



UNIVERSITY OF MEDIA, ARTS AND COMMUNICATION

**TECHNOLOGY ACCEPTANCE AND CUSTOMER ADOPTION OF
CASHLESS PAYMENT SYSTEMS: A STUDY OF ECG GHANA**

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DECLARATION

I, Edna Owusu Ansah, do hereby declare that this dissertation titled: “Technology Acceptance and Customer Adoption of Cashless Payment Systems: A Case of ECG Ghana” is the product of my research towards the award of a Master’s Degree in Public Relations with Marketing. I also declare that this research work has not been submitted to any institution for assessment, publication or any other purpose. This work neither contains materials previously published by another person nor materials accepted for the award of any other degree by this or any other.



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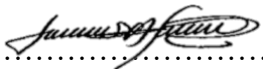
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CERTIFICATION

This dissertation has been prepared and presented under my supervision according to the guidelines for supervision and formatting of dissertation laid down by the University of Media, Arts and Communication.

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Date: 26th January, 2026

Dr. Priscilla Teiko Odoom
(Supervisor)

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My gratitude goes to my husband and family, whose unwavering moral, emotional, and practical support sustained me throughout the demanding phases of this doctoral journey. Their patience and understanding made it possible to balance academic commitments with family responsibilities.

DEDICATION

This work is dedicated to my beloved husband and children, whose unwavering love, patience, and encouragement have been my constant source of strength throughout this academic journey. I also dedicate this study to my cherished mother and to the loving memory of my late father, whose sacrifices, prayers, and steadfast guidance laid the foundation for my pursuit of knowledge and excellence. Above all, I dedicate this work to Almighty God, whose grace, guidance, and unfailing favour made the successful completion of this research possible.

ABSTRACT

This study examines the determinants of customer adoption of cashless payment systems at the Electricity Company of Ghana (ECG) using the Unified Theory of Acceptance and Use of Technology (UTAUT) as its guiding framework. As public utilities increasingly digitalize their service delivery processes to improve efficiency, transparency, and revenue assurance, understanding the behavioural and structural factors that shape customer adoption has become critical, particularly in developing-country contexts where cash-based practices remain deeply entrenched. The study specifically investigates the effects of performance expectancy, effort expectancy, social influence, and facilitating conditions on customers' behavioural intention, the relationship between facilitating conditions and actual usage, and the moderating roles of age, education, and digital literacy on the intention–adoption relationship. A quantitative research approach was adopted, employing an analytical cross-sectional survey design. Primary data were collected through a structured online questionnaire administered to ECG customers in selected operational areas. A total of one hundred and nine (109) valid responses were obtained and analyzed using Statistical Package for Social Sciences (SPSS) and Partial Least Squares Structural Equation Modelling (PLS-SEM). Descriptive statistics, reliability and validity tests, correlation analysis, and structural model estimation were used to examine the hypothesized relationships. The findings reveal that performance expectancy, effort expectancy, social influence, and facilitating conditions all exert significant positive effects on customers' behavioural intention to use ECG's cashless payment systems, with performance expectancy and effort expectancy emerging as the strongest predictors. Facilitating conditions were found to have a significant direct influence on actual usage, highlighting the importance of infrastructural reliability, system stability, and institutional support in translating intention into sustained behaviour. Contrary to the original UTAUT propositions, age, education, and digital literacy did not significantly moderate the relationship between behavioural intention and adoption, suggesting that structural constraints overshadow individual-level differences in this context. The study concludes that customer adoption of cashless payment systems in public utilities is shaped not only by perceived usefulness and ease of use but also, and more critically, by the reliability of supporting infrastructure and the responsiveness of institutional support mechanisms. It argues that digitalization efforts in the public utility sector must move beyond technological deployment to address trust, service continuity, and user-centered system design. The study contributes to the technology acceptance literature by contextualizing UTAUT within a public utility environment and offers practical insights for ECG, policymakers, and digital service providers seeking to accelerate the transition toward cashless service delivery in Ghana.

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LIST OF ABBREVIATIONS

AU	-	Actual Usage
BI	-	Behavioral Intention
BoG	-	Bank of Ghana
CSA	-	Cyber Security Authority
DFS	-	Digital Financial Services
EC	-	Energy Commission
ECG	-	Electricity Company of Ghana
EE	-	Effort Expectancy
FC	-	Facilitating Conditions
GhIPSS		Ghana Interbank Payment and Settlement Systems
ICT	-	Information and Communication Technology
MoMo	-	Mobile Money
PE	-	Performance Expectancy
PURC	-	Public Utilities Regulatory Commission
SI	-	Social Influence
SPSS	-	Statistical Package for Social Sciences
UTAUT		Unified Theory of Acceptance and Use of Technology
USSD	-	Unstructured Supplementary Service Data

CHAPTER ONE

INTRODUCTION

1.0 CHAPTER OVERVIEW

This chapter introduces the study which examines the factors influencing customer adoption of cashless payment systems offered by the Electricity Company of Ghana (ECG). As digital financial services gain prominence across the globe, ECG's transition to cashless platforms presents both opportunities and challenges in the Ghanaian context. The study investigates practical and behavioral barriers to customer uptake of these technologies, such as digital literacy, system reliability, and trust in digital transactions. Grounded in the Unified Theory of Acceptance and Use of Technology (UTAUT), the chapter lays the conceptual and empirical foundation for understanding customer responses to ECG's digital transformation. It frames the study's relevance by linking it to broader efforts to enhance service delivery, customer engagement, and digital inclusion within the utility sector.

1.1 BACKGROUND OF THE STUDY

The global shift towards cashless transactions represents one of the most visible outcomes of digital transformation in contemporary financial ecosystems. Over the past two decades, countries across the globe, from Sweden and Singapore to Kenya and Nigeria have increasingly embraced cashless payment systems (CPS), spurred by rapid technological advancements, convenience, and the need for greater financial inclusion (Tanha et al., 2024). Mobile money platforms, e-wallets, bank apps, and contactless card payments are redefining how individuals interact with financial services, with the COVID-19 pandemic further accelerating this trend due to health-related restrictions on physical cash handling (Boonchieng & Namahoot, 2023).

In developing countries, particularly across sub-Saharan Africa, cashless systems have emerged as critical tools for bridging financial access gaps. Ghana's digital finance landscape has made remarkable strides, fueled by mobile money penetration, favorable policies, and public-private partnerships. The implementation of the Ghana Interbank Payment and Settlement Systems (GhIPSS) and the Bank of Ghana's (BoG) cash-lite agenda have led to significant uptake in digital financial transactions, positioning Ghana as a continental leader in digital payments (Amoah et al., 2017). The Bank of Ghana has actively promoted electronic payment systems, licensing fintech companies and issuing regulatory frameworks for digital financial services. As a result, mobile money transactions surged to GH¢1.1 trillion in 2021, up from GH¢571.8 billion in 2020 (OtiboAddo 2021). Yet, despite these gains, actual customer adoption remains uneven, particularly for utility services such as electricity, where legacy billing practices and customer behavior still heavily favor cash-based transactions.

The Electricity Company of Ghana (ECG), a major utility service provider, introduced multiple digital payment channels such as the ECG Power App, third-party platforms (e.g., ExpressPay, Vodafone Cash), and smart meters to drive convenience, transparency, and reduce revenue leakages. However, the adoption of these systems among a broad spectrum of consumers remains suboptimal. While urban customers have shown moderate uptake, rural and older customer segments often struggle with trust issues, digital illiteracy, and infrastructural bottlenecks (Akanferi et al., 2022; Otibo-Addo, 2021).

Studies suggest that technology adoption is influenced not just by availability, but also by factors such as perceived usefulness, ease of use, facilitating conditions, social influence, and behavioral

intention (Venkatesh et al., 2003; Thawonwisutsakul, 2022). In Ghana, these determinants are further compounded by practical concerns: network instability, limited smartphone penetration, digital fraud fears, and customer support inefficiencies (Ekuban & Omar, 2025; Tanha et al., 2024). For ECG specifically, there is often limited communication or education about digital alternatives, inconsistent system performance, and lingering customer perceptions of unreliability, which continue to slow the full transition to a digital utility service environment.

Moreover, the energy sector presents unique challenges. Unlike consumer goods where digital transactions are often one-off or episodic, electricity usage requires habitual interaction with the payment platform. If the technology interface is not intuitive or if service disruptions occur postpayment, customers quickly revert to traditional methods out of necessity or mistrust. Many ECG customers have been observed to revert to in-person payments not necessarily by preference, but due to trust issues, limited digital literacy, and system usability challenges, factors commonly reported in studies on Ghana's digital public services (Otibo-Addo, 2021; Kpessa-Whyte & Dzisah, 2022). These challenges include app responsiveness issues, difficulty navigating interfaces, and inconsistent service feedback loops.

At the policy level, Ghana's Digital Financial Services Policy (2020–2023) provides a robust framework for enhancing interoperability, cybersecurity, and digital inclusion. However, gaps persist in implementation, especially when it comes to customer-centric innovation and accountability in public service delivery. While ECG's efforts align with national ambitions, the success of its digital transition hinges largely on consumer acceptance, a function of both technological design and social context. Therefore, understanding the factors that influence

customer adoption of ECG's cashless payment systems is timely and essential. The study is important for informing policy, refining system design, and identifying user-centered strategies to enhance adoption.

1.2 PROBLEM STATEMENT

Despite significant investments in digital transformation within Ghana's electricity sector, the uptake of cashless payment systems by customers of the Electricity Company of Ghana (ECG) remains inconsistent and far from optimal. Practically, the ECG has rolled out multiple cashless channels including ECG Power App, POS terminals, mobile money integrations, and USSD platforms, all aimed at reducing physical cash transactions and improving service convenience. Yet, field observations and public feedback suggest that a large segment of ECG customers still prefer traditional, face-to-face payments, particularly at vending outlets and ECG offices. The problem is especially pronounced in peri-urban and low-income communities, where digital literacy, device ownership, and trust in automated systems are low (Gyamerah, & Tetteh, 2024).

Conceptually, this situation raises questions about the effectiveness of existing frameworks guiding digital payment adoption in Ghana's utility sector. Studies conducted in other contexts suggest that successful cashless payment adoption depends on a combination of factors such as perceived ease of use, trust, digital skills, and social influence (Namahoot & Boonchieng, 2023). Yet in Ghana's public utility context, these determinants have not been thoroughly tested or adapted. Furthermore, existing digital financial inclusion programs tend to focus on banking and retail sectors, with limited emphasis on public utilities like ECG, which serve a broad population of non-digitally native customers (Amoah et al., 2017).

From a scholarly perspective, two important gaps emerge from existing literature. First, while several studies examine the adoption of mobile money and fintech platforms in Ghana (Akanferi et al., 2022), few focus specifically on state-owned or semi-public utilities such as ECG. This gap is critical, as ECG's customer base and regulatory obligations differ significantly from commercial banks or private telecom operators. A second gap involves the limited exploration of behavioral resistance in real-world utility usage settings. For example, Tanha et al. (2024) observed that most studies on mobile payment adoption assume rational behavior and overlook the role of entrenched habits, misinformation, and institutional trust deficits, factors especially relevant in Ghana's public sector. Similarly, Gyamerah and Tetteh (2024) found that while many Ghanaian customers are aware of digital channels, they often perceive them as unreliable or overly complex, which reduces long-term usage.

In addition, many existing studies are cross-sectional, relying on student samples or idealized models such as the UTAUT without testing for contextual realities or multi-level factors such as infrastructure availability, urban-rural disparities, or institutional constraints (Namahoot & Boonchieng, 2023). As a result, findings from these studies often fail to capture the challenges facing ECG customers and the factors shaping actual behaviour in public utility payment systems.

1.3 RESEARCH QUESTION AND OBJECTIVES

The overarching question the study addresses is “What are the measurable determinants influencing customer adoption of ECG's cashless payment systems?”

The main objective of this study is to assess the factors influencing customer adoption of cashless payment systems at the Electricity Company of Ghana (ECG), using established technology acceptance constructs. Specifically, the study seeks to:

1. Determine the effect of performance expectancy, effort expectancy, social influence, and facilitating conditions on customers' behavioral intention to use ECG's cashless payment systems.
2. Examine the relationship between facilitating conditions and actual usage of ECG's digital platforms.
3. Assess the moderating effects of demographic factors (age, education, digital literacy) on the relationship between behavioral intention and adoption.

1.4 SCOPE OF THE STUDY

This study focuses specifically on the ECG, a state-owned utility responsible for the supply and distribution of electricity to the southern part of the country. The scope is defined by both sectoral and demographic boundaries relevant to understanding technology adoption in a public utility context. The study investigates the use and acceptance of cashless payment systems introduced by ECG as part of its ongoing digital transformation efforts. These systems include the ECG Power App, mobile money integrations, online billing, and self-service vending kiosks. The study seeks to understand how customers interact with these platforms, what motivates or deters their usage, and how ECG can improve service delivery through digital means.

The population of interest is ECG customers in urban and peri-urban settings, with particular attention given to residential and small business consumers who frequently engage with ECG's

payment systems. The study excludes industrial clients and large commercial entities whose payment behaviors may be governed by different protocols and contractual terms. The study is geographically restricted to selected ECG operational districts, especially within Greater Accra, where digital payment adoption is actively promoted but user behavior still varies widely. Additionally, the study limits itself to customers, excluding ECG staff, as the focus is on external user adoption rather than internal organizational readiness.

In terms of theoretical boundaries, the study is grounded in the UTAUT, which guides the assessment of variables such as performance expectancy, effort expectancy, social influence, and facilitating conditions. The analysis is therefore limited to these constructs and their impact on behavioral intention and actual usage.

1.5 SIGNIFICANCE OF THE STUDY

This study holds both practical and academic significance in the context of Ghana's evolving digital economy, especially within the public utility sector. The Electricity Company of Ghana (ECG), as a major state-owned service provider, plays a pivotal role in driving national financial inclusion and digital transformation through its adoption of cashless payment systems. Yet, customer acceptance and usage of these systems remain uneven. Understanding the factors that influence technology adoption among ECG's diverse customer base is not only timely but also essential for improving service delivery, enhancing revenue assurance, and advancing Ghana's broader cash-lite agenda.

From a theoretical perspective, the study contributes to the growing body of knowledge on digital adoption by applying the UTAUT. By doing so, it bridges the micro-level determinants of technology usage such as perceived usefulness and ease of use, with broader structural and societal

influences like peer adoption, digital infrastructure, and demographic variance. This integrated theoretical lens provides a more nuanced understanding of customer behavior in developing country settings, where technology acceptance is often shaped by both individual perceptions and environmental conditions.

In terms of policy relevance, the findings of this study can guide ECG and similar utility agencies in designing more inclusive and user-centered digital services. By identifying the technological, social, and demographic barriers that hinder adoption, the study offers evidence-based insights that can support targeted interventions such as digital literacy campaigns, service design improvements, and communication strategies to increase uptake. Furthermore, the study's implications extend to regulators like the Ministry of Energy, the Ministry of Communications and Digitalisation, and the Bank of Ghana, who are tasked with advancing national digital payment and financial inclusion strategies.

1.6 ORGANIZATION OF THE STUDY

This study is organized into five chapters. Chapter One introduces the research topic. It presents the background of the study, the statement of the problem, research objectives, research question and hypotheses. The chapter also outlines the scope and the significance. Chapter Two provides a comprehensive review of existing literature on cashless payment adoption, digital financial services in Ghana, and relevant customer behavior models. It discusses key themes and trends in technology acceptance, identifies gaps in the literature, and presents the theoretical framework, specifically the TAM and DOI that underpin the study. Chapter Three outlines the methodology adopted for the study. It describes the research design, the population and sampling procedures,

data collection instruments, and methods of analysis. The chapter also addresses ethical considerations, validity and reliability measures, and explains the statistical techniques employed in processing the quantitative data collected.

Chapter Four presents and analyzes the data collected from respondents. It includes descriptive and inferential statistical analyses to determine the extent to which factors such as performance expectancy, effort expectancy, facilitating conditions, and demographic variables influence the adoption of ECG's cashless payment systems. The findings are interpreted in line with the research questions and objectives. Chapter Five concludes the study with a summary of key findings. It draws conclusions based on the data analysis and provides practical recommendations for ECG, policymakers, and stakeholders in the utility and digital finance sectors. The chapter also suggests areas for further research to address emerging questions and deepen understanding of cashless technology adoption in public utility services.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

This chapter presents a review of relevant literature and theoretical foundations guiding the study. It explores existing research on cashless payment systems, focusing on customer adoption in public utility contexts. The review is organized thematically around four key areas: understanding cashless systems in utilities, determinants of digital payment adoption, barriers in developing economies, and the policy and regulatory environment in Ghana. The chapter also discusses the Technology Acceptance Model (TAM) and Diffusion of Innovations (DOI) theory as the theoretical lenses underpinning the research.

2.1 THEORETICAL FRAMEWORK

2.1.1 Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) was developed by Venkatesh, Morris, Davis, and Davis in 2003 as an integrative framework that consolidates key elements from eight prominent models of technology adoption, including the Technology Acceptance Model (TAM), the Theory of Planned Behavior (TPB), the Motivational Model, and the Diffusion of Innovation theory. The primary objective of UTAUT was to resolve conceptual fragmentation in the technology acceptance literature by offering a unified, parsimonious, and empirically robust explanation of why individuals adopt or reject new technologies (Venkatesh et al., 2003). The authors proposed that four core constructs such as performance expectancy, effort expectancy, social influence, and facilitating conditions, directly determine behavioural intention and actual technology use.

Performance expectancy refers to the degree to which an individual believes that using a particular technology will help them achieve gains in task performance, while effort expectancy captures the perceived ease associated with the use of the system. Social influence reflects the extent to which an individual perceives that important others believe they should use the new technology, and facilitating conditions denote the perceived availability of organisational and technical infrastructure to support use (Venkatesh et al., 2003). These relationships are further moderated by gender, age, experience, and voluntariness of use, making the model sensitive to individual and contextual variations in adoption behaviour.

UTAUT has been widely validated across sectors such as healthcare, education, banking, mobile services, and e-government, consistently demonstrating strong explanatory power relative to earlier models (Williams, Rana, & Dwivedi, 2015). In recognition of the distinct nature of consumer technology adoption, Venkatesh, Thong, and Xu (2012) later extended the original framework into UTAUT2 by incorporating hedonic motivation, price value, and habit, thereby enhancing the model's relevance to non-organisational and consumer-driven settings.

21.1.1 Main Assumptions of the Theory

A central assumption of UTAUT is that technology use is fundamentally intention-driven. The theory posits that individuals do not adopt technologies randomly but instead form deliberate intentions based on their expectations of performance benefits, ease of use, social expectations, and perceived availability of support systems. These intentions, in turn, serve as the most immediate predictor of actual use behaviour, although facilitating conditions may exert a direct influence on usage, particularly when constraints exist (Venkatesh et al., 2003).

UTAUT also assumes that users behave in a largely rational and evaluative manner. It presumes that people cognitively assess the usefulness and complexity of a system before deciding whether to adopt it. This rationalist orientation aligns with earlier expectancy-value theories of behaviour, in which individuals are seen as weighing anticipated benefits against anticipated costs or effort (Venkatesh et al., 2003). Although emotions and habits are not explicitly foregrounded in the original formulation, the theory assumes that cognitive beliefs are the primary drivers of acceptance.

Another core assumption is that technology adoption is socially embedded. The inclusion of social influence acknowledges that individuals do not make adoption decisions in isolation but are shaped by norms, expectations, and recommendations from peers, family members, colleagues, and authority figures. This influence is assumed to be especially strong in the early stages of adoption and among individuals with limited experience (Venkatesh et al., 2003).

The theory further assumes that the translation of intention into actual use is contingent upon the presence of enabling conditions. Even when individuals intend to use a technology, infrastructural deficiencies, limited technical support, or lack of compatibility with existing practices can prevent sustained usage. Facilitating conditions therefore play a crucial role in shaping real-world adoption outcomes (Venkatesh et al., 2003). Finally, UTAUT assumes that adoption effects are not uniform across all users. The relationships between the core constructs and behavioural intention are expected to vary systematically according to age, gender, experience, and voluntariness of use. This assumption reflects the theory's sensitivity to demographic and situational heterogeneity and distinguishes it from earlier, more universalistic models of acceptance (Venkatesh et al., 2003).

2.1.1.2 Scholarly Criticisms of the Theory

Despite its influence, UTAUT has attracted substantial scholarly critique. One of the most prominent concerns is its limited contextual sensitivity. Although the model performs well across many domains, researchers have observed that its predictive strength varies considerably depending on cultural, economic, and technological contexts. As a result, scholars frequently extend or modify the model to incorporate additional variables such as trust, perceived risk, privacy concerns, and security, particularly in financial and digital service settings (Williams et al., 2015; Tamilmani et al., 2021). This pattern suggests that the original formulation may underspecify key contextual drivers of adoption.

Another major critique concerns the proliferation of extensions and “add-on” constructs. The introduction of UTAUT2 itself reflects the need to account for consumer-specific motivations such as enjoyment, habitual behaviour, and price sensitivity (Venkatesh et al., 2012). While these extensions increase empirical fit, they also raise concerns about theoretical coherence. Some scholars argue that the continual expansion of the framework risks transforming UTAUT into a flexible template rather than a bounded theory with clear conceptual limits (Tamilmani et al., 2021).

Questions have also been raised about the stability and universality of the model’s proposed relationships and moderators. Meta-analytic and re-examination studies suggest that certain paths, particularly those involving demographic moderators, are not consistently supported across

empirical contexts (Dwivedi et al., 2019). These findings challenge the assumption that the original structure of UTAUT can be applied wholesale across domains without recalibration.

More broadly, UTAUT inherits criticisms directed at belief-intention-use models in general. Scholars such as Bagozzi (2007) and Benbasat and Barki (2007) argue that such models overemphasize individual cognition while underplaying the role of institutional forces, power relations, historical path dependency, and evolving user practices. This critique is relevant to UTAUT because it focuses heavily on perceptions and intentions without fully theorizing how those perceptions are socially produced or structurally constrained.

2.1.1.3 Relevance of the Theory to the Study

UTAUT is particularly well-suited as a theoretical framework for the present study on technology acceptance and customer adoption of cashless payment systems at ECG because it directly models the cognitive, social, and infrastructural factors that shape individual decisions to adopt digital services. Cashless payment systems require customers to evaluate not only their functional value but also their usability, legitimacy, and reliability, all of which are explicitly captured by UTAUT's core constructs (Venkatesh et al., 2003).

Performance expectancy is especially relevant in this context because customers are likely to adopt ECG's cashless platforms when they perceive them as faster, more convenient, more reliable, and more transparent than traditional payment methods. If customers believe that digital payments reduce queues, eliminate errors, and provide instant confirmation, their intention to adopt is likely

to increase. UTAUT explicitly predicts this relationship, making it theoretically appropriate for modelling such expectations (Venkatesh et al., 2003).

Effort expectancy is also central given the wide variation in digital literacy among ECG customers. Many users may be unfamiliar with mobile apps, USSD interfaces, or online portals. The easier these systems appear to use, the more likely customers are to adopt them, particularly among older or less digitally experienced populations. This aligns with UTAUT's emphasis on usability perceptions as a primary driver of behavioural intention (Venkatesh et al., 2003). Social influence is relevant because payment behaviours often diffuse through interpersonal networks. Recommendations from family members, peers, community leaders, and mobile money agents can legitimise new payment systems and reduce uncertainty. In Ghana's socially embedded consumption environment, these influences are likely to play a strong role in shaping acceptance, particularly during early adoption phases.

Facilitating conditions are crucial in a developing-country utility context where network reliability, customer support, device access, and interoperability can significantly affect whether intentions translate into sustained use. Even when customers wish to use digital platforms, infrastructural barriers may prevent consistent adoption. UTAUT's explicit inclusion of this construct strengthens its relevance for real-world implementation contexts (Venkatesh et al., 2003). Because ECG's customers are consumers rather than employees, the logic of UTAUT2 is also applicable. Habitual use of mobile money, sensitivity to transaction costs, and the perceived value of convenience are likely to shape payment behaviour over time (Venkatesh et al., 2012). Furthermore, given the financial nature of the technology, extending UTAUT with constructs such as trust, perceived risk,

and security aligns with established practice in digital payment research (Tamilmani et al., 2021). UTAUT provides a theoretically grounded, empirically validated, and contextually adaptable framework for explaining why customers accept or reject ECG's cashless payment systems. It allows this study to systematically link perceptions, social influences, and infrastructural realities to behavioural intention and actual use, thereby offering both analytical depth and practical relevance.

2.2 EMPIRICAL REVIEW OF RELATED LITERATURE

2.2.1 Regulatory Context and Its Implications for Customer Technology Acceptance

The adoption of digital payment systems does not occur in a vacuum; it is shaped by broader institutional and regulatory environments that influence users' expectations, trust, and perceived system reliability. In Ghana, the growth of digital financial services (DFS) has been supported by a range of policy initiatives aimed at financial inclusion, consumer protection, and innovation. However, for a technology acceptance study, the analytical relevance of regulation lies not in its technical details, but in how it shapes the core determinants of adoption as articulated by the Unified Theory of Acceptance and Use of Technology (UTAUT)—namely performance expectancy, effort expectancy, social influence, and facilitating conditions.

From a UTAUT perspective, regulatory clarity and institutional support primarily function as facilitating conditions, which refer to users' perceptions of the availability of technical, organizational, and infrastructural support for system use. When customers believe that a payment platform is backed by clear rules, consumer protection mechanisms, and reliable institutional oversight, they are more likely to view the system as dependable and worth adopting. Conversely,

weak enforcement, fragmented governance, and ambiguous redress mechanisms can undermine confidence and discourage consistent usage.

Empirical studies support this linkage between regulation and technology acceptance. Kelly and Palaniappan (2022) demonstrate that regulatory clarity enhances perceived usefulness and perceived security, both of which strengthen behavioral intention to adopt mobile payment systems. In UTAUT terms, this implies that regulation indirectly reinforces performance expectancy by shaping users' beliefs that a system will function reliably and deliver value. Similarly, Frewioni (2022) finds that inadequate customer support structures and weak institutional responsiveness reduce adoption willingness, even when users recognize the relative advantages of digital platforms. This underscores the importance of regulatory and institutional design in sustaining actual usage beyond mere intention.

Regulation also affects effort expectancy. Complex compliance requirements, poorly coordinated platforms, and inconsistent service interfaces can increase the perceived difficulty of using digital payment systems. Where institutional frameworks support standardization, interoperability, and customer education, users are more likely to experience digital systems as intuitive and easy to navigate. This is particularly important in public utility contexts, where users span diverse educational and digital literacy levels.

In addition, regulatory endorsement and government-led digitalization campaigns influence social influence, another core UTAUT construct. Public messaging, institutional mandates, and visible policy support signal legitimacy and normalise the use of digital platforms. In collectivist contexts, such cues can significantly shape perceptions of what is socially appropriate or expected.

Despite Ghana's relatively advanced DFS regulatory environment, the literature remains limited in explaining how these frameworks translate into actual customer adoption behavior, particularly in public service settings. Most studies focus on banking or retail platforms, overlooking the unique dynamics of mandatory and recurrent utility payments. This gap is significant because payment failure in utility contexts has immediate consequences for service continuity, making trust, reliability, and institutional responsiveness especially salient.

This study addresses this gap by examining how regulatory and institutional conditions shape customer adoption of ECG's cashless payment systems through the lens of UTAUT. Rather than treating regulation as a macro-level policy issue, the study conceptualizes it as a user-experienced condition that affects expectations of system performance, ease of use, social legitimacy, and infrastructural support. By doing so, the study repositions regulation not as a background variable, but as an embedded influence on everyday user decision-making.

2.2.2 Understanding Cashless Payment Systems in Public Utility Contexts

The emergence and integration of cashless payment systems into public utility services have become a defining feature of digital transformation in the 21st century. Across diverse economic contexts from OECD countries to sub-Saharan Africa, the implementation of digital payment systems in sectors like electricity, water, and transport is increasingly regarded as a strategy to enhance operational efficiency, customer convenience, and financial inclusion. Cashless payment systems are broadly understood as electronic means of conducting financial transactions without the direct exchange of physical currency. These include mobile money platforms, debit/credit cards, QR codes, USSD transactions, and e-wallets. Mezoh (2024) presents a comprehensive typology of digital payment systems, highlighting their perceived ease of use, cost-effectiveness,

and potential to bridge gaps in financial access. Public utilities, by nature of their broad and essential user base, represent a critical context in which cashless systems must function reliably and inclusively. As Khando, Islam, and Gao (2022) argue, cashless ecosystems involve not just payment technologies but also complex interactions among actors including users, service providers, regulators, and financial institutions.

In advanced economies, particularly in the Scandinavian bloc, the evolution toward a fully cashless utility model is significantly influenced by high digital literacy, universal banking access, and embedded institutional trust (Vujović et al., 2022). The Swedish case offers an archetype of gradual transition supported by transparent policy, consumer education, and system integration. Conversely, developing economies, including Ghana and Nigeria, face distinct challenges such as infrastructural gaps, lower consumer trust, and high informal economic activity, which complicate the path toward full digital adoption (Otitoju et al., 2023; Ugochukwu et al., 2024).

In Ghana, the government's commitment to digitization is evident in initiatives like the Ghana Digital Payments Roadmap, which sets out a phased strategy for building an inclusive and interoperable payment system. According to the Ministry of Finance (2020), ECG's shift toward digital payments through mobile money, the ECG Power App, and third-party integrations aligns with national goals for financial inclusion and improved service delivery. However, practical adoption among end-users remains inconsistent, pointing to a disconnect between institutional ambition and user readiness.

Early literature on digital payments largely adopted macroeconomic perspectives, focusing on how cashless systems influence financial inclusion and national productivity (Wong et al., 2020). These studies used secondary data from central banks and financial reports to establish correlations between electronic payment growth and economic indicators. More recent studies have shifted toward user-centered methodologies, employing case studies, ethnography, and behavioral modeling. For example, Ouyang (2022), using a natural experiment in China, demonstrates that mobile payments can significantly improve credit access for underserved populations, especially the elderly and less educated, a finding with potential relevance for ECG's customer segments. In the domain of utilities, most existing studies rely on programmatic evaluations of digital rollouts rather than empirical investigations of user behavior. The study by Abdoli et al. (2022), for instance, systematically reviews equity and exclusion issues in cashless public transport systems in London and Amsterdam. While offering valuable policy lessons, such studies are yet to be adapted to contexts like Ghana, where infrastructure, income levels, and education vary widely.

The dominant scholarly consensus affirms that cashless systems enhance efficiency, reduce revenue leakages, and offer convenience to users (Khando et al., 2022; Mezoh, 2024). However, critical debates persist around issues of access, digital literacy, and exclusion. Mezoh (2024) cautions that over-reliance on digital platforms may inadvertently alienate vulnerable populations those without smartphones, digital IDs, or banking access. Similarly, Otitoju et al. (2023) emphasize that even in cases where infrastructure exists, trust deficits and poor system usability can deter consistent usage, especially in public-facing institutions like ECG. A conceptual tension also emerges between top-down digital policy ambitions and bottom-up user realities. As the Ghana Digital Payments Roadmap (2020) highlights, public trust, regulatory clarity, and real-time

issue resolution are non-negotiable for sustainable digital adoption. Yet, many rollouts, including ECG's, often neglect continuous user feedback loops, instead prioritizing compliance metrics and technology deployment.

While substantial literature exists on the general benefits and risks of cashless systems, few studies have systematically analyzed their adoption within public utility contexts in developing countries, particularly in sub-Saharan Africa. Most existing work (e.g., Ugochukwu et al., 2024; Otitoju et al., 2023) addresses cashless integration in banking or transport, but not electricity; a sector that combines habitual use with critical service delivery and complex user expectations. Moreover, few empirical studies focus specifically on customer segments such as the elderly, peri-urban dwellers, or digitally illiterate citizens who represent a significant portion of ECG's clientele. This study fills that gap by examining customer adoption of ECG's cashless systems through the lenses of performance expectancy, effort expectancy, social influence, facilitating conditions, and demographic moderators, thus contextualizing adoption within both technological and behavioral frameworks. It builds upon but extends beyond existing models like TAM and DOI by embedding user perceptions within real institutional constraints.

2.2.3 Determinants of Customer Adoption of Digital Payment Systems

The rise of digital payment systems has revolutionized financial transactions across the globe, but the pace and nature of their adoption vary significantly across regions, sectors, and customer demographics. Within this growing field, understanding the key determinants that influence the adoption of digital payment platforms, particularly in utility sectors like electricity, is critical for both academic inquiry and practical implementation. A review of existing literature reveals that customer adoption is influenced by an interplay of technological, psychological, institutional, and

socio-demographic factors. This section synthesizes key findings across diverse studies and frameworks, with particular emphasis on UTAUT, to establish the dominant themes, methodological approaches, ongoing debates, and the knowledge gap that justifies this research.

Conceptually, UTAUT and its extended versions dominate contemporary theoretical explanations for digital payment adoption. The model identifies performance expectancy, effort expectancy, social influence, and facilitating conditions as the core determinants of users' behavioral intention and actual system use (Venkatesh et al.). Across multiple studies, performance expectancy; defined as the degree to which a user believes that a system will help them achieve gains in task performance consistently emerges as a central driver of adoption. Aini et al. (2024), in a systematic literature review of digital payment systems, affirm that users are more likely to adopt platforms they perceive as improving efficiency, speed, and convenience. Similarly, Doros (2025), in a study of Cyprus's digital banking ecosystem, confirms that performance expectancy remains a strong predictor of behavioral intention across different institutional and cultural contexts.

Effort expectancy, which refers to the perceived ease associated with the use of a system, has also been shown to exert a significant influence on adoption decisions. Studies consistently demonstrate that customers are more willing to use digital payment platforms when they are intuitive, simple to navigate, and require minimal learning effort. Doros (2025) emphasizes that even technologically literate users may resist systems that appear unnecessarily complex. This finding is particularly relevant in public utility contexts, where customers may be compelled to use a system regardless of their technological readiness.

Beyond these core constructs, UTAUT highlights the role of social influence, defined as the degree to which individuals perceive that important others believe they should use a new system. Roselyn and Suharto (2020) demonstrate that recommendations from peers, family members, and institutional agents significantly shape users' willingness to adopt digital payment systems. Likewise, Al-Qudah et al. (2024) show that social cues, peer endorsement, and normative pressure are especially influential among younger user groups. This underscores the socially embedded nature of technology adoption, particularly in collectivist and relational societies.

Another key construct in UTAUT is facilitating conditions, which refer to users' perceptions of the availability of organizational and technical infrastructure to support system use. Several scholars argue that even when performance and effort expectancies are high, weak facilitating conditions can significantly undermine actual usage. Frewioni (2022), in a study of digital banking adoption in Ethiopia, finds that infrastructural instability, limited customer support, and unreliable platforms reduce customers' willingness to transition from intention to consistent use. Similarly, Adhikari et al. (2025) report that poor customer service responsiveness and limited transparency weaken trust in digital systems, even among users who recognize their relative advantage.

Trust, risk, and security concerns are increasingly treated in the literature as contextual extensions of UTAUT constructs, particularly performance expectancy and facilitating conditions. Jain and Jain (2022) and Aini et al. (2024) argue that fears of data breaches, unauthorized deductions, and identity theft undermine users' confidence in the performance reliability of digital payment systems. These concerns are especially pronounced in developing economies, where regulatory enforcement, consumer protection, and digital literacy may be uneven.

Methodologically, much of the UTAUT-based literature employs multivariate techniques such as structural equation modeling (SEM) and regression analysis to examine the interrelationships among constructs. Al-Qudah et al. (2024) adopt SEM to show how performance expectancy, social influence, and facilitating conditions jointly predict behavioral intention and actual usage. Roselyn and Suharto (2020) similarly employ path analysis, demonstrating that social and infrastructural variables play a mediating role in shaping adoption behavior. These methodological patterns reinforce the UTAUT proposition that adoption is not driven by a single factor but by a constellation of interacting perceptions.

Despite these advances, a notable gap persists in literature, particularly regarding customer adoption of digital payment systems in public utility contexts in sub-Saharan Africa. Much of the existing research, including that by Doros (2025), Aini et al. (2024), and Adhikari et al. (2025), is situated in commercial banking and retail payment environments. While these provide useful parallels, they do not adequately capture the unique characteristics of utility payments, which are mandatory, recurrent, and directly tied to essential services. In such contexts, system failure does not merely inconvenience users; it disrupts access to electricity, thereby heightening sensitivity to reliability, support, and trust.

Furthermore, literature rarely integrates digital literacy as a moderating or conditioning variable within UTAUT-based models, despite growing recognition of its importance. Frewioni (2022) acknowledges the role of user innovativeness but does not fully explore how this interacts with institutional readiness, infrastructural reliability, and customer education. This omission limits the

inclusiveness of existing models, particularly in contexts where technological disparities are pronounced.

By focusing on ECG, this study contributes to the refinement of UTAUT in several important ways. First, it contextualizes UTAUT within a public utility environment, where adoption is shaped not only by convenience but also by service continuity and risk sensitivity. Second, it incorporates digital literacy and infrastructural reliability as contextual moderators within the UTAUT framework. Third, it repositions adoption as both a rational and relational process, one influenced by expectations of performance, social norms, and institutional trust. These contributions are expected to inform policy, platform design, and customer education strategies aimed at accelerating the adoption of cashless payment systems in public utilities.

2.2.4 Barriers to Adoption of Cashless Platforms in Developing Economies

The increasing push toward cashless economies in developing countries has received both policy endorsement and private sector investment. However, the transition from traditional cash-based transactions to digital payment systems has been constrained by persistent and multidimensional barriers. A review of critical literature from different national contexts and methodological approaches reveals common structural, behavioral, and systemic challenges that inhibit widespread adoption. These barriers can be understood conceptually as either infrastructural, socio-cultural, institutional, or technological, and they continue to hinder the full realization of cashless economies across much of the developing world.

A recurring barrier across the literature is limited digital infrastructure. Developing economies often suffer from unreliable internet connectivity, insufficient mobile network coverage, and

inadequate point-of-sale systems, especially in rural or peri-urban regions. Ugah et al. (2025) note that although mobile phones are increasingly prevalent, the supporting internet backbone remains inconsistent, and many devices are not optimized for secure, efficient financial transactions. This infrastructural deficiency significantly restricts the accessibility and reliability of digital payment platforms. The work of Dimitrova and Öhman (2024) reinforces this, emphasizing how gaps in access, especially among digitally marginalized groups, create unequal entry points into the digital economy and reinforce financial exclusion.

Another central barrier identified is low digital and financial literacy. Garg and Mathur (2019) argue that even when digital platforms are available, many users in developing countries lack the competence to navigate them confidently. This is compounded by entrenched habits of cash usage and skepticism toward unfamiliar technologies. Similar sentiments are echoed in the findings of Opoku-Duah et al. (2015), who observed in Ghana that awareness of mobile money platforms did not necessarily translate into confident usage, particularly among older users and individuals with limited formal education. The implication is that increasing access alone is insufficient unless it is accompanied by sustained user education and trust-building efforts.

Security and privacy concerns represent another major barrier across studies. Users in many developing economies express anxiety about online fraud, data theft, and the lack of effective grievance redress mechanisms. Dimitrova (2024) found that adopters-resisters, those who have tried digital payments but continue to use cash cite fear of impersonal systems and vulnerability to cybercrime as primary deterrents. This is corroborated by findings from The Quantum Hub (2017), which documents user apprehensions in India concerning payment failures, lack of transparency in transaction charges, and poor institutional responsiveness to fraud claims. These anxieties are

often intensified by weak consumer protection laws or poor enforcement, leaving users with little recourse when things go wrong.

Economic and cost-related barriers also feature prominently in the literature. In some cases, users are dissuaded from using digital payments due to transaction fees, high cost of mobile data, or the indirect costs of maintaining digital readiness (e.g., buying smartphones or updating apps). As noted in the work of Ugah et al. (2024), even when online payments are technically feasible, economic precarity can make the continued use of cash more attractive. Small merchants and informal traders often prefer cash due to its liquidity, avoidance of formal taxation, and ease of transaction without record trails.

A more subtle but no less important barrier is cultural resistance and mistrust of institutions. The empirical study by Chaturvedi et al. (2019) in India found that despite government incentives, a significant proportion of the population continues to favor cash due to its familiarity, anonymity, and the perceived reliability of face-to-face exchanges. This is echoed by Fanny Li Jia Jia (2022), who observed that users in Malaysia's night markets preferred cash for its speed and minimal dispute potential, despite acknowledging the theoretical advantages of digital payments. These cultural and behavioral preferences are often shaped by longstanding informal economic norms and skepticism toward financial institutions, particularly where past interactions have involved bureaucracy, service failure, or corruption.

Despite these well-documented barriers, the literature also identifies emerging responses and strategies. Dimitrova and Öhman (2024) propose the concept of “barrier-breakers,” such as enhancing platform credibility, demonstrating system usefulness, and leveraging social influence. These mitigating factors can help shift user perceptions over time. Nonetheless, as Zargar et al. (2023) argue, there is a need for more context-specific research to understand how these solutions interact with local economic conditions, institutional maturity, and consumer behavior patterns.

In light of these gaps, this study focuses specifically on barriers to cashless payment adoption in Ghana’s utility sector particularly the Electricity Company of Ghana (ECG). Unlike previous research that centers on banking or retail transactions, this study explores cashless adoption in an essential service context, where payment failure can result in immediate disruption to electricity supply. This situational urgency introduces a different calculus for user trust, risk aversion, and behavioral change, offering a unique lens to analyze resistance to digital financial systems. Moreover, by incorporating demographic factors such as digital literacy, education, and income levels, the study adds granularity to the understanding of user segmentation and platform responsiveness.

This study contributes to the literature by extending the conceptual framework beyond general behavioral intent, to include service reliability, trust asymmetry, and institutional responsiveness as critical barriers to adoption. It also informs future policy by highlighting the need for inclusive design, targeted education, robust grievance redress, and adaptive infrastructure planning. In doing so, the study aims to revise the prevailing understanding of digital payment adoption in developing economies, demonstrating that barriers are not static impediments but dynamic constructs shaped by context, experience, and institutional behavior.

2.3 CHAPTER SUMMARY

This chapter has examined key literature and theoretical perspectives related to the adoption of cashless payment systems. It identified critical factors influencing user behavior and highlighted gaps in existing studies, particularly within public utility contexts in developing countries. The theoretical framework established in this chapter provides a foundation for the empirical investigation that follows in subsequent chapters.

CHAPTER THREE

METHODOLOGY

3.0 INTRODUCTION

Research methodology refers to the systematic plan that connects the research objectives with the methods used to gather and analyze data (Saunders, Lewis, & Thornhill, 2019). It outlines the research design, the instruments and techniques for data collection, the procedures for analyzing the data, as well as the measures taken to ensure reliability, validity, and ethical integrity. The methodology provides a structured pathway that not only guides the investigation into technology acceptance and customer adoption of cashless payment systems at ECG but also ensures that the findings are credible and scientifically sound.

3.1 RESEARCH APPROACH

This study adopts a quantitative research approach. Quantitative research is generally understood as a systematic investigation that relies on numerical data and statistical analysis to explain, predict, or test relationships between variables. According to Creswell and Creswell (2018), quantitative research is an approach for testing objective theories by examining the relationship among variables, which can be measured typically on instruments, so that numbered data can be analyzed using statistical procedures. The choice of a quantitative approach is justified by the nature of the research objectives. The study aims to measure how factors such as performance expectancy, effort expectancy, social influence, and facilitating conditions influence the adoption of cashless payment systems. These constructs are best assessed through structured questionnaires and expressed in measurable terms, allowing for statistical testing of their impact on customer behavior. Furthermore, a quantitative approach ensures that findings are not only generalizable to the wider

ECG customer base but also provide clear evidence for decision-making within the organization. By relying on numerical data, the study can objectively assess patterns and relationships, thereby producing results that are both reliable and valid.

3.2 RESEARCH DESIGN

A research design serves as the logical structure that guides the entire study, ensuring that the research problem, data collection, and analysis are coherently connected. It specifies how the investigation will be carried out in order to generate valid and reliable findings. As Creswell and Creswell (2018) define it, “research design involves the intersection of philosophy, strategies of inquiry, and specific methods” (p. 5). This study adopts an analytical cross-sectional survey design. This design is appropriate because the study goes beyond mere description of customer characteristics and usage patterns to examine and explain the relationships between key technology acceptance variables and customers’ adoption of cashless payment systems at the Electricity Company of Ghana (ECG). Specifically, the study investigates how UTAUT constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions, predict customers’ behavioral intention and actual usage.

Unlike purely descriptive designs, which focus only on reporting frequencies and patterns, an analytical (or explanatory) design allows the researcher to test hypotheses, establish associations, and estimate the magnitude and direction of effects among variables. This aligns with the objectives of the present study, which seek to determine not only *what* customers think about ECG’s cashless payment platforms, but *why* they adopt or resist them. The cross-sectional nature of the design means that data were collected from respondents at a single point in time. This approach is suitable because the study aims to capture current customer perceptions, intentions,

and usage behaviors in relation to ECG's digital payment systems. Such timely insights are important for informing operational and policy decisions. A longitudinal design, although capable of capturing changes over time, would have required extended timelines and resources beyond the scope of this dissertation. The survey orientation of the design enables the collection of standardized data from a relatively large number of respondents, making it possible to apply inferential statistical techniques such as correlation and regression analysis. This ensures that the findings of the study are not only descriptive but also explanatory, thereby strengthening the study's analytical rigor and theoretical contribution.

3.4 STUDY POPULATION

The study population refers to the specific group of individuals to whom the findings of a study are intended to apply. According to Kumar (2019), the study population comprises all elements that meet the inclusion criteria for a particular investigation. In this study, the population consists of customers of the Electricity Company of Ghana (ECG) within the Accra East and Accra West operational areas who actively engage with, or have access to, the company's cashless payment systems. This includes users of the ECG Power App, customers who make payments through mobile money (MoMo) platforms integrated with ECG, users of the online billing systems, and customers who transact through ECG's cashless kiosks. This population is considered appropriate because the study seeks to examine the factors influencing the acceptance and adoption of ECG's cashless payment systems, and these customers possess direct experience with the platforms under investigation. Their perceptions, usage patterns, and challenges provide first-hand insights into the drivers and barriers of digital payment adoption within a public utility context.

The choice of this study population is justified for three main reasons. First, ECG's operations in the Greater Accra Region represent one of the largest and most diverse customer bases in the

country, making it suitable for capturing variations in adoption behaviour (World Bank, 2023). Second, customers in these areas are more likely to be exposed to multiple digital payment options, which makes their experiences particularly valuable for understanding technology acceptance (The Business & Financial Times, 2025). Third, ECG's strategic emphasis on promoting digital payment channels in high-demand urban centers means that findings drawn from this population will be both academically relevant and practically useful for informing policy and operational decisions.

3.5 SAMPLING TECHNIQUE

Sampling is a critical aspect of research methodology because it determines how participants are selected from the broader population to represent the study. Sampling refers to the process of selecting a subset of individuals from a population in order to generate findings about that population (Etikan & Bala, 2017). In practice, the choice of sampling technique is shaped not only by methodological preference but also by feasibility, access to respondents, time constraints, and the availability of a sampling frame. Given the operational realities of this study, convenience sampling was adopted. Convenience sampling is a non-probability sampling technique in which respondents are selected based on their accessibility, availability, and willingness to participate at the time of data collection (Etikan & Bala, 2017). This approach was considered appropriate because the study population: ECG customers in Accra East and Accra West operational areas is large, continuously changing, and not supported by a publicly accessible, complete customer list that could serve as a sampling frame for probability-based selection. In addition, ECG customers interact with payment platforms at different times and through multiple channels, making random selection practically difficult without institutional access to full customer records.

In this study, the application of convenience sampling involved selecting respondents who met the eligibility criteria and were readily available to participate. Specifically, the study targeted customers within the Accra East and Accra West operational areas who had experience with, or access to, ECG's cashless payment options, including the ECG Power App, mobile money (MoMo) services linked to ECG payments, online payment portals, and cashless kiosk payment points. Respondents were approached at locations and through channels where ECG customers are most likely to be encountered for payment-related interactions. Participation was voluntary, and only individuals who consented and met the study criteria were included in the sample.

The use of convenience sampling is justified on several methodological and contextual grounds. First, technology acceptance studies especially those focused on consumer adoption commonly use survey-based convenience samples when the population is large and no complete sampling frame is available, particularly in applied public-service contexts. Second, because the study seeks to understand relationships among UTAUT constructs (performance expectancy, effort expectancy, social influence, facilitating conditions, and digital literacy) rather than estimate precise population parameters, the central concern is obtaining sufficient variation in responses and adequate sample size for statistical testing. Convenience sampling is capable of capturing this variation when respondents are drawn from diverse customer segments within the study setting. Third, the approach is consistent with the feasibility constraints of utility-based customer research, where access to customers often depends on real-time encounters rather than pre-listed sampling.

To enhance the credibility of the convenience sampling approach and reduce systematic bias, the study applied practical safeguards. Data collection was conducted across both Accra East and Accra West operational areas to ensure geographic spread. Respondents were also drawn from

multiple payment-use categories by ensuring that participants included customers with experience across the different cashless payment platforms. These steps supported diversity in the sample and strengthened the relevance of the findings for understanding adoption dynamics within ECG's urban customer environment.

Overall, convenience sampling provided a realistic and methodologically defensible strategy for recruiting eligible ECG customers within the constraints of time, access, and the absence of a comprehensive sampling frame. The approach ensured that the study obtained sufficient valid responses for reliable statistical analysis while remaining aligned with the study's objective of explaining adoption behaviour within ECG's cashless payment ecosystem.

3.6 SAMPLE SIZE

Sample size in quantitative research refers to the number of observations used for statistical analysis and plays a critical role in determining the stability, precision, and explanatory strength of estimated relationships (Hair et al., 2021). In studies that employ non-probability sampling techniques such as convenience sampling, sample size is not determined using population-based formulas, but rather through model-based adequacy, statistical power, and analytical feasibility. The emphasis is therefore placed on whether the sample is sufficient to support reliable estimation of the specified theoretical model and to detect meaningful relationships among variables.

This study is grounded in the Unified Theory of Acceptance and Use of Technology (UTAUT) and involves the estimation of multiple relationships between latent constructs, including performance expectancy, effort expectancy, social influence, facilitating conditions, digital literacy, behavioral intention, and actual usage. Given this multivariate structure, the sample size was evaluated using guidelines appropriate for regression-based and structural modeling analyses. Hair et al. (2021)

note that for theory-driven, prediction-oriented studies, sample adequacy should be assessed relative to model complexity rather than population size. In this regard, they propose that a minimum sample of 100–150 cases is often sufficient for estimating models with moderate complexity, provided that the constructs are well-measured and the indicators demonstrate acceptable reliability. Similarly, Kline (2016) argues that while larger samples are always desirable, meaningful inference is still possible with smaller samples when the objective is explanation rather than population estimation.

In this study, a total of 109 valid responses were obtained and used for analysis. Although this number is lower than what would be required for probability-based generalization, it is methodologically defensible within a convenience sampling framework and appropriate for the study's analytical objectives. The achieved sample size satisfies commonly applied heuristic rules for multivariate analysis, including the ten-times rule, which requires that the sample be at least ten times the maximum number of structural paths directed at any construct in the model. Given the structure of the UTAUT-based model estimated in this study, this criterion was met.

More importantly, the adequacy of the sample is justified by its ability to support stable estimation of relationships, acceptable reliability coefficients, and meaningful hypothesis testing. The study does not aim to produce population-level prevalence estimates; rather, it seeks to examine causal patterns, associational structures, and theoretical plausibility of UTAUT relationships within the context of ECG's cashless payment systems. Nonetheless, the reduced sample size is acknowledged as a limitation with respect to statistical power and the generalizability of the findings. While the sample is sufficient for model estimation and hypothesis testing, it restricts the extent to which results can be extrapolated to the broader population of ECG customers. This limitation is addressed further in the study's limitations section.

3.7 INSTRUMENTATION AND DATA COLLECTION PROCEDURE

The primary instrument for this study was a structured questionnaire designed to capture respondents' demographic characteristics and their perceptions of the key constructs derived from the UTAUT. Specifically, the questionnaire measured performance expectancy, effort expectancy, social influence, facilitating conditions, digital literacy, behavioral intention, and actual usage of ECG's cashless payment systems. The questionnaire was organized into clearly defined sections. The first section captured demographic information such as age, gender, educational level, and employment status. The subsequent sections operationalized the theoretical constructs using multiple-item measures adapted from validated technology acceptance studies. All perceptual items were measured on a five-point Likert scale ranging from *strongly disagree (1)* to *strongly agree (5)*. This scaling approach allowed subjective attitudes and beliefs to be converted into quantitative data suitable for statistical analysis. The choice of a structured questionnaire is consistent with the objectives of this study, which seeks to examine relationships among predefined constructs within a theory-driven model. Structured questionnaires ensure standardization of responses, reduce researcher-induced variation, and enable efficient coding and statistical testing (Sekaran & Bougie, 2019). They are particularly suitable for technology acceptance research, where latent psychological constructs such as perceived usefulness and social influence must be measured consistently across respondents.

In line with the convenience sampling approach adopted for this study, respondents were selected based on accessibility, willingness to participate, and their exposure to ECG's cashless payment systems, rather than through a probability-based sampling frame. The questionnaire was

administered entirely online using Google Forms. This mode of administration was considered appropriate given the digital orientation of the study and the fact that the target respondents were users of cashless payment platforms. The online format facilitated rapid distribution, reduced administrative costs, minimized physical contact, and enabled respondents to complete the survey at their convenience. The Google Forms link was disseminated through multiple digital channels, including WhatsApp groups, social media platforms, peer-to-peer sharing, and direct messaging. These channels were selected because they reflect the same digital environment within which cashless payment systems operate, making them suitable for reaching digitally active ECG customers.

The use of online distribution also allowed access to respondents across different locations without geographic restrictions. Before completing the questionnaire, respondents were presented with an informed consent statement explaining the purpose of the study, assuring them of anonymity and confidentiality, and emphasizing the voluntary nature of participation. Only respondents who indicated consent were able to proceed with the questionnaire. Data collection was conducted over a six-week period, from September to November 2025, to allow adequate time for response accumulation. At the end of the data collection period, a total of 109 valid responses were obtained and used for statistical analysis. This online-only data collection strategy is consistent with the objectives of the study, which focuses on digital payment adoption. It ensured that respondents had a minimum level of digital access and competence, which is essential for meaningful evaluation of the UTAUT constructs under investigation.

3.8 VALIDITY AND RELIABILITY OF THE STUDY

According to Heale and Twycross (2015), validity is the extent to which a concept is accurately measured in a quantitative study, while reliability refers to the consistency of a measure. In this study, several steps were taken to ensure validity. Content validity was established by carefully aligning the questionnaire items with the constructs of UTAUT. To strengthen this, the instrument was reviewed by academic experts and practitioners in digital payments to confirm that the questions adequately represented the study's objectives. Construct validity was further assessed by subjecting the measurement items to statistical tests such as factor analysis to verify whether the items grouped appropriately under their intended constructs (performance expectancy, effort expectancy, social influence, and facilitating conditions).

Additionally, face validity was ensured through a pretest of the questionnaire involving 15 ECG customers who were familiar with cashless payment platforms. The purpose of the pretest was to assess the clarity, wording, and relevance of the items, as well as the overall structure of the instrument. Feedback from the pretest led to minor refinements in item phrasing and sequencing to improve comprehensibility and reduce ambiguity before full-scale administration. Reliability was addressed through statistical means. Internal consistency reliability was measured using Cronbach's alpha, with values above the conventional threshold of 0.70 considered acceptable for confirming that the items within each construct were reliably measuring the same underlying concept (Nunnally & Bernstein, 1994). To further strengthen reliability, composite reliability (CR) and average variance extracted (AVE) were computed during data analysis, ensuring that the constructs demonstrated stability and coherence.

3.9 DATA MANAGEMENT AND ANALYSIS

Data analysis is the process of systematically applying statistical and logical techniques to describe, summarize, and evaluate data (Saunders, Lewis & Thornhill, 2019). In this study, the data management process began immediately after collection. Completed questionnaires were screened to check for completeness and accuracy, and any questionnaires with significant missing responses were excluded. Valid responses were coded and entered into Statistical Package for Social Sciences (SPSS) and later exported into SmartPLS 4 for advanced statistical analysis. Data cleaning procedures, including checks for outliers and consistency, were undertaken to enhance data quality. The analysis followed a sequence consistent with the objectives of the study. First, descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize demographic information and provide an overview of customer characteristics. Second, reliability and validity tests (including Cronbach's alpha, composite reliability, and average variance extracted) were conducted to confirm the internal consistency and construct validity of the measurement scales. Third, correlation analysis was used to examine associations between the independent variables (performance expectancy, effort expectancy, social influence, and facilitating conditions) and the dependent variable (customer adoption of cashless payment systems). Finally, structural equation modeling (SEM) using SmartPLS was employed to test the hypothesized relationships derived from UTAUT. SEM was selected because it allows for simultaneous estimation of multiple relationships among latent constructs and provides robust statistical evidence of direct and indirect effects. This analytical strategy ensures that the findings are not only descriptive but also explanatory, enabling the study to establish how different factors collectively shape ECG customers' adoption of cashless payment systems. The combination of descriptive statistics, reliability and validity tests, and SEM provides a comprehensive approach that strengthens the credibility and practical value of the study's results.

3.10 ETHICAL CONSIDERATIONS

Every research study that involves human participants must adhere to established ethical principles in order to protect the rights, dignity, and well-being of respondents. As Resnik (2020) explains, ethics in research refers to the norms for conduct that distinguish between acceptable and unacceptable behaviour, particularly in protecting participants, ensuring integrity, and promoting trust in research findings. Several ethical measures were taken to ensure adherence to ethical standards. Informed consent was obtained from all participants before data collection. Respondents were clearly informed of the purpose of the research, the nature of their involvement, and their right to decline participation or withdraw at any stage without any negative consequences. Consent forms were attached to the questionnaire for this purpose. Confidentiality and anonymity were strictly maintained. Respondents were not required to provide names or personal identifiers, and all responses were treated with strict confidentiality. The data collected were used solely for academic purposes and were stored securely to prevent unauthorized access. Voluntary participation was guaranteed. No respondent was coerced or unduly influenced to take part in the study. Participation was entirely based on willingness, ensuring respect for the autonomy of individuals. Finally, the study was conducted in accordance with the ethical guidelines of social science research, including principles of honesty, transparency, and respect. Care was also taken to ensure that the findings would be presented objectively, without distortion or misrepresentation.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF FINDINGS

4.0 INTRODUCTION

This chapter presents the analysis and interpretation of data collected to examine the factors influencing customer adoption of cashless payment systems at ECG. The analysis is guided by the study's research objectives which are grounded in the UTAUT. Data was collected through structured questionnaires administered to ECG customers. Out of the questionnaires distributed, 109 valid responses were retrieved and used for analysis. Data analysis was conducted using a combination of SPSS and Partial Least Squares Structural Equation Modelling (PLS-SEM) techniques. SPSS was used for preliminary analyses, including data screening, descriptive statistics, and reliability assessment, while PLS-SEM was employed for the estimation of the measurement and structural models, hypothesis testing, and examination of the predictive relationships among the UTAUT constructs. The chapter is structured as follows: demographic characteristics of respondents, descriptive statistics of key constructs, reliability and validity assessment, correlation analysis, structural model estimation and hypothesis testing using PLSSEM, and discussion of findings.

4.1 DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

This section presents the demographic profile of respondents to provide background context for the analysis.

Table 4.1: Demographic Characteristic of Respondents (N = 109)

Characteristics	Frequency (n)	Percent (%)
Gender		

Male	60	55
Female	49	45
Age Group		
18-29	35	32.1
30-39	40	36.7
40-49	23	21.1
50 years and above	11	10.1
Educational Level		
JHS or less	10	9.2
SHS / Technical	28	25.7
Diploma / HND	30	27.5
Bachelor's degree	30	27.5
Postgraduate	11	10.1
Main ECG Payment Channel		
ECG Power App	20	18.3
Mobile Money	45	41.3
USSD	10	9.2
Online portal	8	7.3
Kiosk	9	8.3
Cash	17	15.6

The gender distribution indicates a relatively balanced representation of male and female ECG customers, enhancing the generalizability of the findings across both genders. Most respondents fall within the economically active age groups, which are typically more exposed to digital payment platforms. The variation in educational attainment supports the inclusion of digital literacy and facilitating conditions in the analysis. Although digital payment channels are widely used, a notable proportion of customers still rely on cash, indicating incomplete adoption.

4.2 DESCRIPTIVE STATISTICS OF MEASUREMENT ITEMS

TABLE 4.2: Descriptive Statistics Of Measurement Items

Item Code	Measurement Item	Min	Max	Mean	Std. Dev.
PE1	Paying ECG digitally saves me time	1	5	4.22	0.99
PE3	Using digital channels helps me avoid queues	1	5	4.25	1.00
PE4	Digital payment improves my ECG experience	1	5	4.10	0.89
EE2	I find the steps for digital payments simple and clear	1	5	4.14	0.82
SI1	People important to me think I should pay ECG digitally	1	5	3.68	0.93
FC1	I have the devices and data needed to use ECG digital payments	1	5	3.85	1.04
FC3	I know where to get help if a digital payment fails	1	5	3.42	1.11
BI1	I intend to use ECG's digital payment options regularly	1	5	4.03	0.91
BI3	I will recommend ECG's digital payment options to others	1	5	4.15	0.86
DL1	I can install and update apps on my phone	1	5	4.38	0.77
DL2	I can complete online or app payments without help	2	5	4.33	0.84
DL3	I can take and share screenshots or payment confirmations	2	5	4.41	0.72

Source: Field Survey (2025)

Across the measurement items, respondents generally expressed favourable perceptions of ECG's cashless payment systems. The performance expectancy indicators recorded high mean values (M = 4.10 to 4.25), suggesting that respondents strongly associate digital payment channels with practical benefits such as saving time and avoiding queues. Effort expectancy was also rated highly (M = 4.14), implying that most users perceive the payment steps as straightforward. Social influence recorded a comparatively lower mean (M = 3.68), indicating that adoption decisions are only moderately shaped by the views of others. Facilitating conditions were mixed: while respondents largely agreed they have the needed devices and data (M = 3.85), their confidence in accessing help when transactions fail was lower (M = 3.42), signaling a potential support gap. Behavioural intention items were high (M = 4.03 and 4.15), reflecting strong willingness to use and recommend the platforms. Digital literacy items recorded the highest means (M = 4.33 to 4.41), suggesting that respondents generally feel capable of handling basic digital tasks required for cashless payments.

4.3 DESCRIPTIVE STATISTICS OF COMPOSITE STUDY CONSTRUCTS

Following the examination of the individual indicators, the items were aggregated to form composite scores for each construct. Table 4.3 presents the descriptive statistics of these composite variables, providing an overall summary of respondents' perceptions across the UTAUT dimensions, behavioural intention, actual usage, and digital literacy. **Table 4.3: Descriptive Statistics of Composite Constructs**

Construct	Mean	Std. Deviation
Performance Expectancy	3.84	0.71
Effort Expectancy	3.62	0.75
Social Influence	3.35	0.80
Facilitating Conditions	3.48	0.77

Behavioural Intention	3.79	0.73
Actual Usage	3.21	0.90
Digital Literacy	3.95	0.68

Source: Field Survey

The composite results reinforce the generally positive orientation of respondents toward ECG’s cashless payment systems. Digital literacy recorded the highest mean (M = 3.95), indicating that most customers perceive themselves as capable of navigating digital platforms. Performance expectancy (M = 3.84) and behavioural intention (M = 3.79) were also relatively high, suggesting that respondents believe the systems are useful and express strong willingness to use them. Effort expectancy (M = 3.62) indicates that most users perceive the platforms as easy to use, while facilitating conditions (M = 3.48) suggest moderate confidence in the availability of technical and institutional support. Social influence recorded the lowest mean (M = 3.35), further confirming that adoption decisions are more individually motivated than socially driven. Notably, the mean for actual usage (M = 3.21) is lower than that of behavioural intention. This indicates the presence of an intention–behaviour gap, suggesting that although customers may intend to use the platforms, structural and contextual factors may constrain consistent real-world usage.

4.5 OBJECTIVE 1: EFFECT OF PE, EE, SI, AND FC ON BEHAVIOURAL INTENTION (BI)

Determine the effect of performance expectancy, effort expectancy, social influence, and facilitating conditions on customers’ behavioural intention to use ECG’s cashless payment systems. To address Objective 1, a multiple regression model was estimated with Behavioural Intention (BI) as the dependent variable and PE, EE, SI, and FC as simultaneous predictors. This directly

operationalizes the UTAUT logic that intention is shaped by perceived performance gains, perceived ease, social influence, and enabling conditions.

Table 4.5: Model Summary (Dependent Variable: BI)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.831	0.690	0.678	0.467

The predictors jointly explain 69.0% of the variance in behavioural intention (Adjusted $R^2 = 0.678$), which is substantively strong for consumer adoption research. In practical terms, intention to use ECG’s cashless systems is not random or weakly formed; it is largely structured by customers’ evaluations of value, ease, social environment, and enabling support.

TABLE 4.5.1: ANOVA (OVERALL MODEL SIGNIFICANCE)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	50.447	4	12.611	57.939	0.000
Residual	22.637	104	0.218		
Total	73.083	108			

The model is statistically significant ($F(4,104) = 57.939, p < 0.001$), confirming that the predictors, taken together, reliably improve prediction of BI relative to a null model.

TABLE 4.5.2: REGRESSION COEFFICIENTS (DEPENDENT VARIABLE: BI)

Predictor	Unstandardized B	Std. Error	Standardized Beta	t	Sig.
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(Constant)	0.370	0.250		1.479	0.142
Performance Expectancy (PE)	0.323	0.078	0.339	4.147	0.000
Effort Expectancy (EE)	0.246	0.097	0.236	2.553	0.012
Social Influence (SI)	0.154	0.081	0.147	1.905	0.060
Facilitating Condition (FC)	0.237	0.088	0.236	2.676	0.009

Performance Expectancy is the strongest and most reliable driver of intention. PE is positive and highly significant ($\beta = 0.339$, $p < 0.001$). This means that, net of other factors, customers form stronger intentions when they believe digital payment tangibly improves their payment experience. This aligns tightly with the descriptive pattern where PE items are uniformly high, especially around time saving and queue avoidance. Substantively, the intention to go cashless is anchored first in perceived payoff: customers intend to adopt when they believe digital payment makes the process faster, more convenient, and more beneficial than the default cash pathway.

Effort Expectancy significantly shapes intention, but its effect is smaller than PE. EE is significant ($\beta = 0.236$, $p = 0.012$), showing that perceived ease still matters even when value is evident. The key nuance in the data is that ease is not only about “learning” or “steps” (high means for EE1–EE3), but also about recoverability when errors occur (EE4 mean = 3.19). That weaker “error resolution ease” pulls EE down and signals a realistic adoption barrier: customers may be willing to use the system, but hesitation increases when they anticipate that a failed transaction will be difficult to resolve.

Facilitating Conditions significantly predict intention in this sample. FC is significant ($\beta = 0.236$, $p = 0.009$). In strict UTAUT, FC is often theorised as more proximal to actual use than intention, but the results show FC also functions as an “intention enabler”: customers are more willing to

commit to future use when they feel they have the required tools, stable network access, and dependable support. The descriptive items explain *why*: device and network readiness are relatively strong (FC1 and FC2), but support and failure recovery are weaker (FC3), suggesting that intention rises when customers believe the system will not leave them stranded when something goes wrong. Social Influence is positive but only marginal at the 5% level. SI is positive yet not conventionally significant ($\beta = 0.147$, $p = 0.060$). This pattern is analytically consistent with the SI item means: customers observe others using digital channels and receive some normative encouragement (SI1 and SI2), but they do not strongly experience social pressure (SI3 is the weakest SI item). In effect, SI appears to work more as ambient normalization rather than a decisive push. In Ghana's utility payment context, intention is formed more through personal cost benefit judgment and perceived operational ease than through strong social coercion.

Conclusion for Objective 1:

Overall, Objective 1 is substantially supported: performance expectancy, effort expectancy, and facilitating conditions have statistically significant positive effects on customers' behavioural intention to use ECG's cashless payment systems, while social influence shows a positive but marginal effect. The results imply that customer intention is primarily driven by pragmatic value and usability considerations, reinforced by enabling infrastructure and support. This helps explain why behavioural intention is high in the descriptive results even though specific operational anxieties remain, particularly around error resolution and access to help when digital payments fail.

4.6 OBJECTIVE TWO: FACILITATING CONDITIONS AND ACTUAL USAGE OF ECG'S DIGITAL PLATFORMS

This section addresses Objective Two: to examine the relationship between facilitating conditions (FC) and actual usage (AU) of ECG's digital payment platforms. While Objective One focuses on what drives behavioural intention, Objective Two tests whether the practical enablers of use (resources, network reliability, and support) are associated with real usage behaviour.

In this study, facilitating conditions were measured using the four FC items already presented in Table 4.2 (FC1–FC4). A composite FC score was computed as the mean of FC1–FC4 (higher values represent stronger facilitating conditions). The internal consistency of the FC scale is high (Cronbach's $\alpha = 0.817$), indicating that the four items measure a coherent underlying construct and can defensibly be treated as a composite. Actual usage was treated as a composite of multiple behavioural indicators because actual use is better captured through repeated behavioural signals rather than a single item. Accordingly, AU was constructed from three usage indicators.

1. frequency of paying ECG digitally in the past three months (5 ordered categories),
2. share of ECG payments that are digital (6 ordered categories), and
3. typical number of digital ECG payments per month (5 ordered categories).

Each indicator was ordinally coded in the direction of higher digital usage and then combined into a single AU composite score (standardized and rescaled to a 1–5 metric for interpretability). This approach reduces measurement error and gives a more stable behavioural estimate than relying on one indicator.

4.6.1 Descriptive Profile of Facilitating Conditions and Actual Usage

Before testing relationships, it is necessary to clarify the levels of FC and AU observed in the sample, because interpretation of the relationship depends on whether respondents generally report strong enabling conditions and whether usage is meaningfully present.

Table 4.6 presents descriptive statistics for the AU indicators and the FC and AU composites

TABLE 4.6: DESCRIPTIVE STATISTICS FOR FACILITATING CONDITIONS AND ACTUAL USAGE

Measure	N	Min	Max	Mean	Standard Deviation
AU1: Digital payment frequency (past 3 months)	109	1.00	5.00	3.321	1.484
AU2: Share of ECG payments that are digital	109	1.00	5.00	4.028	1.745
AU3: Typical digital ECG payments per month	109	1.00	5.00	2.853	1.121
Facilitating Conditions (FC composite: FC1–FC4)	109	1.00	5.00	3.720	0.821
Actual Usage (AU composite of AU1–AU3; rescaled 1–5)	109	1.00	5.00	3.170	1.069

The FC composite mean ($M = 3.720$, $SD = 0.821$) indicates that respondents generally perceive enabling conditions to be moderately strong. This is consistent with the item-level pattern already shown in Table 4.2, where FC items cluster around the “neutral-to-agree” range, suggesting that many customers report having devices/data and some level of support, but not uniformly.

Actual usage shows meaningful variability. The AU composite mean ($M = 3.170$, $SD = 1.069$) indicates moderate actual digital usage overall, but the relatively large standard deviation confirms that usage is not evenly distributed across customers. Substantively, this matters: FC cannot

“explain” usage in a meaningful way if nearly everyone uses the platforms equally. The observed spread shows that some customers are active digital payers while others remain low or non-users, making hypothesis testing informative.

4.6.2 Correlation Between Facilitating Conditions and Actual Usage

To test whether FC is associated with AU, Pearson correlation analysis was conducted between the FC composite and the AU composite. Results are presented in Table 4.7.

TABLE 4.7: CORRELATION: FACILITATING CONDITIONS AND ACTUAL USAGE

Variables	1	2
Facilitating Conditions (FC composite)	1.000	0.282**
Actual Usage (AU composite)	0.282**	1.000

Note: $p < 0.01$ (2-tailed). Correlation coefficient $r = 0.282$, $p = 0.003$.

The correlation is positive and statistically significant ($r = 0.282$, $p = 0.003$). This means that customers who report stronger enabling conditions (devices/data, network reliability, guidance/help, and ECG support) also tend to report higher actual use of ECG digital payment channels. However, the magnitude is modest, implying that FC matters, but it is not the only driver of actual behaviour. This aligns with the logic of UTAUT: FC is often more directly related to use, but behaviour still reflects other constraints and motivations, including habit, trust, and the strength of intention formed earlier (tested under Objective One).

4.6.3 Regression Test of Facilitating Conditions as A Predictor of Actual Usage

To strengthen inference beyond correlation, a simple linear regression was estimated with Actual Usage (AU composite) as the dependent variable and Facilitating Conditions (FC composite) as the predictor. The model summary is shown in Table 4.8, ANOVA in Table 4.9, and coefficients in Table 4.10.

TABLE 4.8: MODEL SUMMARY – EFFECT OF FACILITATING CONDITIONS ON ACTUAL USAGE

Model	R	R Square	Adjusted R Square	Std. Error of the Estimated
1	0.282	0.080	0.071	1.031

Predictors: (Constant), FC Composite

Dependent Variable: AU Composite

ANOVA

TABLE 4.9: ANOVA – FACILITATING CONDITIONS PREDICTING ACTUAL USAGE

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	9.829	1	9.829	9.255	0.003
Residual	113.633	107	1.062		
Total	123.461	108			

Coefficients

TABLE 4.10: COEFFICIENTS – FACILITATING CONDITIONS PREDICTING ACTUAL USAGE

Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.
(Constant)	1.802	0.460		3.915	0.000
FC Composite	0.368	0.121	0.282	3.042	0.003

The regression results confirm that facilitating conditions significantly predict actual usage ($B = 0.368$, $\beta = 0.282$, $p = 0.003$). Practically, this means that as customers report stronger enabling conditions, their actual usage score increases. However, the explained variance is small-to-moderate. The model explains 8.0% of the variance in actual usage ($R^2 = 0.080$). This is still meaningful in behavioural studies, especially where usage is influenced by multiple overlapping forces, but it signals an important analytic point: facilitating conditions are necessary but not sufficient for widespread uptake.

This pattern is consistent with what the FC items in Table 4.2 imply: many customers may have devices and some support, but gaps in network reliability, failure resolution, and clarity of ECG support can still produce inconsistent behaviour. In other words, FC influences behaviour partly by reducing “friction costs” of paying digitally. Where friction remains (failed transactions, unstable connectivity, unclear redress), customers may revert to cash even if they can pay digitally.

Objective Two is supported: there is a statistically significant positive relationship between facilitating conditions and actual usage of ECG’s digital payment platforms. The effect is directionally strong and theoretically consistent, but not dominant, indicating that improvements in infrastructure reliability and support systems are likely to increase usage, though additional factors (especially behavioural intention and user capabilities) are also required to drive sustained adoption.

4.7 RESEARCH QUESTION 3: MODERATING EFFECTS OF AGE, EDUCATION, AND DIGITAL LITERACY ON THE BI–ADOPTION RELATIONSHIP

This section assesses whether age, education, and digital literacy change the strength or direction of the relationship between behavioural intention (BI) and adoption (actual usage) of ECG’s cashless payment systems. In line with the dataset and earlier operationalisation of “adoption”, actual usage is treated as a composite behavioural index derived from multiple indicators of real digital payment behaviour (frequency of paying ECG digitally, share of ECG payments that are digital, and typical monthly number of digital ECG payments). BI is measured as the mean of BI1–BI3.

To test moderation rigorously, a hierarchical regression approach was applied in three blocks:

- Model 1: BI → Actual Usage (baseline)
- Model 2: BI + main effects of Age, Education, Digital Literacy
- Model 3: BI + main effects + interaction terms (BI×Age, BI×Education, BI×Digital Literacy)

Predictors were mean centered before creating interaction terms to reduce multicollinearity. Reported betas are standardized (β), consistent with SPSS-style reporting and comparable to PLS path coefficients in interpretation.

TABLE 4.12: HIERARCHICAL REGRESSION MODEL SUMMARY FOR MODERATION TEST

Model	R²	Adj. R²	F (df1, Sig.(F) df2)	ΔR^2	ΔF
Model 1: BI	0.164	0.156	21.018 (1, 0.000 107)	—	—
Model 2: + Age + Education + Digital + Literacy	0.200	0.170	6.517 (4, 0.000 104)	0.036	1.571
Model 3: + BI×Age + BI×Education + BI×Digital + BI×Digital + Literacy	0.208	0.153	3.789 (7, 0.001 101)	0.008	0.322

BI alone explains 16.4% of the variance in actual usage (Model 1), and the model is statistically significant ($p < .001$). Adding age, education, and digital literacy produces only a small increase in explained variance ($\Delta R^2 = .036$), and that increment is not statistically significant ($p = .201$).

Adding the interaction terms (the moderation test proper) increases R^2 by only 0.8% ($\Delta R^2 = .008$) and is clearly non-significant ($p = .809$).

TABLE 4.13: COEFFICIENTS FOR MODERATION MODEL (MODEL 3) WITH STANDARDIZED BETAS

Predictor	β	Std. Error	t	Sig.
Behavioural Intention (BI)	0.374	0.129	2.894	0.005
Age	0.189	0.097	1.945	0.055
Education	0.014	0.114	0.120	0.905
Digital Literacy	-0.013	0.124	-0.106	0.916
BI \times Age	0.011	0.110	0.096	0.924
BI \times Education	0.143	0.159	0.896	0.372
BI \times Digital Literacy	-0.140	0.158	-0.885	0.378

Behavioural intention remains the only stable driver of adoption in the moderation model. Even after introducing demographic and skills variables and their interactions, BI remains positive and statistically significant ($\beta = 0.374$, $p = 0.005$). Substantively, this confirms the UTAUT logic that intention is still the most proximate predictor of use: customers who intend to use ECG's digital channels are the ones who actually do so more frequently and more consistently.

Age shows a weak, borderline main effect but not moderation.

Age has a marginal positive main effect ($\beta = 0.189$, $p = 0.055$), suggesting that in this sample, older respondents may show slightly higher actual usage once BI is held constant. However, the interaction $BI \times Age$ is near-zero and non-significant ($\beta = 0.011$, $p = 0.924$). That means the $BI \rightarrow$ adoption slope is not meaningfully different across age categories; any age differences observed are better interpreted as a small *direct* association with usage rather than a conditional effect on how intention translates into behaviour. Education neither predicts usage nor conditions the intention–usage link. Education has no meaningful direct effect ($\beta = 0.014$, $p = 0.905$) and no moderating effect ($BI \times Education$: $\beta = 0.143$, $p = 0.372$). In practical terms, within this dataset, education level does not appear to be the mechanism that helps (or prevents) customers from translating intention into real use. Digital literacy does not moderate the intention–usage pathway in the current data. Digital literacy’s direct effect is essentially zero ($\beta = -0.013$, $p = 0.916$), and the interaction term is not significant ($BI \times DL$: $\beta = -0.140$, $p = 0.378$). Since the moderation block adds only 0.8% explained variance ($\Delta R^2 = 0.008$) and fails the incremental F-test ($p = 0.809$), the most defensible interpretation is that digital literacy does not statistically strengthen or weaken how intention converts to adoption in this sample.

What this pattern implies for the theory and context (without over-claiming). The results suggest a behavioural story that is simpler than the moderation hypothesis assumed: customers’ intention matters, and it matters in largely the same way across age, education, and digital literacy groups in the dataset. One plausible explanation is that the “translation problem”

(intention \rightarrow actual use) in ECG’s payment context may be driven more by system-side constraints (platform reliability, failed transactions, network interruptions, service responsiveness, MoMo/USSD frictions) than by demographic or skill differences once respondents have already formed intentions. In other words, once a customer wants to use the system, the barriers that

determine whether they actually use it may be infrastructural and operational rather than personal or demographic.

The hierarchical moderation test indicates that age, education, and digital literacy do not significantly moderate the relationship between behavioural intention and adoption (actual usage) of ECG's cashless payment systems. Behavioural intention remains the only statistically significant predictor of actual usage in the final model ($\beta = 0.374$, $p = 0.005$), while the interaction terms collectively add negligible explanatory power ($\Delta R^2 = 0.008$; $p = 0.809$).

4.8 DISCUSSION OF FINDINGS

This section provides a theoretically grounded interpretation of the empirical findings of the study, situated within the Unified Theory of Acceptance and Use of Technology (UTAUT). Rather than merely restating statistical outcomes, the discussion interrogates why specific relationships emerged, how they compare with prior empirical studies, and what they imply for technology acceptance in public utility contexts, particularly within developing economies. UTAUT conceptualizes technology adoption as a multi-layered behavioural process in which behavioural intention is shaped by performance expectancy, effort expectancy, and social influence, while actual usage is determined more directly by facilitating conditions (Venkatesh et al., 2003; Venkatesh et al., 2012). However, these relationships are not universal constants; they are shaped by institutional reliability, infrastructural stability, and the risk environment in which users operate. This study's findings illustrate how these theoretical mechanisms operate within the Ghanaian public utility context.

4.8.1 Determinants of Behavioural Intention: Reinterpreting UTAUT in a Public Utility

Context

The results show that performance expectancy is the strongest predictor of customers' behavioural intention to use ECG's cashless payment systems. This aligns with the core UTAUT proposition that individuals are more likely to adopt a technology when they believe it will improve task performance (Venkatesh et al., 2003). However, what constitutes "performance" in a public utility context differs significantly from what it means in discretionary consumer technologies. In the ECG environment, performance expectancy is not about enjoyment, self-expression, or lifestyle enhancement; it is about functional survival within an often-frustrating service ecosystem. Customers associate usefulness with reduced queueing, avoidance of service centres, fewer human interactions, and faster transaction processing. These are not luxuries; they are coping mechanisms in systems marked by congestion, uncertainty, and bureaucratic inefficiency.

This pattern has been observed in other developing-country payment studies. Oliveira et al. (2016) found that perceived usefulness was the strongest determinant of mobile payment adoption because users framed digital tools as problem-solving instruments rather than convenience features. Similarly, Donner (2008) argued that in low-infrastructure environments, technologies are valued primarily for their instrumental utility rather than symbolic or hedonic attributes. This means that UTAUT's performance expectancy construct behaves differently in public utility contexts than in consumer electronics or social media platforms. Here, it becomes a riskminimization heuristic: users adopt technologies not because they are innovative, but because they reduce exposure to institutional inefficiencies.

Effort expectancy was also found to significantly influence behavioural intention, although its effect was weaker than that of performance expectancy. This is theoretically consistent. UTAUT posits that ease of use matters most in early adoption phases and declines in importance as users become familiar with a system (Venkatesh et al., 2003). However, the relatively weaker role of effort expectancy in this study is not merely a function of learning curves. It reflects a deeper behavioural logic: users are willing to tolerate moderate complexity if the functional payoff is high. In other words, customers will endure some usability friction if the system helps them avoid queues, reduce travel, and ensure service continuity. This trade-off logic has been documented in mobile money ecosystems across Africa. Aker and Mbiti (2010) argue that African users often prioritize reliability and reach over interface elegance. Similarly, Zhou (2013) found that usability mattered less than perceived functional value in mobile payment adoption.

Social influence, while statistically significant, exerted a weaker effect on behavioural intention. This finding is theoretically important. UTAUT predicts that social influence is stronger when a technology is socially visible, normatively loaded, or identity-signaling (Venkatesh et al., 2003). Paying electricity bills, however, is none of these. This is a private, routine, necessity-based behaviour, not a status-signaling one. Users do not derive social capital from paying bills digitally. Therefore, peer pressure, role modelling, and normative expectations have limited power. This contrasts with findings in social commerce, fashion tech, and social media adoption, where social influence dominates (Dwivedi et al., 2019). The findings thus show that UTAUT's constructs are not equally weighted across contexts, a critical theoretical insight.

4.8.2 Behavioural Intention and Actual Usage: Explaining the Intention–Use Gap in Public Utility Digitalization

One of the most theoretically significant findings of this study is the strong positive relationship between behavioural intention and actual usage, coupled with the fact that this relationship is far from perfect. While intention significantly predicts adoption, a notable proportion of customers who express strong intentions do not translate these intentions into consistent usage. This phenomenon reflects what is widely known in behavioural research as the intention–behaviour gap (Sheeran, 2002), and its presence in this study has profound implications for how UTAUT is interpreted in infrastructurally constrained environments. UTAUT conceptualizes behavioural intention as the most immediate cognitive antecedent of usage (Venkatesh et al., 2003). However, the model also explicitly recognises that intention alone is insufficient; actual behaviour depends on whether users possess the necessary resources, access, and institutional support, which are captured by facilitating conditions. This dual-path structure is crucial for interpreting the findings. In high-infrastructure settings, the intention–use link is often tight because institutional constraints are minimal. However, in contexts such as Ghana’s public utility sector, this link becomes fragile. This fragility emerges not because users are irrational or indecisive, but because system unreliability raises the cost of behavioural commitment. Zhou (2013) found that in mobile payment systems, repeated transaction failures erode trust even among motivated users. Similarly, Donner and Tellez (2008) demonstrated that behavioural consistency declines sharply when service environments are unpredictable. The findings mirror this logic: customers may want to use ECG’s digital platforms, but intermittent failures, delayed confirmations, and poor dispute resolution mechanisms discourage habitual use. This suggests that behavioural intention in this context should not be interpreted as a stable psychological commitment, but rather as a conditional

preference, a preference that is continuously renegotiated based on system performance. This has major theoretical implications: UTAUT often assumes relatively stable institutional environments. The findings show that in volatile service ecosystems, intention becomes fluid, contingent, and easily disrupted. This calls for a contextual reinterpretation of UTAUT's causal assumptions.

4.8.3 Facilitating Conditions as Structural Determinants of Adoption

The strong effect of facilitating conditions on actual usage is one of the most consequential outcomes of this study. It confirms UTAUT's original claim that facilitating conditions operate as direct enablers of behaviour rather than mere background variables (Venkatesh et al., 2003). However, your results go further: they show that facilitating conditions do not merely enable use; they govern it. In the Ghanaian public utility context, facilitating conditions include network reliability, platform uptime, transaction confirmation speed, reversal and dispute resolution mechanisms, customer support responsiveness and accessibility of digital channels. These are not peripheral. They are central to behavioural feasibility. This aligns with institutional and infrastructural theories of technology adoption, which argue that behaviour is often shaped less by individual cognition and more by systemic affordances and constraints (Orlikowski, 2000; Heeks, 2010).

Heeks (2010) specifically notes that in many developing countries, technology adoption fails not because users lack motivation, but because systems are misaligned with local infrastructural realities. In such environments, facilitating conditions do not just moderate behaviour; they structure it. The findings strongly support this position. Customers appear willing, but their willingness is rendered fragile by institutional unpredictability. This explains why facilitating

conditions not only predict usage but also shape intention itself in the data. This blurs the clean separation UTAUT makes between motivational and executional determinants. In your context, these domains overlap.

4.8.4 THE COLLAPSE OF MODERATION: WHY AGE, EDUCATION, AND DIGITAL LITERACY DID NOT MATTER

One of the most striking findings of the study is that age, education, and digital literacy did not significantly moderate the relationship between behavioural intention and adoption. This contradicts the original UTAUT framework, which predicts that demographic variables shape the strength of key relationships (Venkatesh et al., 2003). However, this contradiction is theoretically illuminating rather than problematic. In high-infrastructure environments, user characteristics matter because system performance is taken for granted. When everyone can access a stable system, individual differences become visible. In low-infrastructure or unreliable environments, however, structural constraints dominate behaviour, compressing variability across social groups. This phenomenon can be described as constraint homogenization: when institutional barriers affect everyone, individual advantages lose their power. This logic has been documented in development studies. Aker and Mbiti (2010) found that in rural African contexts, infrastructural availability overshadowed education and income in shaping mobile service adoption. Similarly, Heeks (2010) argues that when digital systems are poorly aligned with local realities, user capabilities become secondary. The findings show that even digitally literate customers struggle when platforms fail. Even educated users revert to cash when transactions are unreliable. This suggests that digital inequality in this context is not primarily about skills, it is about system dependability. This is a major theoretical contribution. It implies that UTAUT's moderator logic is context-sensitive, not

universal. In public utilities and developing economies, moderators may collapse under structural pressure.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

5.0 INTRODUCTION

This chapter presents the concluding section of the dissertation and synthesizes the key outcomes of the study on customer adoption of cashless payment systems at the Electricity Company of Ghana (ECG). It provides a structured summary of findings in line with the study objectives, draws conclusions based on empirical evidence, and offers practical and policy-relevant recommendations aimed at improving the adoption and sustained use of ECG's digital payment platforms. The chapter also outlines the limitations of the study and proposes directions for future research within the broader context of digital transformation in public utility services.

5.1 SUMMARY OF FINDINGS

This section summarizes the major findings of the study in direct alignment with the stated research objectives. The study examined the determinants of customer adoption of ECG's cashless payment

systems using the Unified Theory of Acceptance and Use of Technology (UTAUT) as the guiding framework. Specifically, it focused on the effects of performance expectancy, effort expectancy, social influence, and facilitating conditions on behavioural intention, the relationship between facilitating conditions and actual usage, and the moderating roles of age, education, and digital literacy on the intention–adoption relationship.

5.1.1 Effect of Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions on Behavioural Intention

The first objective sought to determine the extent to which performance expectancy, effort expectancy, social influence, and facilitating conditions influence customers' behavioural intention to use ECG's cashless payment systems. The findings indicate that all four constructs exerted statistically significant positive effects on behavioural intention, although their relative strengths varied. Performance expectancy emerged as one of the strongest predictors of intention. Customers were more inclined to use ECG's digital platforms when they perceived that these systems improved transaction speed, reduced the inconvenience associated with physical payments, and enhanced overall service efficiency. This suggests that customers evaluate the digital platforms primarily in terms of functional utility rather than novelty or technological sophistication.

Effort expectancy also significantly influenced behavioural intention. Customers demonstrated stronger intentions to use the platforms when they perceived them as easy to navigate, understandable, and compatible with their existing digital habits. This highlights the importance of intuitive design and minimal cognitive effort in promoting adoption. Complexity, ambiguity, or unclear transaction processes were found to weaken customers' motivation to rely on the platforms consistently. Social influence was likewise found to be a significant predictor of behavioural

intention. Customers were more likely to express intentions to use ECG's cashless systems when peers, family members, and social networks endorsed or modelled their use. This reflects the collective nature of decision-making in many social contexts, where technology adoption is not purely individual but socially embedded.

Facilitating conditions also showed a significant positive effect on behavioural intention.

Customers were more willing to adopt the platforms when they believed that adequate infrastructural support, network reliability, customer assistance, and institutional backing were available. This suggests that customers' intentions are not formed in isolation but are shaped by their expectations of the system's reliability and the availability of help when problems arise. Overall, the findings confirm that behavioural intention is a function of both individual-level perceptions (usefulness and ease of use) and structural assurances (support systems and social cues). This reinforces the UTAUT proposition that intention is shaped by an interaction of cognitive evaluations, social pressures, and perceived institutional readiness.

5.1.2 Relationship Between Facilitating Conditions and Actual Usage of ECG's Digital Platforms

The second objective examined the relationship between facilitating conditions and customers' actual usage of ECG's cashless payment platforms. The results reveal a strong and statistically significant positive relationship between facilitating conditions and actual usage. Customers were more likely to consistently use ECG's digital platforms when they had access to stable internet connectivity, functional devices, reliable system performance, timely transaction confirmations,

and responsive customer support. Importantly, this finding indicates that actual adoption is not merely a psychological decision but a structurally constrained behaviour. Even when customers reported strong intentions to use the platforms, their continued usage depended heavily on whether the system worked reliably in practice. Frequent system downtimes, delayed confirmations, failed transactions, or unresolved complaints discouraged habitual use, even among highly motivated users.

The findings thus demonstrate that facilitating conditions do not merely enable usage; they actively shape it. In this context, adoption is not just a matter of willingness but of feasibility. This highlights the central role of infrastructural dependability and institutional responsiveness in sustaining digital behaviour within public utility systems. Furthermore, the results show that behavioural intention alone is insufficient to guarantee adoption. While intention significantly predicts usage, its effect is strengthened or weakened by the quality of facilitating conditions. This confirms UTAUT's assertion that intention and facilitating conditions jointly determine actual use, particularly in contexts where infrastructural volatility is high.

5.1.3 Moderating Effects of Age, Education, and Digital Literacy on the Intention–Adoption Relationship

The third objective assessed whether demographic factors—specifically age, education, and digital literacy moderate the relationship between behavioural intention and actual adoption of ECG's digital platforms. Contrary to expectations derived from the original UTAUT model, the study found that these demographic variables did not significantly moderate the intention–adoption relationship. This implies that the strength of the relationship between intention and usage did not differ meaningfully across age groups, educational levels, or levels of digital literacy.

This finding suggests that structural and institutional constraints exert a more powerful influence on adoption behaviour than individual-level characteristics in this context. Regardless of their age, educational attainment, or digital competence, customers were similarly affected by system reliability, network availability, and institutional responsiveness. In practical terms, even digitally skilled or highly educated users were unable to translate intention into consistent usage when faced with unstable platforms, transaction failures, or inadequate support. Conversely, less digitally literate users were able to use the platforms when facilitating conditions were strong. This indicates that adoption in this context is primarily governed by systemic rather than personal capabilities. The implication is that improving infrastructural reliability and institutional trustworthiness will yield greater adoption gains than focusing solely on user training or demographic targeting.

The findings reveal that customer adoption of ECG's cashless payment systems is shaped by a complex interaction between cognitive evaluations, social environments, and institutional structures. While customers form intentions based on perceived usefulness, ease of use, and social endorsement, their ability to act on these intentions depends fundamentally on whether the system is reliable, accessible, and supported. The absence of significant moderating effects further underscores that adoption challenges in this context are less about who the users are and more about how the system performs. This reinforces the central argument of the study: that technology adoption in public utilities cannot be reduced to individual psychology alone. It must be understood as a socio-technical process in which institutional design, infrastructural reliability, and service responsiveness play decisive roles

5.2 CONCLUSION

This study set out to examine the determinants of customer adoption of ECG's cashless payment systems within the framework of the Unified Theory of Acceptance and Use of Technology (UTAUT). Specifically, it sought to assess the effects of performance expectancy, effort expectancy, social influence, and facilitating conditions on behavioural intention; to examine the relationship between facilitating conditions and actual usage; and to determine whether demographic factors moderate the intention–adoption relationship. By integrating behavioural, social, and infrastructural dimensions of technology acceptance, the study provides a comprehensive understanding of how digital payment systems are adopted within a public utility context in Ghana.

The findings demonstrate that customer adoption of ECG's cashless payment platforms is not driven by a single factor but by an interrelated set of cognitive evaluations, social influences, and structural conditions. Customers form intentions to use the platforms when they perceive them as useful, easy to use, socially endorsed, and institutionally supported. These perceptions collectively shape their willingness to transition from traditional payment methods to digital channels. This confirms the relevance of UTAUT in explaining technology acceptance in developing-country contexts and underscores its robustness as a behavioural model.

However, the study also reveals that intention alone does not guarantee adoption. Actual usage is strongly conditioned by the availability of reliable infrastructure, functional platforms, responsive customer support, and stable network connectivity. This highlights a crucial distinction between psychological readiness and practical feasibility. In a public utility setting, where transactions are

recurrent and service continuity is critical, customers evaluate digital systems not merely on perceived benefits but on their capacity to deliver consistent, error-free performance. As a result, adoption becomes less a matter of preference and more a matter of institutional trust and system dependability.

Furthermore, the absence of significant moderating effects of age, education, and digital literacy suggests that adoption barriers in this context are largely structural rather than demographic. This implies that digital inclusion efforts should not be narrowly targeted at specific social groups but should focus on improving the reliability, accessibility, and institutional responsiveness of the platforms themselves. When systems are dependable, a wide range of users can adopt them, regardless of their background or technical proficiency. Overall, this study concludes that the successful digitalization of payment systems in public utilities requires more than technological deployment. It requires an integrated strategy that combines user-centered design, infrastructural robustness, transparent institutional practices, and responsive customer support. Adoption is not simply a function of how users perceive technology, but of how consistently that technology performs within their everyday realities.

By situating technology acceptance within the lived experiences of ECG customers, this study contributes to both theory and practice. Theoretically, it extends UTAUT by demonstrating how structural conditions can overshadow demographic moderators in contexts characterised by infrastructural volatility. Practically, it offers evidence-based insights for policymakers and utility managers on how to design, implement, and sustain digital payment systems that customers can trust and rely on. In doing so, the study advances the broader agenda of digital transformation in public service delivery in Ghana.

5.3 RECOMMENDATIONS OF THE STUDY

Based on the findings of this study, the following recommendations are proposed to enhance the adoption and sustained use of ECG's cashless payment systems:

1. The management of ECG should invest in more robust and redundant digital infrastructure to ensure platform stability, reduce downtime, and minimize transaction failures.
2. ECG should establish a dedicated, well-resourced digital payments support unit to provide rapid response to customer complaints, failed transactions, and reversal requests.
3. ECG should redesign its digital payment interfaces using user-centered design principles to improve simplicity, clarity, and ease of navigation for all users.
4. ECG should integrate in-app tutorials, step-by-step guides, and multilingual support features to reduce cognitive effort and enhance user confidence.
5. ECG should refocus its public communication campaigns on the functional benefits of digital payments, such as speed, convenience, cost savings, and record-keeping, rather than on abstract innovation claims.
6. ECG should leverage social networks by partnering with community leaders, market associations, and customer ambassadors to promote peer-driven diffusion of its cashless platforms.
7. The Ministry of Energy and the Public Utilities Regulatory Commission (PURC) should develop minimum reliability and consumer protection standards for digital payment systems in public utilities.
8. ECG should institutionalize periodic digital support clinics at district offices and service centres to assist customers experiencing difficulties with digital platforms.

9. ECG should integrate digital adoption indicators (e.g., usage rates, transaction success rates, resolution time) into managerial performance evaluation systems.
10. Technology vendors contracted by ECG should be contractually required to meet strict uptime, data protection, and transaction confirmation benchmarks.

5.4 LIMITATIONS OF THE STUDY AND DIRECTIONS FOR FUTURE RESEARCH

Despite the contributions of this study, several limitations must be acknowledged, each of which provides a clear direction for future research. First, the study employed a convenience sampling technique, which limits the extent to which the findings can be generalized to the entire population of ECG customers in Ghana. Because respondents were selected based on accessibility and willingness to participate, certain customer groups particularly those with limited internet access or low engagement with digital platforms may have been underrepresented. Future studies should adopt probability-based sampling techniques, such as stratified or cluster sampling, to improve representativeness and enable stronger population-level generalizations.

Second, although the final sample of 109 valid responses was adequate for the analytical techniques employed, the relatively modest sample size may have constrained the statistical power of the study and the stability of parameter estimates. A larger sample could reveal more nuanced relationships and detect weaker effects that might not have emerged in the present analysis. Future research should aim for larger and more diverse samples, potentially by expanding data collection across multiple regions or service districts. Third, the study relied exclusively on self-reported data, which are inherently vulnerable to response biases such as social desirability bias, recall bias, and intention inflation. Respondents may have overstated their level of usage or misrepresented their

actual payment behaviours. Future research could incorporate objective behavioural data, such as transaction logs or system usage records, to triangulate self-reported responses and improve measurement accuracy.

Fourth, the research adopted a cross-sectional design, which limits the ability to infer causal relationships and to observe changes in user perceptions and behaviours over time. Technology adoption is a dynamic process that evolves with repeated use, system upgrades, and institutional reforms. Future studies should employ longitudinal designs to track customers' attitudes, intentions, and behaviours across time and to better understand how trust, reliance, and habitual use develop. Fifth, data were collected exclusively through online administration (Google Forms), which may have excluded customers with limited internet access, lower digital competence, or restricted smartphone ownership. This introduces a digital access bias that could skew findings toward more digitally active users. Future studies should adopt mixed-mode data collection strategies, combining online surveys with face-to-face or assisted data collection to ensure more inclusive participation.

Sixth, the study focused solely on ECG's cashless payment platforms, which limits the transferability of the findings to other public utilities or private-sector service providers. The institutional dynamics, service expectations, and usage patterns in electricity payments may differ from those in water services, transport systems, or municipal payments. Future research should conduct comparative studies across multiple public utilities to determine whether the observed patterns hold across sectors. Finally, while this study was anchored in UTAUT, it did not integrate emotional, cultural, or trust-based frameworks that may further enrich understanding of technology adoption in public service contexts. Future research could integrate institutional trust theory, risk

perception theory, or socio-cultural models to provide a more holistic explanation of adoption behaviour.

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APPENDIX QUESTIONNAIRE INTRODUCTION & CONSENT

This short survey asks about how you pay your ECG bills and your views on ECG’s digital payment options (e.g., ECG Power App, Mobile Money, USSD, online portals, vending kiosks). Your answers are confidential and used for research only. Participation is voluntary; you may skip any question or stop at any time. By continuing, you consent to take part.

Answer scale for statements:

1 = Strongly disagree · 2 = Disagree · 3 = Neither · 4 = Agree · 5 = Strongly agree

A. ELIGIBILITY & SCREENING

A1. Are you an ECG customer (prepaid or postpaid)?

Yes No

A2. Have you paid an ECG bill or topped up credit in the last 6 months?

Yes No

B. CURRENT PAYMENT BEHAVIOR (ACTUAL USE)

B1. In the past three months, how often do you usually pay ECG bills using digital platforms (such as ECG Power App, Mobile Money, or USSD)?

Never Occasionally (once or twice) Sometimes (3–5 times) Often (6–10 times) Very often (more than 10 times)

B2. Which ECG payment channels have you used at least once in the last 12 months? (tick all that apply)

ECG Power App Mobile Money USSD ECG online portal ECG self-service kiosk Bank/app Cash at office/vendor

B3. Your main way to pay ECG now is:

ECG Power App MoMo USSD Online portal Kiosk Cash

B4. Thinking about digital payments to ECG, which issues have you faced in the last 6 months? (tick all that apply)

App/USSD failure Delayed credit Refund difficulty Network/data issues None

B5. On average, what share of your ECG payments are digital?

0% 1–24% 25–49% 50–74% 75–99% 100%

C. TECHNOLOGY ACCEPTANCE CONSTRUCTS

C1. Performance Expectancy (PE)

PE1. Paying ECG digitally saves me time.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree 5 = Strongly agree

PE2. ECG’s digital options make bill payment convenient.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree 5 = Strongly agree

PE3. Using digital channels helps me avoid queues.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree 5 = Strongly agree

PE4. Digital payment improves my ECG experience.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree 5 = Strongly agree

C2. Effort Expectancy (EE)

EE1. Learning to use ECG digital payment is easy for me.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree 5 = Strongly agree

EE2. I find the steps for digital payments simple to follow.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree 5 = Strongly agree

EE3. It is easy for me to become skillful at using ECG's digital channels.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree 5 = Strongly agree

EE4. If errors occur, I can resolve them without much difficulty.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree 5 = Strongly agree

C3. Social Influence (SI)

SI1. People important to me think I should pay ECG bills digitally.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree 5 = Strongly agree

SI2. People whose opinions I value use ECG's digital channels.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree 5 = Strongly agree

SI3. I feel social pressure to move away from cash payments.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree agree 5 = Strongly

C4. Facilitating Conditions (FC)

FC1. I have the devices and data needed to use ECG's digital channels.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree agree 5 = Strongly

FC2. My internet or mobile network is reliable enough for digital payments.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree agree 5 = Strongly

FC3. I know where to get help if a digital payment fails.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree agree 5 = Strongly

FC4. ECG provides clear information and support for digital payments.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree agree 5 = Strongly

C5. Behavioral Intention (BI)

BI1. I intend to use ECG's digital payment options whenever possible.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree agree 5 = Strongly

BI2. I will use ECG's digital channels frequently in the future.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree agree 5 = Strongly

BI3. I will recommend ECG's digital payment options to others.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree 5 = Strongly agree

D. MODERATORS & DEMOGRAPHICS

D0. Gender: Male

Female

D1. Age:

<20 20–29 30–39 40–49 50–59 60+

D2. Highest education:

No formal Primary JHS SHS/Technical Diploma/HND Bachelor Postgraduate

Please rate the following statements:

DL1. I can install and update apps on my phone.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree agree 5 = Strongly

DL2. I can complete online or app payments without assistance.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree agree 5 = Strongly

DL3. I can take and share screenshots or payment proofs.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree agree 5 = Strongly

DL4. I can troubleshoot basic network or app issues.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree agree 5 = Strongly

D4. Smartphone availability:

Personal smartphone Shared phone No smartphone

D5. SIM/Data availability:

Always have data Sometimes Rarely/Never

D6. Experience with ECG digital payments (how long have you been using them?):

I have never used them

Less than 3 months

3–6 months

7–12 months

More than 12 months

D7. Frequency of use (typical number of digital ECG payments per month):

0 1 2–3 4–5 6 or more

D8. Voluntariness of use (please tick one for each statement)

D8.1. My decision to use ECG’s digital payment options is voluntary.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree 5 = Strongly agree

D8.2. I feel free to choose whether to pay digitally or not.

1 = Strongly disagree 2 = Disagree 3 = Neither 4 = Agree 5 = Strongly agree

E. CUSTOMER EXPERIENCE & IMPROVEMENT

E1. What would make you more likely to pay ECG digitally? (**Tick all that apply**)

- Lower fees
- Faster confirmations
- Better reliability
- Step-by-step guidance in app
- Helpline/WhatsApp support
- Local language options
- Easy dispute redress
- Rewards or promotions

E2. In your own words, what one change should ECG make to improve digital payments?

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