres to ethical guidelines, and your personal details will remain confidential. Your participation is entirely voluntary, and you have the right to withdraw at any stage without any consequences. You will not be penalized in any way if you choose not to participate. There is no payment for participating in this research study. Data collected will be stripped off personal identifiers and will be replaced by codes.

Purpose:

The principal objective of this survey is to collect information regarding the impact of gamification elements in mobile payment systems, in fulfillment of the criteria for the completion of the Master's thesis. Your responses will be analyzed to draw meaningful conclusions that will contribute to the academic discourse in the field.

Contact:

Should you have any questions or require further clarification, please do not hesitate to contact Edina Galaa at 0501384117.

SURVEY QUESTIONS

PART A. Demographics (please tick [√]) where appropriate

1. Gender. Male [ ], Female [ ], Prefer not to say [ ]
2. Age. 18-25 [ ], 26-35 [ ], 36-45 [ ], 46-55 [ ], 56-65 [ ], above 65 [ ]
3. What is your level of education? SHS and below [ ] Diploma [ ], Degree [ ], Masters [ ], PhD [ ], None [ ], please specify others…….
4. What is your marital status? Single [ ], Married [ ], Divorced [ ], Widowed [ ]

5. What is your main occupation? Student [ ], Entrepreneur/Self-employed [ ], Public Service worker [ ], Private Service worker/NGO [ ], please specify others ……
6. Monthly income? GH₵0.00- GH₵1,000.00 [ ], GH₵1,001.00- GH₵2,000.00 [ ], GH₵2,001.00- GH₵3,000.00 [ ], GH₵3,001.00- GH₵4,000.00 [ ], above 4,001.00 [ ]

PART B. Mobile payment systems usage section (please tick [√]) where appropriate

7. Do you use any mobile payment service? Yes [ ], No [ ].
8. If yes, which mobile payment applications do you currently use? Mobile Money [ ], Mobile banking [ ], both [ ], please specify others ……
9. How frequently do you use mobile payment applications? Daily [ ], Weekly [ ], Monthly [ ], Occasionally [ ], Rarely [ ].
10. How long have you used mobile payment systems? Below 4 years [ ], 5-10 years [ ], above 10 years [ ]
11. What types of transactions do you typically perform using mobile payment apps? (Select all that apply) Online shopping [ ], Peer-to-peer money transfer [ ], Bill payments [ ], please specify others ……

PART C Factors influencing user retention in a gamified mobile payment application with trust as a moderating variable. (please tick [√]) where appropriate using a 5-point Likert as: 1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree.

	Test Items	**1**	**2**	**3**	**4**	**5**
	REWARD					
RW1	I try to get more rewards for my activities whenever I use a gamified mobile payment system.					

RW2	The value I associate with the badges contributes to my continuous trust in the mobile payment application.					
RW3	Earning badges in a gamified mobile payment as a reward strongly influences my trust in the application					
RW4	Unlocking new levels in a gamified mobile payment increases my trust in the application					
RW5	The value I associate with reaching higher levels contributes to my continuous trust in the mobile payment application.					
RW6	The points accumulated in a gamified mobile payment contributes to my trust in it.					
RW7	The value I associate with points contributes to my continuous trust in the mobile payment application					
RW8	The value I associate with the rewards I receive contributes to my continuous trust in the mobile payment application.					
RW9	If mobile payment app continues to give me rewards anytime, I use the application I will continuously trust it					
	EXPECTATION					
EXP1	I expect that the gamification elements in the mobile payment app will positively influence my overall trust in the application.					
EXP2	I expect gamification elements will make mobile payment system more enjoyable to use.					
EXP3	I expect the mobile payment system should be easy to use.					
EXP4	I expect the mobile payment system should be secured to use					
EXP5	I expect gamification elements should influence my long-term commitment in using mobile payment system.					
EXP6	I expect the gamification elements should make mobile payment system more convenient to use.					

EXP7	I anticipate that the gamified features of the mobile payment system will be useful in enhancing my overall experience.					
	SOCIAL INFLUENCE					
SI1	I use gamified mobile payment because most people surrounding me use it as well.					
SI2	The use of the gamification app gives me social approval.					
SI3	People who are important to me encourages me to use gamified mobile payment system.					
SI4	Competing with others on leaderboards boosts trust in the mobile payment app.					
SI5	Achieving recognition on leaderboards enhances my overall trust and confidence in the mobile payment app.					
SI6	Being recognised on the leaderboard positively influences my trust in the mobile payment application.					
	RECIPROCITY					
REP1	I find that using a gamified mobile payment can be mutually helpful.					
REP2	When the mobile payment app recognizes my achievements on leaderboards, I reciprocate by engaging in more activities.					
REP3	When a mobile payment app reward me for consistent usage, I feel more inclined to reciprocate by increasing my engagement with the app.					
REP4	I reciprocate by increasing my engagement with the mobile payment app when it awards me badges, levels, or points for my activities.					
REP5	I reciprocate by feeling more secure in using the mobile payment app for financial transactions when it reciprocates my loyalty with exclusive benefits, badges, levels, or points.					

	UTILITY					
UT1	I feel that a gamified mobile payment system is useful.					
UT2	I can get access to financial services easily when I use a gamified mobile payment system.					
UT3	I am satisfied with the benefits I receive from using a gamified mobile payments application.					
UT4	Using gamified mobile applications improves my overall quality of life.					
UT5	The more I feel that a gamified mobile payment is useful the more I trust it.					
UT6	The overall utility of a gamified mobile payment application directly affects my trust in it.					
	TRUST					
TR1	I believe a gamified mobile payment system is trustworthy					
TR2	I continuously trust a gamified mobile payment app because it meets my financial needs and preferences					
TR3	I continuously trust a gamified mobile payment application because it rewards me anytime, I use the application.					
TR4	I am committed to using gamified mobile payment system because it fosters social interactions					
TR5	The app's commitment to providing utility through convenience and usefulness influences my trust, and this trust impacts my decision to continue using the mobile payment app.					
	USER RETENTION					
After my experience using a gamified mobile payment system,						
UR1	I intend to use mobile payment systems on a regular basis.					
UR2	I intend to continue using mobile payment than use any alternative means.					

UR3	I think it is worth using mobile payment systems when it is available.					
UR4	I intend to continue using gamified mobile payment to pay my bills					
UR5	I intend to continue using gamified mobile payment for my peer-to-peer money transfer					
UR6	I intend to continue using gamified mobile payment for my online shopping					

3APPENDIX 2: Gaps Identified from Studies

Author(s)	Study focus	Underpinning theory and framework	Research method/ setting	Relevant gap for future studies
Literature on the adoption and determinants of mobile payment				
Franque Frank Bivar, Oliveira Tiago and Tam Carlos	Understanding factors influencing the continuance intention to use mobile payment in an African context.	success model and the expectation-confirmation model	Quantitative/ Mozambique	Expanding the participant pool too. Also include other African countries to validate the findings. Additionally, incorporating trust as a factor in the model
Michael Humbani and Melanie Wiese	The adoption and continuance intention to use mobile payment apps in South Africa	Modified Technology Readiness Index (TRI) and the Extended Expectation Confirmation Model (EECM-IT)	Quantitative/ South Africa	Include other African countries to understand continuance use. Factors like usefulness and convenience should be investigated to continuance use.

Nobukhosi Dlodlo	The post-adoption usage of mobile payment services, specifically in South Africa	The information systems (IS) model	Quantitative/ South Africa	Replicate the study in other developing countries to establish the robustness of the findings.
Tao Zhou	Examining the factors affecting the continuance intention of mobile payment services	Information Systems Success Model (ISS)	Quantitative/ China	Future research can explore the impact of other factors affecting continuance intention.
Lingling Gao and Kerem Aksel Waechter	Examining the role of initial trust in user adoption of mobile payment services	ISS and Transaction Cost Economics (TCE)	Quantitative/ Australia	Explore relationship between continuous trust and user retention in mobile payment adoption. Investigate other factors that may influence trust.
Tao Zhou	Identifying the factors affecting the continuance usage of mobile payment.	TAM and Innovation Diffusion Theory (IDT)	Quantitative/ China	Initial adoption at the expense of post-adoption.
Kamal Abubker Abrahim	Exploring the factors influencing	Unified Theory of Acceptance and	Quantitative/ Sudan	future research could examine the effects of other

Sleiman, Wang Jin, Lan Juanli, Hong Zhen Lei, Jingyi Cheng, Yuanxin Ouyang, and Wenge Rong	the continuance intention to use mobile payments in Sudan	Use of Technology (UTAUT)		factors on continuance intention, such as accessibility, reputation and trust in other countries
Francisco Liébana-Cabanillas, Nidhi Singh, Zoran Kalinic, Elena Carvajal-Trujillo	Examining the determinants of continuance intention to use near field communication (NFC) mobile payments	Technology Acceptance Model (TAM)	Quantitative/ Spain	Encourages studies to investigate various types of payment systems
Shuiqing Yang, Yaobin Lu, Sumeet Gupta, Yuzhi Cao and Rui Zhang	Examining the role of behavioural beliefs, social influences, and personal traits in	Theory of reasoned action (TRA) and the innovation	Qualitative/ China	Further studies should include elderly into their study.

	adoption and use of mobile payment services	diffusion theory (IDT)		
İkram Daştan and Cem Gürle	The study focuses on investigating the factors affecting the adoption of mobile payment systems (MPS) by consumers	TAM	Quantitative	Future research models can include more factors influencing the adoption of MPS. Additionally, within those models, it would be useful to examine the impact of various mediator variables.
Carlos Flavian, Miguel Guinaliu, Yuntao Lu	Investigating the main determinants of mobile payment use intention	N/A	Quantitative/ USA and Spain	Research should be tailored for each type of mobile payment adoption, taking into account the distinct characteristics and contexts of each representation.
Shalini Chandra, Shirish C. Srivastava, Yin-Leng Theng	consumer adoption of mobile payment systems and the role of trust in this adoption process.	trust-theoretic model	Quantitative/ Singapore	A dynamic model predicting users' intentions over time might be more suitable for studying the acceptance of mobile payment systems, serving as a potential focus for future research.
Literature on trust in information systems				

Maohao Che, Sze Yee Ashley Say, Han Yu, Qingji Zhou, Jared Shu, Wen Sun, Xi Luo& Hong Xu	Investigate how customers' continuous trust is formed at the continuous-use stage in mobile banking	N/A	Quantitative/China	Cultural differences can affect how consumers act and see things in different markets.
Shalini Talwar, Amandeep Dhir, Ashraf Khalil, Geetha Mohan f, and A.K.M. Najmul Islam	Exploring the factors that influence initial trust in mobile-based payment methods	Information Systems Success (ISS) model, Transaction Cost Economics (TCE) theory, and the IT Continuance model	Quantitative/ India	Data was gathered from students.
Debajyoti Pal, Suree Funilkul, and Borworn Papasratorn	Examining the trust building process in an Internet of Things (IoT) based wearable platform and its impact on	N/A	Quantitative/ Thailand	The need for more heterogeneous samples to generalize the findings.

	the continuance usage intention of the wearables			
Hartmut Hoehle	examining the role of continuous trust in determining a user's intention to continue using Internet banking services	IS continuance theory	Quantitative/ New Zealand	Further research is required to explore the factors influencing ongoing trust. The study's findings only relate to Internet banking.
Serena Hillman and Carman Neustaedter	Investigating users' mobile commerce activities, particularly mobile shopping, purchases, and mobile payment systems.	N/A	Qualitative/ North America	future research may be able to focus on one successful type of mobile payment
Xin Li, Traci J. Hess, and Joseph S. Valacich	Exploring initial trust in organisational	N/A	Qualitative/ USA	The study notes limitations with student participants and a field survey. Future research could look into population differences like age, occupation, and computer experience.

	information systems and its impact on technology use and user perceptions.			
Shih-Ming Pi, Hsiu-Li Liao and Hui-Min Chen	Suggest a framework for continuously adopting online financial services.	N/A	Quantitative/ Taiwan	Mobile payment application wasn't included in the study
Zhen Shaoa, Lin Zhang, Xiaotong Li, and Yue Guo	Investigate gender differences in trust-building mechanisms for mobile payments.	IDT	Quantitative/ Chinese	Future research can explore the applicability of our proposed theoretical model in various countries.
Literature on gamification in information system				
Goncalo Baptista and Tiago Oliveira	Impact of gamification on the acceptance of mobile banking services.	UTAUT2 by combining it with a gamification construct.	Quantitative /Brazil	Explore the impact of gamification in other industries and countries. There is the need to study trust as a factor affection retention or continuance use.

Michael D. Dzandu, Charles Hanu and Hayford Amegbe	Understanding how gamification of mobile money payment can generate customer value through its social impact.	Social impact theory	Quantitative / Ghana	Absence of trust in the study
Behzad Foroughi, Mohammad Iranmanesh, Mahaletchimi Kuppusamy, Yuvaraj Ganesan, Morteza Ghobakhloo and Madugoda Gunaratnege Senali	Exploring the factors influencing individuals' continuance intention to use gamified task manager apps	Technology Continuance Theory	Quantitative/ Malaysia	The study focused on gamified task manager apps, so its findings might not apply to other gamification apps

Audrey Thalia Jesslyn, Chiquita Adaora, Jerry S. Justianto, and Irene Bunga Amanda	Examining the impact of gamification on female Gen Z users' continuance intention to use digital payment methods	TAM and extends the Theory of Planned Behaviour (TPB)	Quantitative/ Indonesia	This paper suggests exploring other concepts like trust for future research.
Ayoung Suh, Christian Wagner and Lili Liu	Understanding how gamification enhances user engagement with an information system	cognitive evaluation theory (CET)	Quantitative/ South Korea	There is a relevant gap for future studies to explore the role of trust as a factor affecting retention or continuance use in gamified systems.
Ebina Justin and Dr. Manu Melwin Joy	Analysing the application of gamification in mobile payment apps to promote customer engagement and		Survey	Future research aims to understand factors affecting the adoption and effectiveness of gamification in mobile payment apps.

	continuous intention to use			
De Liu, Radhika Santhanam, and Jane Webster	Focuses on the design and research of gamified information systems.		Survey	The study underscores the limited scope of current gamification research and urges broader investigation in this area.
Juho Hamari, Jonna Koivisto and Harri Sarsa	Examining the effects of gamification on psychological and behavioural outcomes in various contexts and user groups.		Survey	Further research is needed to explore the long-term effects of gamification and its impact on various user groups.
Literature on post-adoption of information systems				
Hongxiu Li and Yong Liu	Investigating the factors influencing two post-adoption behaviours of e-service users	Post-Acceptance Model of IS Continuance	Quantitative / China	Exploring other factors that might affect the likelihood of continued use. Studying the importance of trust and looking into how social influence can have an impact.

Madhavan Parthasarathy and Anol Bhattacherjee	Understanding post-adoption behaviour in the context of online services	IDT	Quantitative/ N/A	Future studies could also focus on retention rate
Khawaja A. Saeed, Sue Abdinnour-Helm	The goal is to analyse how information system characteristics, specifically system integration and information quality, impact perceived system usefulness after adoption.	TAM and the IS success mode	Quantitative	Future research can build on this study to provide more insights into the concept and factors influencing post-adoption usage of information systems.
Anil Gupta, Anish Yousaf, and Abhishek Mishra	Focuses on the factors that influence post-adoption behaviours of digital technologies,	Extended Expectation Confirmation Theory	Quantitative/ India	Study was on recent but frequent users of M-wallet. Extend study to other developing countries.

	specifically mobile wallets.			
Hyunjeong Kang, Min Jae Lee, and Jin Kyu Lee	Explaining the sustained use of mobile banking services in the post-adoption stage	Developed a model	Quantitative/ South Korea	More research is needed to understand what influences continued use of integrated mobile financial services after adoption.