FINTECH ADOPTION, DIGITAL MATURITY AND OPERATIONAL EFFICIENCY AMONG 3-STAR HOTELS IN NAIROBI METROPOLITAN AREA, KENYA

BY

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DECLARATION

I verify that this dissertation is my original work and has not been submitted for any academic fulfilment by any other institution in any other institution. References being used in this study have been made referring to the related sources accordingly.

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SUPERVISOR APPROVAL

I do hereby confirm that I have examined the master's dissertation of

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And have certified that all revisions that the dissertation panel and examiners recommended have been adequately addressed.

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ABSTRACT

The study examined the effect of financial technology (FinTech) adoption on the operational efficiency of three-star hotels within the Nairobi Metropolitan Area, Kenya. FinTech innovations have become critical tools for enhancing service delivery, cost control, and financial management in the hospitality industry. Despite this, many mid-sized hotels continue to experience inefficiencies arising from delayed payments, manual invoicing, and limited digital integration. Guided by the Technology Acceptance Model (TAM), the Technology–Organization–Environment (TOE) framework, the Resource-Based View (RBV) theory, and the Financial Intermediation Theory, the study sought to assess how mobile money payment, card payment, and electronic invoicing influence operational efficiency, and to analyze the moderating effect of digital maturity on these relationships. The study adopted a descriptive research design and targeted all 62 registered three-star hotels in the Nairobi Metropolitan Area, where the unit of analysis was the hotel and the unit of observation was the operations manager. A census approach was employed, and data was collected using structured questionnaires administered through both physical and electronic channels. The data were analyzed using descriptive statistics, correlation, and hierarchical multiple regression analysis. Diagnostic tests were conducted to ensure normality, linearity, homoscedasticity, and the absence of multicollinearity. Results revealed that all FinTech dimensions were positively correlated with operational efficiency. Regression analysis indicated that card payment and electronic invoicing had significant positive effects on operational efficiency, while mobile money payment showed a positive but weaker relationship. After introducing digital maturity as a moderator, the strength of all relationships increased, and the model's explanatory power improved (R^2 rising from 0.217 to 0.650). The moderation results confirmed that hotels with higher digital maturity derived greater efficiency gains from FinTech use. The study concludes that FinTech adoption significantly enhances operational efficiency among three-star hotels and that digital maturity amplifies this relationship by improving technological readiness, staff competence, and innovation capability. It recommends that hotel management invest in digital capacity building, continuous system upgrades, and strategic partnerships with FinTech providers to optimize service delivery and operational performance. Policymakers should also support digital transformation initiatives in the hospitality sector through incentives, training programs, and regulatory frameworks that promote innovation and competitiveness.

Key words: fintech, fintech adoption, digital maturity, electronic invoicing, card payments, operational efficiency, financial management, hospitality industry, three-star hotels

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DEDICATION

This dissertation is lovingly dedicated to my children Zuriel Kibali and Zoey Neema Nyagaka, whose patience, joy, and unconditional love inspired me every step of the way; to my parents Mr and Mrs Samson Kibe Muthari whose sacrifices, prayers, and unwavering belief in me laid the foundation for my academic journey; to my siblings Nduta and Brian Kibe for constant encouragement and to my husband Nyagaka Ondiere for unwavering support, understanding, love and belief in me throughout this endeavor. I am deeply grateful to God for the strength and grace that made this achievement possible.

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ACRONYMS AND ABBREVIATIONS

ADR	Average Daily Rate
CBK	Central Bank of Kenya
EAC	East African Community
eTIMS	electronic Tax Invoice Management System
FinTech	Financial Technology
GOPPAR	Gross Operating Profit per Available Room
GSMA	Global System for Mobile Communications Association
KNBS	Kenya National Bureau of Statistics
KRA	Kenya Revenue Authority
NMA	Nairobi Metropolitan Area
OTA	Online Travel Agency
POS	Point of Sale
RevPAR	Revenue per Available Room
TOE	Technology–Organization–Environment framework
TRA	Tourism Regulatory Authority
UNWTO	United Nations World Tourism Organization
WTTC	World Travel & Tourism Council

OPERATIONAL DEFINITION OF TERMS

Card Payments – The acceptance of debit and credit transactions through point-of-sale terminals, enabling guests to make secure and traceable payments within hotels (Ozili, 2018).

Digital Maturity – The extent to which an organization has integrated digital technologies into its operations, culture, and strategy, enabling it to leverage digital tools for improved performance and innovation (Westerman *et al*., 2014).

Electronic Invoicing – The digital generation and transmission of invoices through platforms such as Kenya Revenue Authority's eTIMS, automating billing processes, ensuring accuracy, and enhancing compliance (Mutie & Wanyoike, 2016).

FinTech (Financial Technology) – The use of technology to enhance and automate financial services, including mobile banking, blockchain applications, and digital lending platforms (Ndung'u, 2019).

Mobile Money Payments – The use of mobile-based financial platforms such as M-Pesa to facilitate instant, cashless hotel transactions including deposits, bill settlements, and reconciliations (Jack & Suri, 2014).

Nairobi Metropolitan Area – A geographic region covering Nairobi City County and its surrounding counties (Kiambu, Machakos, and Kajiado), recognized as an integrated social and economic zone under Kenya's Vision 2030 urban development framework (Government of Kenya, 2013).

Operational Efficiency – The ability of an organization to deliver services using minimal resources by optimizing processes, reducing waste, and improving service quality and turnaround time (Sigala, 2018).

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Three-star hotels play a critical role in the hospitality and tourism ecosystem by providing standardized midscale accommodation and services that balance affordability with quality. Unlike luxury properties, three-star hotels typically offer essential amenities such as comfortable rooms, in-house dining, and basic business services, making them attractive to both domestic and international travelers who are cost-conscious yet still seek reliability and convenience (Sigala, 2018). Their position in the mid-market segment allows them to absorb spillover demand from larger events and conferences while ensuring that tourism is inclusive and accessible to wider social groups. Globally, three-star hotels are recognized as the backbone of urban hospitality markets because of their ability to maintain consistent occupancy rates across seasons and to generate stable cash flows despite economic fluctuations (Akerman & HotStats, 2024; World Travel & Tourism Council [WTTC], 2024).

At the global level, the hotel industry has experienced a strong rebound since the COVID-19 pandemic, with international arrivals surpassing pre-pandemic levels and the contribution of travel and tourism to global GDP returning to approximately 10 percent (WTTC, 2024). While demand has recovered, operational challenges remain. Rising labor costs, inflationary pressures on inputs, and changing consumer expectations have created significant pressure on hotel operators to deliver services more efficiently (UNWTO, 2024; STR, 2025). Studies in Europe, Asia, and North America show that three-star hotels, in particular, face intense competition and thin margins, which make operational efficiency a central determinant of sustainability (Sigala, 2018;

Iranmanesh *et al.*, 2022). This global context underscores the growing importance of integrating digital solutions and rethinking operating models to achieve cost-effectiveness, enhance guest experiences, and sustain profitability.

Regionally, the African hotel industry has witnessed uneven recovery patterns. Revenue per available room (RevPAR) and occupancy rates have risen in destinations such as South Africa, Egypt, and Kenya, but the recovery has been uneven across the continent (HVS Africa, 2023). New supply pipelines, fluctuations in international arrivals, and macroeconomic headwinds continue to challenge operators. Within Sub-Saharan Africa, midscale hotels are particularly vulnerable because they often lack the financial reserves of luxury chains, yet they are strategically positioned to serve the expanding middle class and the growing number of regional travelers (Tiwasing et al., 2024). Research highlights that African mid-tier hotels must prioritize lean operations, technological adoption, and process re-engineering to maintain competitiveness in an increasingly digitalized hospitality landscape (Fan et al., 2023).

In Kenya, the Nairobi Metropolitan Area (NMA), comprising Nairobi City, Kiambu, Machakos, and Kajiado counties under the Nairobi Metro 2030 framework, represents the largest and most dynamic hotel market in the country (Government of Kenya, 2013). Data from the Kenya National Bureau of Statistics (2024) indicates that international arrivals and bed-night occupancy have grown steadily post-pandemic, with Nairobi continuing to serve as a regional hub for business tourism, conferences, and leisure travel. However, the expansion of hotel supply, particularly in the three-star category, has intensified competition and placed greater pressure on operators to maximize efficiency. Reports by Cytonn (2024) on Nairobi's serviced apartments and mid-tier accommodation highlight how increased room inventory, shifting customer preferences, and

compliance with regulatory requirements such as the Kenya Revenue Authority's electronic Tax Invoice Management System (eTIMS) have forced operators to rethink their business models. For three-star hotels, improving operational efficiency is no longer optional but a strategic necessity for survival and growth.

The adoption of financial technologies (FinTech) has emerged as a critical enabler of operational performance. Kenya is globally recognized as a leader in digital finance, with mobile money platforms such as M-Pesa transforming the way businesses and consumers transact (Jack & Suri, 2016; GSMA, 2024). In the hospitality sector, FinTech applications—mobile money payments, card payments, online booking payments, and electronic invoicing—have been shown to streamline operations by reducing cash handling, improving transaction speed, enhancing reconciliation, and ensuring regulatory compliance (Ozili, 2018; Mutie & Wanyoike, 2016). Empirical evidence suggests that firms adopting FinTech experience shorter settlement cycles, better working capital management, and reduced operational errors, thereby linking financial innovation directly to efficiency outcomes (Tiwasing *et al*., 2024; Fan *et al*., 2023). For three-star hotels in Nairobi Metropolitan Area, where margins are tighter and competition fiercer, leveraging FinTech adoption represents not just an opportunity but a strategic imperative to achieve operational efficiency in a rapidly changing business environment.

1.1.1 Fintech Adoption

Financial technology (FinTech) has transformed the global financial services landscape by enhancing efficiency, inclusivity, and transparency. The disruptive nature of FinTech lies in its ability to integrate digital tools into conventional financial and business operations, thereby fostering efficiency, innovation, and competitiveness. According to Arner, Barberis, and Buckley

(2017), FinTech represents technological innovation in financial services that can result in new business models, applications, and processes. Gomber, Koch, and Siering (2017) describe it as a new financial industry applying technology to improve financial activities, while Schueffel (2017) defines it more broadly as a new financial industry that delivers financial services through innovative digital solutions. Collectively, these perspectives highlight FinTech as a strategic enabler of efficiency and value creation across multiple industries. In the hospitality sector, the most common elements of FinTech adoption include mobile money payments, card payments, and electronic invoicing (Jack & Suri, 2016).

Mobile money has revolutionized financial transactions, particularly in Sub-Saharan Africa, by providing accessible and secure platforms for payments outside the traditional banking system. In Kenya, M-Pesa and Airtel Money dominate the landscape, enabling customers to make hotel bookings, pay for services, and settle bills instantly. Studies have shown that mobile money adoption reduces transaction costs, enhances customer convenience, and strengthens cash flow management for businesses (Jack & Suri, 2016; GSMA, 2024). Mobile money may improve operational efficiency of organizations by minimizing reliance on cash, reducing reconciliation time, and lowering risks associated with cash handling. The adoption of this technology, as it has been shown in previous studies, enables hotels to capture spontaneous bookings and last-minute transactions, thereby increasing revenue while streamlining administrative processes (Tiwasing, Muthinja, & Mwangi, 2024).

The adoption of debit and credit card payments through point-of-sale (POS) systems is a core component of FinTech in the hospitality industry. Card transactions allow hotels to serve both domestic and international guests who prefer secure, traceable, and cashless methods of payment.

Research indicates that the adoption of card payments not only enhances transaction speed but also builds customer trust and improves service quality (Ozili, 2018; Deloitte, 2019). For most organizations, card payment systems reduce manual cash counting, provide real-time transaction records, and integrate easily with property management systems. This integration reduces operational errors and allows hotel managers to make more informed financial decisions, thereby strengthening overall operational performance (Sigala, 2018).

Electronic invoicing, particularly through systems such as the Kenya Revenue Authority's electronic Tax Invoice Management System (eTIMS), represents another important facet of FinTech adoption. E-invoicing automates billing, reduces paperwork, and enhances accuracy in financial reporting. According to Mutie and Wanyoike (2016), the implementation of electronic invoicing in Kenya has improved tax compliance and reduced operational inefficiencies among enterprises. For three-star hotels, adopting e-invoicing ensures regulatory compliance, minimizes billing errors, and accelerates the reconciliation of accounts. Moreover, e-invoicing provides managers with real-time financial data that enhances decision-making, reduces audit risks, and improves overall operational efficiency (KRA, 2024; Fan, Zhang, & Luo, 2023).

1.1.2 Operational Efficiency

Operational efficiency is broadly defined as an organization's capacity to maximize output from given inputs while minimizing waste, cost, and delays in service delivery. In the hospitality industry, it refers to the ability of hotels to provide quality guest services by optimizing processes, workforce, and technology utilization (Sigala, 2018). Efficient operations ensure that resources are allocated effectively, tasks are executed promptly, and customer expectations are consistently met. This efficiency is not only reflected in cost savings but also in improved customer satisfaction and

loyalty, which are critical for sustaining competitiveness in the hotel sector (Alonso-Almeida & Bremser, 2021).

The importance of operational efficiency lies in its direct link to financial performance and sustainability. Hotels that achieve higher efficiency can lower operating expenses, increase profitability, and build resilience in the face of economic shocks or fluctuating demand (Iranmanesh, Ghobakhloo, & Tseng, 2022). In midscale hotels such as three-star establishments, where profit margins are narrower than luxury brands, even small efficiency gains can make a significant difference. Operational efficiency thus serves as a strategic imperative for survival and growth, influencing key performance outcomes such as revenue per available room (RevPAR) and gross operating profit per available room (GOPPAR).

From a theoretical perspective, operational efficiency is closely linked to the adoption of financial technologies (FinTech). FinTech tools streamline financial transactions, automate billing and reconciliation, and provide real-time data for decision-making. The Technology–Organization–Environment (TOE) framework suggests that technological innovations can directly enhance organizational processes, leading to improved efficiency (Tornatzky & Fleischer, 1990). In this sense, FinTech adoption can be viewed as both a driver and facilitator of operational efficiency, since it reduces transaction costs, minimizes human errors, and shortens process cycles (Tiwasing, Muthinja, & Mwangi, 2024; Ozili, 2018).

Operational efficiency can be measured using both financial and non-financial indicators. Common metrics include occupancy rates, average daily rate (ADR), RevPAR, and cost-to-revenue ratios. Process-level measures such as check-in/check-out times, billing accuracy, transaction reconciliation speed, and staff productivity are also widely used in hospitality research

(Sigala, 2018; Alonso-Almeida & Bremser, 2021). In studies focusing on FinTech, operational efficiency can additionally be assessed by examining reductions in cash handling, frequency of payment errors, and the proportion of transactions completed digitally. Together, these indicators provide a comprehensive view of how efficiently hotels utilize resources to achieve superior performance.

1.1.3 Fintech Adoption, Digital Maturity and Operational Efficiency

FinTech adoption has emerged as a critical driver of transformation across industries, enabling businesses to streamline financial processes, reduce transaction costs, and improve customer convenience. In the hospitality sector, FinTech applications such as mobile money, card payments, online booking systems, and electronic invoicing are increasingly recognized as tools that reshape how hotels manage financial transactions and deliver services. By embedding digital payment solutions into daily operations, hotels can shorten service cycles, minimize errors, and strengthen compliance, thereby creating conditions for enhanced operational efficiency (Arner, Barberis, & Buckley, 2017; Ozili, 2018).

The concept of digital maturity provides an important theoretical bridge between technology adoption and organizational performance. Digital maturity refers to the degree to which an organization integrates digital technologies into its processes, culture, and strategy to achieve sustained performance improvements (Westerman, Bonnet, & McAfee, 2014). Hotels with higher levels of digital maturity are more capable of leveraging FinTech tools effectively, as they possess the necessary technological infrastructure, leadership support, and organizational culture to adapt to innovation. In contrast, hotels with low digital maturity may adopt FinTech superficially,

without fully embedding it into workflows, which limits efficiency gains (Fan, Zhang, & Luo, 2023).

The interaction between FinTech adoption and digital maturity can be understood through the lens of the Technology–Organization–Environment (TOE) framework and dynamic capability theory. The TOE framework highlights that the impact of technological innovation depends on organizational readiness and contextual factors, while dynamic capability theory emphasizes an organization's ability to reconfigure resources in response to environmental change (Tornatzky & Fleischer, 1990; Teece, 2018). Within this perspective, digital maturity moderates the relationship between FinTech adoption and operational efficiency by determining the extent to which digital tools translate into streamlined processes, cost reduction, and improved service quality (Iranmanesh, Ghobakhloo, & Tseng, 2022).

Operational efficiency outcomes can thus be seen as contingent on both the breadth of FinTech adoption and the depth of digital maturity. Hotels that adopt multiple FinTech applications and simultaneously cultivate a digitally mature environment, through staff training, integrated systems, and strong managerial support, are more likely to experience measurable improvements in efficiency indicators such as transaction speed, billing accuracy, and resource utilization. This triadic relationship underscores that FinTech adoption alone is insufficient; rather, it is the combination with digital maturity that maximizes efficiency gains and strengthens competitiveness in the hospitality industry (Sigala, 2018; Tiwasing, Muthinja, & Mwangi, 2024).

1.1.4 Three-Star Hotels in Nairobi Metropolitan Area (NMA)

Three-star hotels are midscale hospitality establishments that provide affordable yet reliable accommodation and service quality, positioned between budget hotels and upscale or luxury

properties. According to the Tourism Regulatory Authority (TRA) under the East African Community (EAC) classification system, three-star hotels must offer comfortably furnished rooms with private bathrooms, functional public areas, on-site dining, adequate staffing, and consistent cleanliness and safety standards (TRA, 2020). In practice, these hotels typically include amenities such as WiFi, in-house restaurants, meeting spaces, and front-desk services, but without the extensive luxury facilities characteristic of higher-rated establishments (Fredrick, 2019). They therefore appeal to cost-conscious domestic and international travelers, business guests, and conference participants who seek a balance between affordability and quality.

The importance of three-star hotels in the Nairobi Metropolitan Area cannot be overstated. NMA, covering Nairobi City, Kiambu, Machakos, and Kajiado counties, is the economic and political hub of Kenya, hosting multinational firms, government institutions, and major events. Three-star hotels play a central role in accommodating the large inflow of middle-income tourists, regional business travelers, and local conference delegates who may not afford or require luxury hotels. They also absorb overflow demand from international conferences and provide vital employment opportunities in the hospitality value chain (KNBS, 2024; Tourism Regulatory Authority, 2024). By delivering affordable and standardized services, these hotels contribute to inclusive tourism development and enhance Nairobi's competitiveness as a regional business and leisure destination.

Despite their strategic role, three-star hotels in NMA face multiple operational challenges. The growth of hotel supply has intensified competition, driving down occupancy rates and pressuring operators to deliver more value at lower prices (Tourism Regulatory Authority, 2024). Many establishments operate with tight financial margins and are vulnerable to inefficiencies in

processes such as billing, reservations, and reconciliation. In addition, regulatory demands, such as compliance with the electronic Tax Invoice Management System (eTIMS), require investment in digital infrastructure that many midscale hotels struggle to implement effectively (KRA, 2024). Infrastructure issues such as inconsistent internet connectivity and high utility costs further constrain their efficiency. Moreover, customer expectations have shifted toward faster, digitalized, and contactless services, placing pressure on these hotels to modernize despite resource constraints (Fan, Zhang, & Luo, 2023).

Three-star hotels in the Nairobi Metropolitan Area offer a unique context. Unlike luxury hotels with greater capital resources, or budget accommodations with minimal service obligations, three-star hotels are caught in a "squeeze zone": they must maintain quality standards while remaining affordable and efficient. Their operational performance is highly sensitive to managerial innovation, technology adoption, and process efficiency. FinTech adoption, through mobile money, card payments, online booking payments, and electronic invoicing, offers a promising pathway to address their efficiency gaps, but the extent to which these technologies deliver tangible performance improvements remains underexplored in this segment.

1.2 Statement of the Problem

An organization operating efficiently maximizes revenues, reduce costs, and consistently deliver superior guest experiences. Efficient operations for three-star hotels would translate into higher profitability, stronger competitiveness, and sustained contributions to tourism's share of GDP, which globally accounts for about 10 percent (WTTC, 2024; UNWTO, 2024). Studies show that operationally efficient hotels not only enhance service quality and customer satisfaction but also strengthen resilience against external shocks such as pandemics or inflation (Alonso-Almeida &

Bremser, 2021; Iranmanesh, Ghobakhloo, & Tseng, 2022). For midscale properties, small efficiency gains can significantly improve RevPAR and GOPPAR, stabilize employment, and promote inclusive growth by serving cost-conscious domestic and regional travelers (Sigala, 2018; Fan, Zhang, & Luo, 2023; Tiwasing, Muthinja, & Mwangi, 2024).

However, the reality for three-star hotels in NMA is markedly different. Available data show that mid-tier hotels struggle with thin margins, declining occupancy, and rising operating costs. For instance, Kenya National Bureau of Statistics (KNBS, 2024) reports that while bed-night occupancy in Nairobi has risen post-pandemic, average occupancy rates for three-star establishments remain below 55 percent, compared to 70 percent for upscale hotels. Revenue per available room (RevPAR) for midscale hotels lags the industry average, while gross operating profit per available room (GOPPAR) has stagnated amid inflationary pressures (Tourism Regulatory Authority, 2024). Process-level inefficiencies such as delayed check-ins, manual billing errors, and slow reconciliation cycles exacerbate these challenges, reducing customer satisfaction and weakening competitiveness. Compliance with new systems such as the electronic Tax Invoice Management System (eTIMS) further strains limited resources, while rising labor and utility costs undermine profitability (KRA, 2024).

Scholars have attempted to address these challenges scientifically by investigating the role of technology and innovation in enhancing operational efficiency. Sigala (2018) emphasizes digitalization as a driver of efficiency in hotels, but most studies remain Eurocentric, neglecting Sub-Saharan contexts. Iranmanesh, Ghobakhloo, and Tseng (2022) show that operational efficiency is linked to process automation, yet they focus on luxury brands. Fan, Zhang, and Luo (2023) demonstrate that digital adoption improves resource utilization, but their work does not

explicitly examine financial technologies in hospitality. Tiwasing, Muthinja, and Mwangi (2024) explore mobile money adoption in Kenya's hospitality sector, but their study is general and not tailored to three-star hotels. Similarly, Ozili (2018) and Deloitte (2019) highlight the benefits of FinTech in financial management, but there is limited empirical evidence connecting FinTech adoption to measurable operational efficiency indicators such as RevPAR, billing accuracy, or transaction reconciliation speed in midscale hotels. Collectively, these studies reveal gaps in contextual focus, operational metrics, and the mediating role of organizational readiness.

While existing literature acknowledges that FinTech adoption can streamline operations, little is known about how these technologies specifically influence the operational efficiency of three-star hotels in Nairobi Metropolitan Area, a critical yet underexplored segment. Moreover, most prior studies treat technology adoption as a linear input-output relationship, overlooking the role of digital maturity as a moderator. Digital maturity, reflected in managerial support, integrated systems, and staff training, determines whether FinTech tools are fully embedded into workflows or merely adopted superficially (Westerman, Bonnet, & McAfee, 2014; Teece, 2018). This study therefore sought to fill these gaps by examining the effect of FinTech adoption on operational efficiency among three-star hotels in NMA, while integrating digital maturity as a moderating variable.

1.3 Research purpose and Objectives

1.3.1 General Objectives

To assess the effect of fintech adoption and its interaction with digital maturity on operational efficiency of 3-star hotels in Nairobi metropolitan area, Kenya.

1.3.2 Research Objectives

The specific research objectives are to:

i. Examine the effect of mobile money payment adoption on operational efficiency of 3-star hotels in Nairobi metropolitan area, Kenya
ii. Determine the effect of card payments on operational efficiency of 3-star hotels in Nairobi metropolitan area, Kenya.
iii. Assess the effect of electronic invoicing adoption operational efficiency of 3-star hotels in Nairobi metropolitan area, Kenya.
iv. Analyze the moderating effect of digital maturity on the relationship between fintech adoption and operational efficiency of 3-star hotels in Nairobi metropolitan area, Kenya.

1.3.3 Research Questions

i. What is the effect of mobile money payment adoption on the operational efficiency of three-star hotels in the Nairobi Metropolitan Area, Kenya?
ii. What is the effect of card payment adoption on the operational efficiency of three-star hotels in the Nairobi Metropolitan Area, Kenya?
iii. What is the effect of electronic invoicing adoption on the operational efficiency of three-star hotels in the Nairobi Metropolitan Area, Kenya?
iv. How does digital maturity moderate the relationship between FinTech adoption and operational efficiency of three-star hotels in the Nairobi Metropolitan Area, Kenya?

1.4 Significance of the Study

This study is significant for several reasons. First, it contributes to the hospitality management literature by providing empirical evidence on how financial technologies (FinTech), specifically mobile money, card payments, and electronic invoicing, affect operational efficiency in three-star

hotels. While prior studies (Sigala, 2018; Ozili, 2018; Iranmanesh, Ghobakhloo, & Tseng, 2022) have demonstrated the role of technology in hotel performance, limited research has focused on the unique squeeze zone of three-star hotels in Kenya. By integrating digital maturity as a moderating factor, this study advances theoretical understanding using both the Technology–Organization–Environment (TOE) framework and dynamic capability theory, thereby offering fresh insights into the interplay between technology adoption, organizational readiness, and performance outcomes.

The findings will offer practical value to hotel managers and operators of three-star establishments in the Nairobi Metropolitan Area. With increasing competition, regulatory pressures, and evolving guest expectations, managers require actionable strategies to streamline processes, reduce costs, and enhance service delivery. By identifying which FinTech tools deliver the greatest operational efficiency gains, this study will guide decision-making on digital investments, staff training, and system integration. The study has policy relevance for regulators and government agencies such as the Tourism Regulatory Authority (TRA) and the Kenya Revenue Authority (KRA). Insights on how electronic invoicing and digital payments influence efficiency can inform regulatory frameworks that balance compliance with operational flexibility. Furthermore, the findings can support national strategies such as the Nairobi Metro 2030 blueprint and the broader goal of strengthening Kenya's competitiveness as a regional tourism hub.

Finally, the research carries societal significance by highlighting how efficient midscale hotels contribute to inclusive tourism development. Operationally efficient three-star hotels can provide affordable accommodation for domestic and regional travelers, create sustainable employment opportunities, and support Kenya's GDP contribution from travel and tourism, which

stands at approximately 10 percent globally (WTTC, 2024; UNWTO, 2024). By promoting competitiveness in this critical segment, the study underscores how digital innovation can advance both economic growth and social inclusion.

1.5 Scope of the Study

This study focused on the adoption of financial technologies (FinTech) and their influence on the operational efficiency of three-star hotels within the Nairobi Metropolitan Area (NMA), Kenya. The NMA covers Nairobi City, Kiambu, Machakos, and Kajiado counties under the Nairobi Metro 2030 framework. The study was confined to three-star hotels as classified by the Tourism Regulatory Authority (TRA), since they represent the midscale segment that balances affordability and quality, yet faces greater operational pressures compared to luxury or budget hotels.

Conceptually, the study examined three key dimensions of FinTech adoption: mobile money payments, card payments, and electronic invoicing. While online booking payments are acknowledged as part of the broader FinTech ecosystem in hospitality, the current study limits its analysis to the three dimensions above to ensure depth and manageability. The outcome variable is operational efficiency, measured using both financial (e.g., RevPAR, GOPPAR, cost-to-revenue ratios) and process-level indicators (e.g., billing accuracy, reconciliation speed, transaction completion times, and staff productivity).

The study further introduced digital maturity as a moderating variable to capture the extent to which technological infrastructure, organizational culture, and managerial readiness influence the relationship between FinTech adoption and operational efficiency. The analysis was bounded to three-star hotels because of their unique “squeeze zone” position, required to meet regulatory and service standards while operating under tight financial margins and rising customer

expectations. Methodologically, the study was limited to responses from managers and key operational staff, who are directly involved in financial transactions, technology adoption, and operational processes. The findings will therefore generalizable primarily to three-star hotels within the Nairobi Metropolitan Area, though they may offer lessons for similar midscale establishments in other urban centers in Kenya.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature on financial technology (FinTech) adoption, operational efficiency, and the moderating role of digital maturity in three-star hotels. The review positions the study within existing scholarship, identifies knowledge gaps, and forms the basis of the conceptual framework. The chapter outlines the theoretical foundations, clarifies key constructs in the conceptual review, including mobile money, card payments, electronic invoicing, operational efficiency, and digital maturity and presents the empirical review, synthesizing global, regional, and local studies to highlight what is known and where gaps remain. The final section develops the conceptual framework, showing the relationships between FinTech adoption, digital maturity, and operational efficiency.

2.2 Theoretical Framework

The theoretical framework is the basis from which the relationship between fintech and performance of SMEs is understood. It provides a summary of the main theories which explained the adoption and outcomes of digital finance, such as the Technology–Organization–Environment (TOE) framework, Technology Acceptance Model (TAM), Financial Intermediation Theory and Market efficiency theory. These theories informed the study on the grounds that they provide a framework to explain the variables of the study as well as the frame for interpreting the study findings on access, adoption, and financial efficiency and why efficiency outcomes differ depending on digital maturity.

2.2.1 Technology–Organization–Environment (TOE) Theory

The Technology–Organization–Environment (TOE) framework, developed by Tornatzky and Fleischer (1990), is one of the most widely used models for explaining organizational adoption of technological innovations. The framework posits that adoption is shaped by three interrelated contexts: technological, which considers the perceived benefits, compatibility, and complexity of the innovation; organizational, which includes resources, managerial support, structure, and readiness for change; and environmental, which accounts for external pressures such as competition, customer expectations, and regulatory demands. Together, these dimensions provide a holistic understanding of how firms integrate technology into their operations.

In hospitality research, the TOE framework has been extensively applied to explain the uptake of digital tools such as online booking platforms, property management systems, and financial technologies (Aldmour et al., 2023; Iranmanesh, Ghobakhloo, & Tseng, 2022). For three-star hotels in the Nairobi Metropolitan Area, the framework is particularly useful in contextualizing FinTech adoption: perceived operational benefits such as faster transactions (technological), availability of skilled staff and managerial commitment (organizational), and compliance with requirements like the electronic Tax Invoice Management System (eTIMS) or competition in the midscale market (environmental) all interact to influence adoption outcomes.

Despite its strengths, the TOE framework is not without criticism. First, it is often faulted for being overly descriptive rather than predictive, offering broad categories without specifying the relative weight or causal strength of each factor (Oliveira & Martins, 2011). Second, critics argue that it overlooks the role of individual-level factors such as managerial attitudes or employee resistance, which can strongly affect adoption decisions (Baker, 2012). Third, the framework assumes a static environment, yet technology adoption is a dynamic process where feedback loops and rapid market shifts are common (Awa, Ojiabo, & Emecheta, 2015). Finally, while

comprehensive, the framework can be difficult to operationalize empirically, as its three dimensions are broad and sometimes overlap. Nonetheless, TOE remains valuable because of its adaptability across industries and contexts. By considering technological, organizational, and environmental drivers simultaneously, it provides a robust theoretical lens for analyzing how three-star hotels adopt mobile money, card payments, and electronic invoicing to achieve operational efficiency. In this study, TOE offers a foundation for understanding adoption patterns while highlighting the importance of complementing it with perspectives such as dynamic capability theory, which captures the evolving and reconfigurational nature of digital transformation.

2.2.2 Technology Acceptance Model (TAM)

One of the most influential models for explaining technology adoption is the Technology Acceptance Model (TAM), originally developed by Davis (1986) and later refined by Davis, Bagozzi, and Warshaw (1989). TAM posits that two primary antecedents, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), determine an individual's behavioral intention to use a technology, which in turn influences actual system usage (Davis & Granić, 2024). Perceived usefulness refers to the degree to which a person believes that using a technology enhances performance, while perceived ease of use reflects the belief that the technology requires minimal effort. The model suggests a linear, causal flow in which beliefs shape attitudes, attitudes influence intentions, and intentions drive behavior (Rafique *et al*., 2020).

TAM has been widely applied in financial technology adoption research. Abu-Taieh et al. (2022) found that PU and PEOU significantly influenced mobile banking adoption in Jordan. Mutinda and Ochieng (2022) reported similar results in Kenya, showing that small traders' uptake of mobile money services was strongly driven by perceptions of usefulness and ease of use. In the context of SMEs, Davis and Granić (2024) applied TAM to digital financial services and

demonstrated that positive perceptions of FinTech tools enhanced adoption, leading to improved operational efficiency and business performance. These studies highlight TAM's ability to explain how perceptions shape engagement with digital finance solutions.

However, TAM has faced criticisms. First, it has been described as too simplistic, focusing narrowly on perceptions of usefulness and ease while neglecting broader organizational and environmental factors (Venkatesh & Bala, 2008; Bagozzi, 2007). Second, the model assumes a rational decision-making process, downplaying social, cultural, or contextual influences that often shape technology adoption. Third, TAM has been critiqued for being static, failing to capture the dynamic and iterative nature of technology use in real organizational settings (Natasia et al., 2022). Despite these limitations, TAM remains a valuable lens because it emphasizes the importance of user attitudes and perceptions, complementing broader frameworks such as TOE.

The relevance of TAM to the present study lies in its ability to explain the behavioral aspects of FinTech adoption in three-star hotels. Hotel managers and staff are more likely to adopt mobile money, card payments, and electronic invoicing when they perceive these technologies as useful in improving service delivery and efficient in reducing effort. This aligns with evidence that adoption is not only driven by organizational and environmental pressures (as in TOE) but also by individual user perceptions, which directly influence operational efficiency outcomes. The theory supports the proposition that when hotel managers and employees perceive FinTech solutions as useful and easy to use, they are more likely to adopt them, thereby enhancing operational efficiency. Combined with the TOE framework, TAM provides a behavioral dimension that enriches the explanation of FinTech adoption in three-star hotels within the Nairobi Metropolitan Area.

2.2.3 Financial Intermediation Theory

The Financial Intermediation Theory, proposed by Gurley and Shaw (1960), explains the central role of financial intermediaries, such as banks, microfinance institutions, and online lenders, in channeling funds between surplus and deficit units. The theory argues that intermediaries exist to reduce transaction costs, address information asymmetries, and mitigate inefficiencies inherent in direct financing. By pooling deposits and lending to borrowers, intermediaries facilitate the efficient allocation of capital, diversify risks, and provide mechanisms for monitoring borrowers (Molnár, 2018). Thus, intermediaries enhance liquidity and lower the cost of financial transactions while expanding access to credit. Over time, the theory has been extended to incorporate the role of digital financial platforms. FinTech innovations such as mobile banking, digital lending, and online payments are now viewed as modern intermediaries that provide faster, cheaper, and more convenient financial services (Pantielieieva *et al*., 2018). For instance, Nnabugwu (2024) used the theory to examine how banks support SME development, while Kambi and Onyiego (2022) applied it to study the role of digital lenders in enhancing the performance of micro and small enterprises. These applications underscore how financial intermediation continues to evolve in response to technological disruption.

The Financial Intermediation Theory faces several criticisms with some scholars arguing that it assumes intermediaries always act efficiently, overlooking risks of misallocation, regulatory capture, or financial instability (Allen & Santomero, 2001). Others highlight that the theory is bank-centric, underestimating the disruptive role of disintermediation through peer-to-peer platforms and decentralized finance (Philippon, 2016). In addition, while it emphasizes cost and risk reduction, it does not sufficiently address the role of digital maturity and organizational readiness in leveraging modern FinTech intermediaries. These limitations suggest the need to

complement the theory with perspectives such as the Technology–Organization–Environment framework and dynamic capability theory, which capture contextual and organizational dynamics.

Applied to this study, the Financial Intermediation Theory provides the foundation for understanding how FinTech acts as a modern intermediary in the hotel sector, enabling three-star hotels in the Nairobi Metropolitan Area to improve efficiency in transactions, billing, and financial management while expanding access to cost-effective financial solutions. FinTech platforms in Kenya, such as mobile money and electronic invoicing systems, function as intermediaries by reducing reliance on physical banking infrastructure and overcoming barriers faced by SMEs and midscale hotels in accessing credit. Additionally, by lowering costs and accelerating transaction speed, FinTech tools directly enhance working capital management and cash flow efficiency, which are critical for three-star hotels operating on tight margins. The theory therefore supported the proposition that FinTech adoption can improve operational efficiency by optimizing financial processes in midscale hospitality enterprises.

2.2.4 Resource-Based View (RBV)

The Resource-Based View (RBV), developed by Barney (1991), posits that a firm's sustained competitive advantage arises from resources and capabilities that are valuable, rare, inimitable, and non-substitutable (VRIN). These resources may be tangible, such as financial capital, technological infrastructure, and physical assets, or intangible, including managerial expertise, organizational culture, and innovative capacity (Reyes-Mercado, 2021). The theory emphasizes that it is not merely the possession of resources but the ability to deploy and integrate them effectively that determines firm performance (Lubis, 2022). In the context of three-star hotels, RBV highlights that financial and technological resources must be developed internally to translate

into operational efficiency. Firms with strong financial management capabilities and organizational skills are better positioned to leverage FinTech innovations, as they can align these tools with internal processes to achieve efficiency gains (Lubis, 2022; Reyes-Mercado, 2021). This aligns with the present study's focus on operational efficiency in three-star hotels, where margins are tight, and the ability to extract value from technology depends on how effectively internal resources are mobilized. RBV is particularly relevant because it provides a theoretical basis for the moderating role of digital maturity.

Digital maturity, reflected in staff skills, leadership support, integrated systems, and organizational readiness, constitutes an intangible resource that determines how well FinTech adoption translates into efficiency outcomes. Hotels with higher levels of digital maturity are more capable of embedding mobile money, card payments, and electronic invoicing into workflows, while those with low maturity may adopt such technologies superficially, limiting efficiency gains. Thus, RBV underscores that the competitive advantage derived from FinTech adoption depends on the firm's capacity to continuously develop, adapt, and reconfigure its internal resources. Despite its strengths, RBV has been criticized for being static, focusing primarily on resource possession rather than dynamic adaptation to environmental change (Priem & Butler, 2001). It also tends to underplay external factors such as regulation and competition, which are critical in the hospitality sector. Nonetheless, when combined with frameworks such as the TOE and dynamic capability theory, RBV enriches the study by emphasizing the internal organizational dimension of technology adoption. Applied to this study, RBV anchors the moderating variable by demonstrating that digital maturity, an internal, firm-specific capability, is essential in explaining why FinTech adoption has a stronger impact on operational efficiency in some hotels than in

others. This makes RBV a critical focus for linking technological adoption with performance outcomes in the Nairobi Metropolitan Area's three-star hotel sector.

2.3 Empirical Literature Review

2.3.1 Mobile Money Payment and Operational Efficiency

Several studies have been conducted on the role of mobile money payment and efficiency. Nikopoulou *et al*. (2023) investigated the role of digitization in the hospitality sector, with a particular focus on the adoption of mobile and contactless payments in hotels across multiple global markets, including China, Europe, and the United States. The study employed a conceptual synthesis of existing empirical evidence and industry reports to evaluate how mobile payments transform operational processes in hotels. Their findings demonstrated that mobile and contactless payment systems shorten front-desk transaction times, reduce guest waiting periods during check-in and check-out, and lower the workload for front-office staff. This, in turn, frees human resources for value-added tasks such as personalized guest service. The study further noted that by reducing the handling of physical cash, mobile payments minimize reconciliation errors and theft risks while enhancing financial reporting accuracy. Despite these benefits, Nikopoulou *et al.* (2023) acknowledged limitations in the literature, as most studies in their review focused on consumer adoption and satisfaction rather than firm-level operational outcomes such as revenue per available room (RevPAR), gross operating profit per available room (GOPPAR), or staff productivity. Moreover, their review highlighted a geographical gap, with very limited empirical data from Sub-Saharan Africa and particularly from midscale hotels.

Sleiman *et al*. (2023) conducted a large-scale survey-based study to examine the determinants and consequences of mobile payment adoption among consumers and merchants in

non-African settings. Using structural equation modeling, they assessed how perceived efficiency, compatibility, and security influenced both the adoption and the sustained use of mobile payments. Their results revealed that operational efficiency was not merely a by-product of mobile payment adoption but a key factor driving its uptake. Merchants reported fewer transaction delays, easier integration of payments into accounting systems, and better transaction traceability. Consumers, on the other hand, valued speed, and convenience, reinforcing the efficiency narrative from the demand side. However, the study primarily measured outcomes in terms of user perceptions and behavioral intentions rather than objective operational performance indicators such as reduced reconciliation cycles or improvements in working capital management.

Furthermore, while it demonstrated that efficiency perceptions significantly shape adoption behaviors, Sleiman *et al.* (2023) acknowledged that their study was limited by its cross-sectional design, which did not allow for long-term assessment of performance outcomes. Another gap was the absence of sectoral specificity, particularly within hospitality. Although the study provides strong evidence that efficiency is both an antecedent and an outcome of mobile payment adoption, it falls short of showing how hotels and other service-intensive businesses, where operational bottlenecks are critical, derive measurable efficiency improvements from mobile money solutions.

In a study of mobile money adoption among small and medium-sized enterprises (SMEs) in Somalia, Mohamed (2023) employed a cross-sectional survey of 385 SMEs, analyzed using generalized linear models (GLM). The research aimed to determine whether mobile money usage improved business performance, with operational efficiency serving as a mediating channel. The results revealed that mobile money adoption reduced transaction time, lowered reliance on physical cash, and improved record-keeping and cash-flow visibility, which collectively enhanced

efficiency. SMEs using mobile money reported faster supplier payments and better reconciliation practices, which in turn allowed them to focus more on core business operations. However, the study had notable limitations. First, the analysis was broad, covering all SMEs rather than specific industries, meaning the findings lacked sectoral insights. Second, operational efficiency was captured through self-reported measures rather than objective process-level metrics such as transaction turnaround time or error rates. Finally, the Somali context, characterized by financial exclusion and weak formal banking systems, may not be fully comparable to more developed financial ecosystems such as Kenya's. While Mohamed (2023) confirms the positive efficiency implications of mobile money, the study highlights the need for sector-specific investigations that examine how mobile payment systems directly affect operational processes in industries such as hospitality, where efficiency bottlenecks have immediate customer-facing consequences.

A dual set of studies sheds further light on the regional landscape. Osabutey et al. (2024) conducted a review of mobile money research across Africa, focusing on its role in reducing transaction costs and improving efficiency for SMEs. They highlighted mobile money's ability to provide operational benefits such as real-time payments, reduced cash-handling costs, and easier compliance with tax regulations. Complementing this, Hassan (2023) employed firm-level data in Zambia to assess the resilience of informal enterprises that adopted mobile money during periods of economic volatility. Using econometric analysis, the study found that firms with mobile money systems experienced smaller sales declines and greater operational continuity, suggesting that mobile money enhanced resilience through more stable cash flows and quicker payment cycles. Collectively, these studies demonstrate that mobile money adoption contributes to operational stability and efficiency at the firm level. However, their scope is limited. Osabutey et al. (2024) provide a broad synthesis rather than primary empirical evidence, while Hassan's (2023) focus on

informal firms leaves a gap in understanding how structured sectors such as hospitality, where compliance and customer-facing efficiency are critical, can benefit. Moreover, neither study directly measured hotel-specific efficiency outcomes such as average daily rate (ADR), RevPAR, or guest check-in times.

Tiwasing, Muthinja, and Mwangi (2024) used data from the World Bank Enterprise Survey, covering 1,001 businesses in Kenya, to examine the effects of mobile money adoption on business performance. Employing propensity score matching, they compared adopters and non-adopters to isolate the impact of mobile money on key business outcomes. The results showed that mobile money adoption was positively associated with improved performance, largely through mechanisms such as reduced transaction costs, faster settlement cycles, and improved working capital management. Businesses using mobile money were able to process payments more quickly, manage liquidity more effectively, and reduce time spent on administrative tasks related to financial reconciliation. While the study provided robust causal evidence, it remained general, focusing on SMEs across diverse sectors. It did not examine service-intensive sectors such as hospitality, where operational efficiency is closely linked to customer satisfaction and revenue generation. Furthermore, while the findings suggest efficiency gains, the study primarily measured performance outcomes such as sales growth and profitability, leaving a gap in process-level indicators (e.g., check-in speed, billing accuracy) that are particularly relevant for hotel operations.

A recent study published in the Strategic Journals (2025) examined the effect of mobile payment adoption on financial performance among SMEs in Kirinyaga County, Kenya. Using a descriptive survey design, the study collected data from SME owners and managers on their use of mobile payment systems and subsequent performance outcomes. The findings revealed a strong

positive effect of mobile payment adoption on financial performance, attributed to increased transaction speed, improved traceability, and reduced risks associated with cash handling. Businesses reported greater efficiency in daily operations, with mobile money systems enabling them to reconcile accounts more quickly and access real-time financial data. However, the study primarily measured financial performance indicators such as profitability and sales growth, without delving into operational efficiency metrics at the process level. In addition, the focus on SMEs in general meant that hospitality-specific challenges such as front-office transaction bottlenecks and compliance with electronic invoicing systems were not addressed. The study confirms the broad efficiency benefits of mobile money but underscores the need for sector-specific analysis in industries such as hotels, where operational efficiency is critical to service delivery and competitiveness.

Njuguna (2023) carried out a cross-sectional study on mobile money merchant services among SMEs in Nakuru County, with a focus on how mobile payment tools such as till numbers and merchant statements affected operational efficiency. The study collected primary survey data from 150 SMEs and analyzed the impact of mobile money adoption on financial visibility and reconciliation processes. The results showed that businesses using mobile merchant services enjoyed improved cash-flow monitoring, reduced discrepancies in daily reconciliations, and faster closure of accounts. These improvements directly pointed to operational efficiency gains, as managers reported reduced time spent on manual cash-handling and accounting. Despite these strengths, the study's scope was limited to general SMEs, with no disaggregation of results by sector. As such, while the findings illustrate that mobile money tools can improve efficiency, the unique dynamics of three-star hotels, such as high transaction volumes, guest satisfaction requirements, and regulatory compliance, were not explored. Furthermore, the study did not

connect efficiency outcomes to higher-order performance metrics like RevPAR or GOPPAR, which are crucial in hospitality.

2.3.2 Card Payment and Operational Efficiency

Ryu et al. (2022), building on earlier Deloitte (2019) insights, examined the role of card payment systems in improving operational efficiency within the retail and service sectors in advanced economies such as the United States, South Korea, and parts of Europe. The study utilized transaction data and case surveys from medium and large service firms, focusing on adoption of debit and credit card point-of-sale (POS) systems. Findings indicated that card payment systems reduce reliance on cash, improve reconciliation speed, and facilitate real-time tracking of sales, all of which lower administrative burdens and transaction errors. For service firms, including hotels, the shift to card-based payments enhanced financial transparency and reduced risks associated with fraud and cash leakage. The study further demonstrated that card payments improved customer trust and satisfaction by offering secure and widely accepted payment alternatives. However, Ryu et al. (2022) noted limitations: while efficiency outcomes such as reduced transaction errors were documented, the study did not examine process-level outcomes specific to hospitality operations such as front-desk check-in/check-out speed, billing accuracy, or integration with hotel property management systems. Additionally, the evidence was largely derived from high-income economies with advanced digital infrastructure, raising questions about generalizability to midscale hotels in resource-constrained contexts like Sub-Saharan Africa.

Chauhan and Shah (2023) conducted an empirical study on digital payment adoption, including card systems, across hotels and restaurants in India. Using survey data from 214 establishments and regression analysis, they assessed the effect of card payment adoption on

operational and financial outcomes. Results showed that card adoption led to improved speed of transactions, lower costs of cash handling, and fewer billing discrepancies, enhancing both efficiency and customer satisfaction. Hotels that integrated card payments into their property management systems also reported smoother reconciliation between financial and operational records, which facilitated managerial decision-making. The study highlighted that card adoption helped reduce manual errors in cash transactions and created a stronger audit trail, improving compliance and financial accountability. However, Chauhan and Shah (2023) noted that smaller establishments with low digital maturity struggled with integration costs and staff training needs. The gap identified was that while card systems improved efficiency overall, the degree of efficiency gain was contingent on organizational readiness, an issue rarely captured in previous hospitality studies. Moreover, their sample was concentrated in urban India, limiting transferability to the Kenyan hotel market, where infrastructural and regulatory contexts differ significantly.

Amoah and Jibril (2022) investigated card payment adoption in Ghanaian hotels, focusing on its role in improving operational performance and customer service quality. Using a mixed-methods approach involving surveys of 150 hotel managers and follow-up interviews, they found that the adoption of debit and credit card systems facilitated quicker billing, reduced manual errors, and improved cash-flow management. Hotels with POS systems integrated into accounting software experienced faster end-of-day reconciliations and less staff time spent on balancing accounts, which enhanced efficiency. Card adoption was also associated with stronger customer perceptions of professionalism, particularly among international guests who preferred cashless payments. Despite these benefits, the study noted constraints, including unreliable electricity and network outages that frequently disrupted transactions. The authors concluded that while card payment systems enhance efficiency, their full potential is not realized in contexts with

infrastructural weaknesses, pointing to the need for sector- and process-level studies that go beyond customer perception to examine operational efficiency outcomes in depth.

Mutinda *et al*. (2023) studied card payment systems in Ugandan SMEs, including firms in the hospitality sector. Using a quantitative survey of 200 businesses and regression analysis, they assessed the effect of card payment adoption on transaction efficiency and financial performance. The findings showed that businesses accepting card payments experienced shorter transaction times, reduced cash-handling risks, and easier compliance with tax reporting. In hotels, managers reported that card systems enhanced operational efficiency by reducing workload at the cashier desk and improving accuracy in customer billing. Nevertheless, the study found that adoption costs and transaction fees charged by card providers discouraged smaller firms from full adoption. The gaps highlighted include a lack of in-depth examination of hotel-specific operational indicators, as well as the exclusion of digital maturity factors that determine how well card systems integrate with existing hotel management processes.

Although earlier studies by Mutie and Wanyoike (2016) addressed electronic payments broadly, Wanyoike (2022) updated the evidence by focusing on debit and credit card payment adoption among Kenyan SMEs, including hospitality businesses. The study employed a descriptive survey of 300 enterprises across Nairobi and regression analysis to examine efficiency outcomes. Results showed that card payments reduced transaction errors, lowered cash-handling risks, and enhanced financial transparency. Hotels in particular reported that integration of card POS systems reduced the time needed for reconciling guest bills and improved service delivery during peak periods. However, the study highlighted that not all firms benefited equally, as those with limited digital infrastructure and low staff capacity faced operational disruptions when

systems malfunctioned. While it demonstrated efficiency benefits, the study did not connect adoption to hospitality-specific performance metrics such as RevPAR or guest satisfaction scores.

Tourism Regulatory Authority (2024) produced a market report on Nairobi's midscale accommodation sector, which included analysis of digital payment adoption trends. Using industry surveys and hotel financial data, the report highlighted that three-star hotels increasingly rely on card payments to serve both domestic and international guests. Findings showed that card systems reduced billing errors, enabled faster check-outs, and provided managers with real-time transaction records that improved cash management. The report also noted that hotels integrating card systems with accounting software had stronger compliance with Kenya Revenue Authority (KRA) requirements. However, Tourism Regulatory Authority (2024) acknowledged that high transaction fees and dependence on electricity and internet infrastructure presented operational risks. Furthermore, the report emphasized financial outcomes but did not empirically test operational efficiency indicators in three-star hotels, leaving a gap for academic research to assess process-level impacts systematically.

Njuguna (2023) studied electronic merchant payment systems, including card services, among SMEs in Nakuru County. Using survey data from 150 businesses, the research demonstrated that card payments improved financial traceability, reduced manual reconciliation errors, and lowered risks associated with theft or fraud. In firms offering services to international clients, card systems were especially valued for creating a perception of professionalism and reliability. For hospitality establishments, managers reported that adoption of card payments improved customer satisfaction and reduced front-desk congestion during peak hours. Despite these positive outcomes, the study was limited by its focus on SMEs broadly rather than hotels

specifically. Moreover, while operational efficiency was implied through reduced reconciliation time and faster billing, the study did not measure efficiency using hospitality metrics such as RevPAR, ADR, or GOPPAR. This highlights the need for research tailored to midscale hotels in Nairobi Metropolitan Area, where operational efficiency has direct implications for competitiveness and sustainability.

2.3.3 Electronic Invoicing and Operational Efficiency

Zhang and Luo (2023) conducted a study on the adoption of electronic invoicing in Chinese service firms, including hospitality and retail businesses. Using survey data from 420 managers and structural equation modeling, the researchers examined how e-invoicing systems influence operational efficiency. The findings revealed that electronic invoicing significantly reduced administrative overheads, minimized billing errors, and improved compliance with government tax regulations. Firms using integrated e-invoicing systems reported shorter reconciliation cycles and increased accuracy in financial reporting, which freed resources for customer-facing tasks. However, the study also found that firms with low digital infrastructure struggled to achieve efficiency gains, highlighting the moderating role of organizational readiness. The gap in this study lies in its focus on large urban firms, leaving unanswered questions about midscale enterprises such as three-star hotels, which often operate with tighter budgets and limited technological capacity.

In Italy, Cannas et al. (2022) analyzed the mandatory adoption of electronic invoicing across service industries, including tourism. Using a quasi-experimental design with pre- and post-adoption data, the study assessed changes in operational performance indicators such as billing time, reconciliation delays, and compliance rates. Results showed that electronic invoicing

significantly reduced the time taken to process transactions and enhanced financial transparency, particularly in small- and medium-sized enterprises. For hospitality operators, the system enabled faster guest check-outs and reduced disputes over billing. Nevertheless, the study highlighted that the efficiency benefits were uneven, with smaller firms struggling with high initial implementation costs and staff training. While the Italian context provides valuable lessons, the findings may not fully translate to Sub-Saharan Africa, where regulatory enforcement and digital infrastructure are less robust.

In Kenya, Mutie and Wanyoike (2016) investigated the role of electronic invoicing among SMEs as part of broader electronic payment adoption. Using a descriptive survey of Nairobi-based enterprises, they found that e-invoicing improved billing accuracy, reduced paperwork, and enhanced compliance with tax obligations. The study also showed that businesses using e-invoicing reported faster reconciliation and reduced risks of fraud or revenue leakage. However, while it confirmed the efficiency benefits, the research was limited by its general focus on SMEs, without a hospitality-specific lens. Moreover, the study was cross-sectional, meaning it did not capture long-term impacts of e-invoicing adoption on operational efficiency.

Building on Kenya Revenue Authority's (KRA) rollout of the electronic Tax Invoice Management System (eTIMS), KRA (2024) reported that hotels and other service providers adopting e-invoicing systems achieved significant improvements in compliance and operational transparency. Through internal audits and case surveys, the report highlighted reductions in billing disputes, enhanced real-time data availability, and smoother reconciliation processes across adopting firms. For hotels particularly, eTIMS facilitated automated invoicing, which improved front-desk efficiency and minimized manual errors. However, the report also noted that many

midscale hotels faced challenges in staff training, system integration, and managing the upfront costs of compliance. The study gap lies in its descriptive, institutional perspective, it did not empirically measure efficiency outcomes such as RevPAR, GOPPAR, or staff productivity that are critical to hotel operations.

Fan et al. (2023) examined electronic invoicing adoption in service industries across Asia using a mixed-methods approach that combined firm-level surveys with performance data analysis. Their results demonstrated that e-invoicing led to faster billing processes, enhanced accuracy, and stronger internal controls. Importantly, the study showed that firms with higher levels of digital maturity were better able to realize efficiency gains, as they could integrate invoicing systems with accounting software and property management systems. This suggests that digital maturity acts as a moderator between e-invoicing adoption and efficiency outcomes. Yet, while the findings provide strong evidence for the moderating effect, they were limited to Asian service firms, with no empirical application to Sub-Saharan hospitality contexts such as three-star hotels in Nairobi.

A study by Tiwasing *et al*. (2024) explored how financial technology tools, including electronic invoicing, affect operational performance among Kenyan businesses. Using World Bank Enterprise Survey data and propensity score matching, the researchers found that firms adopting electronic invoicing reported higher efficiency in billing and reconciliation, alongside better working capital management. Adoption of e-invoicing reduced delays in payments and minimized errors in transaction records, thereby improving overall operational efficiency. However, the study treated e-invoicing as part of a broader basket of financial technologies, without isolating its specific contribution to hotel performance. Additionally, the study's focus on

general SMEs meant it did not consider the unique operational challenges of hotels, such as front-desk congestion and integration with booking platforms.

2.3.4. FinTech Adoption, Digital Maturity and Operational Efficiency

Arner, Barberis, and Buckley (2017) provide an examination of financial technology adoption, emphasizing its potential to transform operational processes across industries. Their conceptual analysis outlined how FinTech tools such as digital payments, mobile banking, and e-invoicing reduce transaction costs, accelerate settlements, and improve transparency. While the study convincingly demonstrated the role of FinTech adoption in driving efficiency, it treated efficiency outcomes broadly, using cost reduction and financial inclusion as proxies, rather than empirically measuring operational efficiency within specific industries such as hospitality. Moreover, the study did not consider organizational readiness or digital maturity as a moderating factor. This shows that while FinTech adoption has been acknowledged as a driver of efficiency, little attention has been given to the contextual conditions under which these technologies generate measurable improvements in operational outcomes.

Westerman, Bonnet, and McAfee (2014) examined digital maturity in their seminal work on digital transformation, defining it as the extent to which organizations embed digital technologies into processes, culture, and strategy. Drawing from global case studies across manufacturing, finance, and services, the authors demonstrated that digitally mature firms achieve better efficiency outcomes because they integrate technologies holistically rather than superficially. However, the study did not focus on FinTech adoption as a distinct construct and did not test efficiency outcomes in sectors like hospitality, where transaction-heavy processes dominate. The absence of explicit connections between FinTech adoption and operational

efficiency leaves a conceptual gap: while digital maturity is shown to enhance efficiency, it is unclear how it moderates the impact of financial technologies specifically.

Fan, Zhang, and Luo (2023) advanced this discussion by empirically investigating the role of digital technologies in service industries in Asia, with particular emphasis on operational efficiency. Using a mixed-methods design, they found that firms adopting digital systems experienced improvements in billing accuracy, reconciliation speed, and customer service delivery. More importantly, they showed that organizations with higher levels of digital maturity realized greater efficiency gains than those with lower maturity. Despite this contribution, the study bundled FinTech with other digital systems and did not isolate financial technologies as an adoption category. The findings imply that while digital maturity interacts with technology adoption, the specific moderating role it plays in the relationship between FinTech adoption and operational efficiency remains unexplored, especially in hospitality.

Tiwasing, Muthinja, and Mwangi (2024) analyzed FinTech adoption among Kenyan businesses using World Bank Enterprise Survey data. Applying propensity score matching, they demonstrated that businesses adopting FinTech tools such as mobile money and electronic invoicing recorded improvements in working capital management and overall performance. The study confirmed that FinTech reduces operational inefficiencies by lowering transaction delays and minimizing manual errors. However, the study did not account for digital maturity, treating technology adoption as a linear driver of efficiency without acknowledging differences in organizational readiness. Furthermore, while it included service firms, it did not focus on hospitality or three-star hotels specifically, where efficiency challenges are acute. This omission underscores the broader gap in literature: existing studies either examine FinTech adoption and

efficiency in isolation or explore digital maturity in a general digital transformation context, but no research has explicitly integrated the three constructs into a single framework.

2.4 Conceptual Framework

The present study is based on the relationship between FinTech adoption and the operational efficiency of three-star hotels in the Nairobi Metropolitan Area, Kenya. FinTech adoption is analyzed in relation to three key dimensions: mobile money payments, card payments, and electronic invoicing. It is hypothesized that these dimensions positively influence operational efficiency by streamlining financial transactions, reducing reconciliation errors, and enhancing compliance. Operational efficiency is measured using both financial indicators (such as cost-to-revenue ratios, RevPAR, and GOPPAR) and process-level indicators (including billing accuracy, transaction speed, and staff productivity).

To extend the framework, digital maturity is introduced as a moderating variable, recognizing that the extent to which hotels realize efficiency gains from FinTech adoption depends on their internal capabilities, technological readiness, and managerial support. The conceptual framework is shown in Figure 1 below.

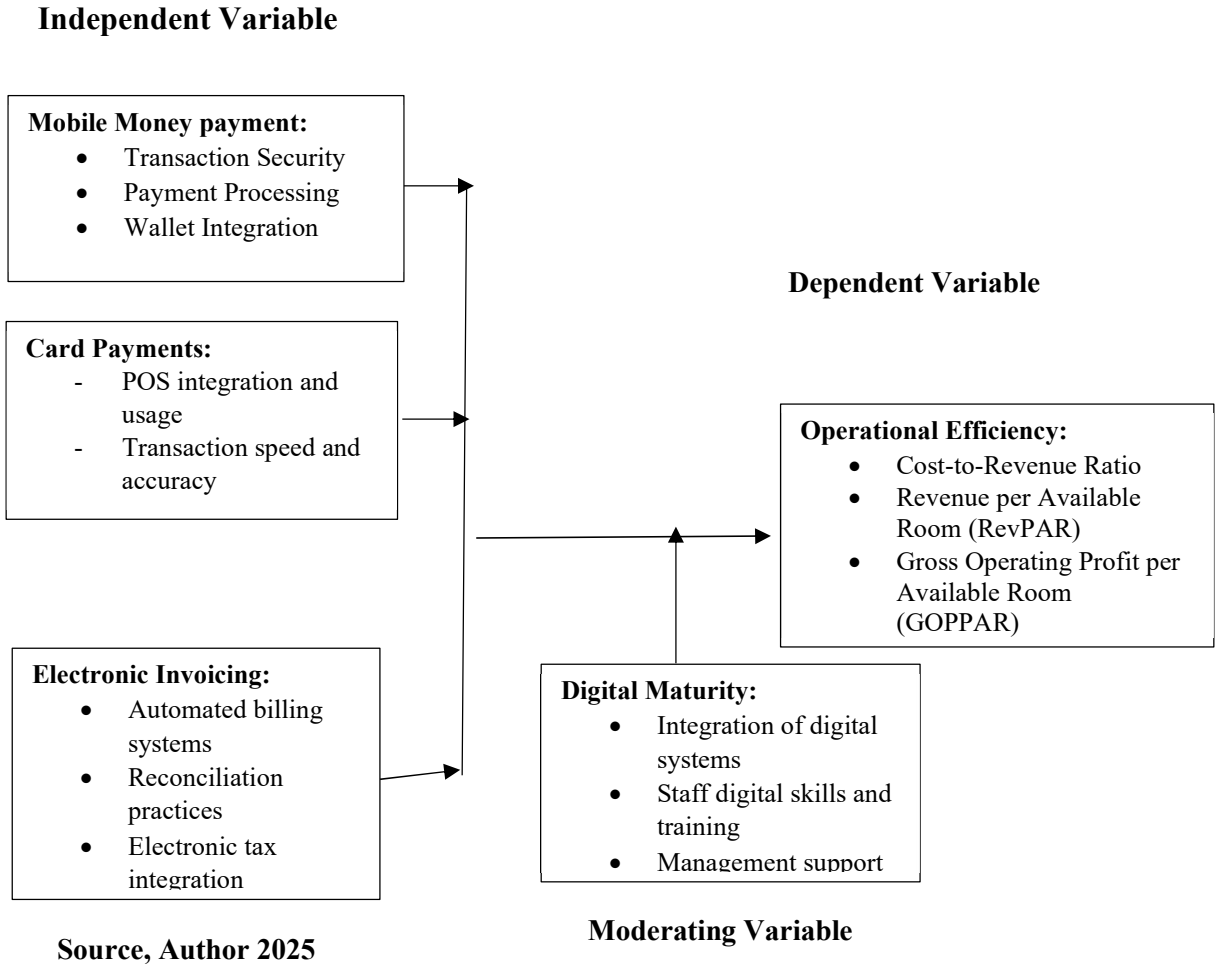

FIGURE 1

Conceptual Framework

2.5 Operationalization and Measurement of Variables

The key variables for this study are operationalized and measured as follows:

TABLE 1

Operationalization and Measurement of Variables

Variable Type	Variable	Operationalization	Measurement
Independent	**Mobile Money payment:**	• Transaction Security • Payment Processing • Wallet Integration - POS integration and usage	Likert scale (1–5)
Independent	**Card Payments**	- Transaction speed and accuracy - Reconciliation	Likert scale (1–5)
Independent	**Electronic Invoicing**	• Automated billing systems • Reconciliation practices • Electronic tax integration	Likert scale (1–5)
Moderator	**Digital Maturity**	• Integration of digital systems • Staff digital skills and	Likert scale (1–5)
Dependent	**Operational Efficiency**	• Cost-to-Revenue Ratio • Revenue per Available Room (RevPAR) • Gross Operating Profit per Available Room (GOPPAR)	Likert scale (1–5)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the methodology that was used to achieve the objectives of the study. It explains the research design adopted, the target population, and the sampling procedures that guided the selection of respondents. The chapter also details the data collection instruments and procedures, as well as the techniques that were employed in analyzing the data. Finally, it addresses issues of validity and reliability to ensure that the instruments are robust and that the findings of the study are credible and dependable.

3.2 Research Design

According to Sekaran and Bougie (2016), a research design is the blueprint or framework that guides the collection, measurement, and analysis of data in a manner that ensures accuracy and minimizes bias. Similarly, Kothari (2004) emphasizes that a sound research design provides a logical structure for the study, ensuring that the research problem is addressed effectively and that valid and reliable conclusions can be drawn. Building on these perspectives, the present study adopts a descriptive research design, which is appropriate for examining relationships between variables without manipulating them.

Descriptive research is particularly suited for this study as it seeks to establish the relationship between FinTech adoption (mobile money, card payments, and electronic invoicing) and operational efficiency of three-star hotels in the Nairobi Metropolitan Area, while also considering the moderating role of digital maturity. This design allows the researcher to systematically collect and analyze data from hotel managers and staff, providing insights into how

financial technologies are applied in real operational contexts. As noted by Creswell and Creswell (2018), descriptive designs are valuable for studies that aim to "observe, describe, and document aspects of a situation as they occur naturally," making them ideal for hospitality research where interventions are not feasible. Unlike experimental designs, which involve manipulation of variables in controlled settings, descriptive research allows for real-world assessment of organizational practices and behaviors. This makes it especially useful for analyzing how digital tools shape financial processes and service delivery in the hotel industry. Previous hospitality and tourism studies have also relied on descriptive approaches to evaluate technology adoption, service efficiency, and customer management, demonstrating its suitability in contexts where the goal is to generate actionable insights for practitioners and policymakers (Singh & Sharma, 2021; Sigala, 2018).

3.3 Target Population

The target population for this study comprises all three-star hotels within the Nairobi Metropolitan Area (NMA), which includes Nairobi City, Kiambu, Machakos, and Kajiado counties under the Nairobi Metro 2030 framework. According to Tourism Regulatory Authority (2024), there are 62 three-star hotels registered by the Tourism Regulatory Authority (TRA) in this region. These hotels are strategically positioned in the hospitality market as midscale establishments that must balance affordability with service quality, yet they often operate under tighter financial margins and heightened operational pressures compared to luxury hotels. This makes them an appropriate focus for examining how FinTech adoption can drive operational efficiency.

The unit of analysis for the study were the hotels, since the aim is to evaluate how FinTech adoption impacts overall organizational efficiency. However, the units of observation were the operational managers of the respective hotels. Operational managers were selected as the primary

respondents because they are directly responsible for overseeing the daily operations of three-star hotels, including front-office processes, financial transactions, billing and invoicing, and compliance with regulatory systems such as the electronic Tax Invoice Management System (eTIMS). As Sekaran and Bougie (2016) emphasize, the reliability of research findings depends heavily on engaging respondents who are closely involved with the phenomena under investigation. Their insights therefore were instrumental in generating valid and practical conclusions about the relationship between FinTech adoption, digital maturity, and operational efficiency in three-star hotels within the NMA.

3.4 Sample and Sampling Techniques

Given that the total number of registered three-star hotels within the Nairobi Metropolitan Area (NMA) is relatively small, the study adopted a census approach. A census involves collecting data from the entire population rather than selecting a subset, and it is recommended when the population is manageable in size and accessible (Kothari, 2004; Sekaran & Bougie, 2016). By targeting all 62 registered three-star hotels, the study minimizes the risk of sampling error and ensures that the findings are comprehensive and generalizable to the entire population of interest. Each hotel was treated as a unit of analysis, while the operational manager of each hotel served as the unit of observation. This approach is particularly suitable for the study because operational managers are directly involved in financial and administrative processes such as billing, payments, and compliance, making them best positioned to provide valid insights into FinTech adoption and operational efficiency. The use of a census also strengthens the external validity of the research findings, as it eliminates bias associated with sample selection and captures the full diversity of hotels across the four counties of the NMA (Nairobi, Kiambu, Machakos, and Kajiado). This

ensures that the conclusions drawn are not only accurate but also representative of the broader midscale hospitality sector in Kenya.

3.5 Research Instrument

The study used a questionnaire as the main tool for data collection. This approach is well suited because it allows information to be gathered in a structured and consistent way from a relatively large number of operational managers across the Nairobi Metropolitan Area. Since the study seeks to establish relationships between FinTech adoption, digital maturity, and operational efficiency, it is important that data be collected systematically so that responses can be compared and analyzed with accuracy. A questionnaire provides this standardization, making it possible to capture both information about hotel practices and perceptions on how these practices affect efficiency.

As Kothari (2004) observes, questionnaires are particularly effective when researchers need to balance breadth and depth—allowing for the collection of quantifiable data while still accommodating managers' perspectives. For operational managers, who often work under time pressures, a questionnaire also offers a practical and non-intrusive way to share information, minimizing disruption to their duties. In addition, a well-structured questionnaire reduces researcher bias, improves objectivity, and facilitates statistical analysis. According to Sekaran and Bougie (2016), this structured approach enhances both the reliability and validity of research findings, ensuring that the evidence generated is credible, replicable, and useful for advancing knowledge in the hospitality sector.

3.6 The Validity and Reliability of the Instrument

3.6.1 Validity of the instrument

To ensure validity, the questionnaire underwent expert review by scholars and practitioners in hospitality management, FinTech adoption, and operational efficiency. Their input helped

determine whether the items adequately capture the constructs under investigation and align with the study objectives. This process established content validity, ensuring that each question contributes meaningfully to measuring mobile money, card payments, electronic invoicing, digital maturity, and operational efficiency. In addition, a pilot study was conducted with a small sample of operational managers drawn from hotels outside the Nairobi Metropolitan Area. The pilot results were used to test the clarity, structure, and relevance of the questionnaire items. Feedback from the pilot was used to refine the instrument so that it is precise, easy to understand, and capable of consistently generating accurate and relevant data.

3.6.2 Reliability of the Instrument

Reliability was assessed using both test–retest and internal consistency techniques. For the test–retest approach, a subset of respondents in the pilot group completed the questionnaire twice within a two-week interval. The two sets of responses were compared to evaluate stability and consistency over time. In addition, a Cronbach's alpha reliability test was carried out on the Likert-scale items. According to Sekaran and Bougie (2016), a coefficient value of 0.70 or higher indicates an acceptable level of reliability. This analysis confirmed whether the questionnaire items measure the intended constructs consistently. This helped minimize response variation and strengthen the credibility of the data, thereby enhancing the overall methodological rigor of the study.

3.7 Data Collection Procedure

Data for this study was collected through a structured questionnaire administered to operational managers of three-star hotels in the Nairobi Metropolitan Area. Before the full rollout, the questionnaire was pilot-tested on a small number of respondents drawn from similar hotels outside the study area. This helped to refine the wording, improve clarity, and confirm the reliability and validity of the instrument. Feedback from the pilot was incorporated to strengthen the final version.

The researcher then distributed the questionnaires to the operational managers of all registered three-star hotels in the study population. To maximize response rates, the questionnaires was delivered both physically and electronically, depending on each hotel's preference and accessibility. Where physical delivery was used, the researcher arranged appointments with the managers and leave the questionnaires for completion, followed by scheduled collection. For electronic distribution, secure survey platforms and official emails was used, ensuring confidentiality of responses.

To encourage accurate and timely completion, clear instructions were provided alongside the questionnaire, and follow-up reminders was sent to non-respondents. Respondents were assured that their feedback was used strictly for academic purposes and that all data was treated with strict confidentiality. This procedure not only enhanced response quality but also improved trust and cooperation from the hotels. By standardizing the data collection process and minimizing disruptions to the managers' schedules, the procedure ensured that valid, comprehensive, and representative data is obtained to address the study objectives.

3.8 Data Processing and Analysis

To ensure validity and reliability of the findings, the data collected was processed and analyzed systematically. Completed questionnaires were first be checked for completeness and consistency, with any omissions, errors, or invalid responses identified and corrected where possible. Qualitative responses were carefully coded and transformed into analyzable categories, while quantitative data was transferred into the Statistical Package for the Social Sciences (SPSS) for statistical analysis.

Descriptive statistics, including frequencies, means, and percentages, were used to summarize the demographic and organizational characteristics of the participating hotels and respondents. These results were presented in tables, charts, and graphs, which provided a clear overview of the sample profile and key patterns. To address the study objectives, inferential statistics were then applied. Multiple regression analysis was used to examine the effect of FinTech adoption dimensions (mobile money, card payments, and electronic invoicing) on the operational efficiency of three-star hotels in the Nairobi Metropolitan Area. In addition, a hierarchical regression model was employed to test the moderating role of digital maturity in the relationship between FinTech adoption and operational efficiency. This approach enabled the study not only to establish direct effects but also to assess how digital readiness strengthens or weakens the impact of FinTech adoption on hotel performance. The following models were used.

Unmoderated Model:

$$\boldsymbol{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon}$$

Where: -

Y = Operational Performance

$\boldsymbol{X_1}$ = Mobile Money Payment

$\boldsymbol{X_2}$ = Card Credit

$\boldsymbol{X_3}$ = Electronic Invoicing

$\boldsymbol{\beta_0}$ = The Constant Term

$\boldsymbol{\beta}$ = Coefficient of independent variables

$\boldsymbol{\varepsilon}$ = Error term

Moderated Model:

$$\boldsymbol{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 Z + \beta_5 X_1 * Z + \beta_6 X_2 * Z + \beta_7 X_3 * Z + \varepsilon}$$

Where Z = Digital Maturity

3.9 Diagnostic Tests

To ensure the accuracy and reliability of the statistical analysis, the study conducted a series of diagnostic tests to verify the assumptions underlying regression analysis. These tests included checks for normality, homoscedasticity, linearity, and multicollinearity, all of which are essential for producing valid and meaningful results.

3.9.1 Normality

Normality testing was conducted to determine whether the data follow a normal distribution, which is a critical assumption for many parametric statistical tests. To assess the shape of the distribution, skewness and kurtosis statistics was examined. As noted by Myoung (2008), values between –1.0 and +1.0 are generally taken to indicate normal distribution. In addition, the study applied the Kolmogorov–Smirnov (K-S) test and the Shapiro–Wilk (S-W) test, as recommended by Hair *et al.* (2010), to detect potential deviations from normality. Following Field (2009), results that are not statistically significant ($p > 0.05$) was interpreted as evidence that the data are normally distributed. Establishing normality is essential since violations of this assumption can compromise the validity of regression results and reduce the accuracy of statistical inferences.

3.9.2 Homoscedasticity

Homoscedasticity refers to the assumption that the variance of the residuals remains constant across all levels of the independent variables. This assumption is critical because violations may

lead to inefficient and biased regression estimates, weakening the accuracy of hypothesis testing. To examine homoscedasticity, the study generated a scatter plot of standardized predicted values (ZPRED) against standardized residuals (ZRESID). A random and evenly distributed pattern of residuals was taken as evidence that the assumption holds, while the appearance of a funnel-like or systematic pattern suggested heteroscedasticity. In the event of heteroscedasticity, appropriate corrective measures such as data transformation or the use of robust standard errors were to be applied, as recommended by Hair *et al.* (2010) and Field (2009). Ensuring homoscedasticity therefore enhanced the efficiency and credibility of the regression analysis.

3.9.3 Linearity

Linearity testing was carried out to confirm that a consistent and proportional relationship exists between the independent and dependent variables. Regression models assume that changes in the predictor variables lead to predictable changes in the outcome variable; when this assumption is violated, the accuracy of the regression estimates may be compromised. To assess linearity, the study examined a scatter plot of standardized predicted values (ZPRED) against standardized residuals (ZRESID). A random distribution of residuals around zero without obvious curvature would be interpreted as evidence of linearity. In addition, the F-statistic from the regression model was used to further test whether the relationship between the variables is linear and statistically significant. As Hair *et al.* (2010) and Field (2009) emphasize, confirming linearity is critical for ensuring that the regression model produces valid and interpretable results.

3.9.4 Multicollinearity

Multicollinearity arises when independent variables in a regression model are highly correlated, making it difficult to isolate their unique contributions to the dependent variable. When present, multicollinearity inflates the standard errors of regression coefficients, reduces statistical

significance, and can distort the overall interpretation of results. To detect multicollinearity, this study computed the Variance Inflation Factor (VIF) for each independent variable, as recommended by Field (2009) and Hair *et al*. (2010). A VIF value greater than 10 (VIF > 10) was be taken as evidence of problematic multicollinearity. In such cases, corrective measures such as removing redundant variables, combining correlated predictors, or applying variable transformation may be implemented to improve model accuracy and stability. Ensuring that multicollinearity is minimized strengthened the reliability of the regression results and enhanced the robustness of the study's conclusions.

3.10 Ethical Considerations

This study sought to adhere to established ethical standards in the design, collection, and reporting of data. First, informed consent was obtained from all participants. Operational managers of three-star hotels in the Nairobi Metropolitan Area were provided with clear information about the purpose of the study, the nature of their participation, and the intended use of the data before agreeing to take part. Participation was entirely voluntary, and respondents were free to withdraw from the study at any stage without facing any negative consequences. Second, confidentiality and anonymity were strictly maintained. No identifying information of hotels or individual managers was disclosed in the reporting of results. Data was coded and stored securely to protect the privacy of participants. Access to the raw data was restricted to the researcher, and findings were presented in aggregated form only. Third, the study ensured that there is no harm or undue pressure placed on participants since the questionnaire was designed to avoid sensitive or intrusive questions, and the data collection process was structured to minimize disruption to the managers' work schedules. Finally, the research complied with the ethical guidelines of KCA University and any other relevant institutional review requirements.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results and analysis of data collected in relation to the study objectives. It provides a detailed account of the empirical findings based on responses from operational managers of three-star hotels in the Nairobi Metropolitan Area. The chapter begins with an overview of the response rate and demographic characteristics of the respondents, followed by descriptive statistics summarizing the key study variables. Inferential analyses, including correlation and multiple regression, are then presented to examine the relationships between mobile money payments, card payments, and electronic invoicing on operational efficiency, as well as the moderating effect of digital maturity. The results are interpreted and discussed in relation to existing literature and the study hypotheses, providing evidence-based insights into how FinTech adoption and digital maturity influence operational efficiency in three-star hotels.

4.2 Questionnaire Response Rate

The study targeted all 62 registered three-star hotels within the Nairobi Metropolitan Area. Out of these, 6 hotels were selected for the pilot study, leaving 56 hotels for the main data collection. Questionnaires were administered to the operational managers of these hotels, who served as the units of observation. A total of 55 questionnaires were successfully completed and returned, representing a response rate of 98.2 percent. According to Rogelberg and Stanton (2007), a response rate above 35 percent is considered adequate for organizational-level studies, indicating that the response rate achieved in this study was highly satisfactory, ensuring data accuracy and minimizing non-response bias.

4.3 Background Information Results

Before examining the effect of FinTech adoption on the operational efficiency of three-star hotels in the Nairobi Metropolitan Area, descriptive statistics were analyzed to understand the background characteristics of the respondents and the nature of their organizations. The descriptive results focused on key demographic and enterprise attributes, including gender, age, education level, years of experience in operations management, and the number of years the hotel has been in operation. These characteristics provided useful context for interpreting the study findings. The results of this descriptive analysis are presented and discussed in the subsequent sub-sections.

TABLE 2

Background Information of Respondents (n = 55)

Question	Options	n	(%)
Please indicate your gender	Male	31	56.4
	Female	24	43.6
	Total	**55**	**100**
Please specify your age bracket	Below 30 years	7	12.7
	31–40 years	21	38.2
	41–50 years	17	30.9
	Above 50 years	10	18.2
	Total	**55**	**100**
Highest educational qualification	Diploma	15	27.3
	Bachelor's degree	26	47.3

Question	Options	n	(%)
	Master's degree	12	21.8
	PhD/Other	2	3.6
	Total	**55**	**100**
Years of experience in operations management	Less than 3 years	9	16.4
	3–5 years	17	30.9
	6–10 years	19	34.5
	Over 10 years	10	18.2
	Total	**55**	**100**
Years hotel has been in operation	Less than 5 years	10	18.2
	5–10 years	18	32.7
	11–20 years	15	27.3
	Over 20 years	12	21.8
	Total	**55**	**100**

4.3.1 Distribution of the Respondents by Gender

The study sought to determine the gender distribution of operational managers in three-star hotels within the Nairobi Metropolitan Area. Understanding this distribution was important, as gender diversity in management can influence organizational decision-making, technology adoption, and overall operational efficiency. As presented in Table 2, the majority of respondents were male, representing 56.4 percent (N = 31) of the total sample, while females accounted for 43.6 percent

(N = 24). This distribution indicates that men slightly outnumber women in operations management roles within the three-star hotel category. The observed gender disparity may be linked to the historical dominance of men in managerial positions within the hospitality sector, often due to work scheduling demands and leadership representation gaps. However, the relatively strong presence of female managers reflects gradual progress toward gender inclusivity in hotel operations, suggesting that women are increasingly assuming leadership roles in the management of service-oriented enterprises.

4.3.2 Distribution of Respondents by Age

The study also sought to determine the age distribution of operational managers in three-star hotels within the Nairobi Metropolitan Area. Age is a crucial factor in understanding managerial adaptability, openness to innovation, and the likelihood of adopting digital financial technologies. Younger managers often demonstrate higher digital literacy and responsiveness to technological change, while older managers may rely more on traditional operational practices. The findings presented in Table 2 show that the largest proportion of respondents were aged between 31 and 40 years, accounting for 38.2 percent (N = 21). This was followed by those aged between 41 and 50 years at 30.9 percent (N = 17). Managers aged above 50 years comprised 18.2 percent (N = 10), while those below 30 years formed 12.7 percent (N = 7). This age distribution indicates that most operational managers are in their thirties and forties, a stage often associated with professional experience, career stability, and managerial competence. The moderate representation of younger managers reflects emerging generational shifts in the hospitality industry, where digital transformation is increasingly influencing management practices and operational decision-making.

4.3.3 Distribution of Respondents by Education

The study examined the distribution of respondents by their highest level of education to assess the academic and professional background of operational managers in three-star hotels within the Nairobi Metropolitan Area. Education plays a vital role in influencing managerial competence, openness to technology, and the ability to integrate financial innovations into operational processes. The findings presented in Table 2 show that most respondents held a bachelor's degree, representing 47.3 percent (N = 26). This was followed by diploma holders, who accounted for 27.3 percent (N = 15). Respondents with a master's degree constituted 21.8 percent (N = 12), while a smaller proportion, 3.6 percent (N = 2), possessed doctoral or other professional qualifications. This distribution indicates that a large majority of operations managers in three-star hotels have attained tertiary education, reflecting a workforce that is relatively well-equipped to understand, adopt, and manage digital financial technologies. The strong representation of degree and diploma holders also suggests that the hospitality sector continues to attract educated professionals capable of enhancing operational efficiency through informed decision-making and digital integration.

4.3.4 Years of Experience in Operations Management

The study also sought to establish the distribution of respondents based on their years of experience in operations management. Experience is a critical factor in determining managerial competence, decision-making ability, and openness to adopting digital financial technologies. Managers with longer experience often possess deeper institutional knowledge and operational insight, while those with fewer years in management may bring innovative perspectives and adaptability to technological change. The findings presented in Table 4.5 show that 34.5 percent (N = 19) of the respondents had between 6 and 10 years of experience in operations management. About 30.9 percent (N = 17) had 3 to 5 years of experience, while 18.2 percent (N = 10) had over 10 years of

experience. The remaining 16.4 percent (N = 9) had less than 3 years of experience. This distribution suggests that most operational managers in three-star hotels within the Nairobi Metropolitan Area possess moderate to extensive experience in their roles, equipping them with the practical skills and industry knowledge necessary to manage hotel operations efficiently. The balanced mix of experienced and relatively new managers also reflects a generational blend that may enhance innovation, particularly in the adoption and implementation of FinTech solutions.

4.3.5 Years Hotel Has Been in Operation

The study further sought to determine the number of years the hotels had been in operation. The duration of operation is an important indicator of organizational experience, market stability, and the level of institutional adaptation to emerging technologies. Older hotels are likely to have more established systems and processes, while newer establishments may demonstrate higher flexibility and willingness to adopt innovative financial technologies. The findings presented in Table 2 show that 32.7 percent (N = 18) of the hotels had been in operation for between 5 and 10 years. About 27.3 percent (N = 15) had operated for between 11 and 20 years, while 21.8 percent (N = 12) had been in existence for over 20 years. The remaining 18.2 percent (N = 10) had been in operation for less than 5 years. This distribution indicates that a majority of three-star hotels in the Nairobi Metropolitan Area have operated for at least five years, suggesting a mature and relatively stable industry. The substantial presence of hotels within the 5–20-year range reflects sustained growth and adaptability, while the existence of newer establishments points to continued investment and expansion within the midscale hospitality segment.

4.4 Descriptive Results on the Study of Variables

The research instrument was structured into sub-sections corresponding to each study variable, with all items presented as closed-ended questions. Respondents were asked to indicate their level

of agreement with various statements on a five-point Likert scale. The responses were first analyzed descriptively to capture underlying patterns and general perceptions regarding FinTech adoption dimensions as well as operational efficiency and digital maturity. The descriptive results provide an overview of respondents' views on each construct, forming the basis for subsequent inferential analysis. The findings from these analyses are presented and discussed in the following sub-sections.

4.4.1 Descriptive Results of Mobile Money Payment

The first objective of the study was to examine the effect of mobile money payment adoption on the operational efficiency of three-star hotels within the Nairobi Metropolitan Area. Respondents were asked to indicate their level of agreement with several statements relating to the use of mobile money payment systems in their hotel operations using a five-point Likert scale. The responses were analyzed descriptively to capture overall trends and perceptions regarding how mobile money facilitates transaction processing, enhances cash flow management, and improves service delivery efficiency. The findings provide insight into the extent to which mobile money payment systems have been integrated into hotel operations and their perceived contribution to operational efficiency. The results are presented in Table 3.

The findings in Table 3 show that most respondents agreed that mobile money payments enhance operational processes and efficiency in three-star hotels within the Nairobi Metropolitan Area. This is reflected in the relatively high mean scores ranging between 3.68 and 3.99. Respondents expressed the strongest agreement with the statement that mobile money enhances transaction speed and customer convenience (M = 3.99, S.D. = 0.95), followed closely by the perception that mobile money use has reduced cash-handling risks in hotel operations (M = 3.89, S.D. = 0.98). The lowest mean score was recorded for the statement on improved accuracy in

payment reconciliation (M = 3.68, S.D. = 1.08), suggesting a slightly lower but still positive perception. The overall mean score of 3.84 (S.D. = 1.02) indicates that respondents generally viewed mobile money payment adoption as a key contributor to operational efficiency, particularly through faster transactions, reduced risk, and greater customer convenience.

TABLE 3

Descriptive Results for Mobile Money Payment (n = 55)

Statements	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	Std. Dev.
Mobile money payments are widely used in hotel transactions.	5.5	9.1	10.9	47.3	27.2	3.82	1.05
The use of mobile money has reduced cash-handling risks in hotel operations.	3.6	7.3	12.7	49.1	27.3	3.89	0.98
Mobile money enhances transaction speed and customer convenience.	3.6	5.5	9.1	50.9	30.9	3.99	0.95
Mobile money integration has improved accuracy in payment reconciliation.	7.3	10.9	12.7	45.5	23.6	3.68	1.08
Mobile money has improved overall operational efficiency in hotel service delivery.	5.5	9.1	10.9	49.1	25.4	3.80	1.02
Average	**5.1**	**8.4**	**11.3**	**48.4**	**26.9**	**3.84**	**1.02**

4.4.2 Descriptive Results of Card Payment

The second objective of the study was to determine the effect of card payment adoption on the operational efficiency of three-star hotels within the Nairobi Metropolitan Area. Respondents were asked to indicate their level of agreement with several statements regarding the use of debit and credit card payment systems in hotel operations using a five-point Likert scale. The descriptive results are summarized in Table 4.

The findings indicate that respondents generally agreed that card payment adoption positively influences operational efficiency in hotel operations. The highest-rated statement was that the use of card payments improves transaction security and traceability (M = 3.91, S.D. = 0.95), followed by customer preference for card payments due to convenience and reliability (M = 3.87, S.D. = 0.98). The lowest-rated item related to integration with other financial systems (M = 3.70, S.D. = 1.04), implying that while card payment systems are widely adopted, system integration remains an area for improvement. The overall mean of 3.80 (S.D. = 1.01) suggests that card payments are well accepted in three-star hotels and are perceived as contributing significantly to efficiency, accuracy, and customer satisfaction.

TABLE 4

Descriptive Results for Card Payment (n = 55)

Statement	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	Std. Dev.
Card payment systems are available and functional in this hotel.	7.3	9.1	10.9	45.5	27.2	3.77	1.07
Card payments have reduced cash-handling and accounting errors.	5.5	10.9	12.7	47.3	23.6	3.73	1.01
The use of card payments has improved transaction security and traceability.	3.6	9.1	9.1	49.1	29.1	3.91	0.95
Customers prefer card payments because they are convenient and reliable.	5.5	7.3	9.1	50.9	27.2	3.87	0.98
Card payment systems are well integrated with other financial systems in the hotel.	7.3	10.9	12.7	45.5	23.6	3.70	1.04
Average	**5.8**	**9.5**	**10.9**	**47.7**	**26.1**	**3.80**	**1.01**

4.4.3 Descriptive Results of Electronic Invoicing

The third objective of the study was to assess the effect of electronic invoicing adoption on the operational efficiency of three-star hotels within the Nairobi Metropolitan Area. Respondents were requested to indicate their level of agreement with several statements regarding the use of electronic invoicing systems in hotel operations using a five-point Likert scale. The descriptive results are summarized in Table 5.

The findings show that most respondents agreed that electronic invoicing has enhanced efficiency and financial management in hotel operations. The highest-rated statement was that electronic invoicing provides real-time financial data that supports managerial decision-making (M = 3.91, S.D. = 0.97), followed closely by improved billing accuracy and reduced errors (M = 3.88, S.D. = 0.98). The lowest mean score related to reduced paperwork and enhanced efficiency (M = 3.73, S.D. = 1.06), suggesting that while the benefits are acknowledged, some hotels may still be transitioning fully to digital invoicing systems. The overall mean of 3.83 (S.D. = 1.01) indicates that respondents view electronic invoicing as an effective tool for improving accuracy, compliance, and decision-making within hotel operations.

TABLE 5

Descriptive Results for Electronic Invoicing (n = 55)

Statements	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	Std. Dev.
The hotel has adopted electronic invoicing for	5.5	10.9	9.1	50.9	23.6	3.77	1.02
Electronic invoicing has improved billing	3.6	9.1	10.9	49.1	27.3	3.88	0.98
The use of electronic invoicing has enhanced	5.5	7.3	9.1	50.9	27.2	3.87	1.00
Electronic invoicing has reduced paperwork and enhanced operational efficiency.	7.3	9.1	12.7	45.5	25.4	3.73	1.06
Electronic invoicing provides real-time financial data that supports managerial decision-making.	3.6	7.3	10.9	50.9	27.3	3.91	0.97
Average	**5.1**	**8.7**	**10.5**	**49.5**	**26.2**	**3.83**	**1.01**

4.4.4 Descriptive Results of Operational Efficiency

The dependent variable of the study was operational efficiency of three-star hotels within the Nairobi Metropolitan Area. Respondents were asked to indicate their level of agreement with statements assessing the hotel's ability to manage costs, utilize resources effectively, streamline operations, and maintain consistent service quality. The descriptive results are presented in Table 6. The findings in Table 6 indicate that most respondents agreed that the adoption of digital financial technologies has significantly enhanced operational efficiency in three-star hotels. The mean scores ranged between 3.68 and 3.91, reflecting generally positive perceptions toward the impact of FinTech on hotel performance. Respondents most strongly agreed that the use of FinTech tools has reduced service delivery time and improved accuracy (M = 3.91, S.D. = 0.95) and that operational processes have become more efficient through digital tools (M = 3.87, S.D. = 0.97). The lowest mean score was recorded for optimal resource utilization (M = 3.68, S.D. = 1.08), suggesting some variability in human resource efficiency across hotels. The overall mean of 3.79 (S.D. = 1.01) indicates that respondents perceive their hotels to be operationally efficient, largely due to the integration of digital solutions that streamline transactions, improve resource management, and enhance customer satisfaction.

TABLE 6

Descriptive Results for Operational Efficiency (n = 55)

Statements	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	Std. Dev.
The hotel consistently maintains a favorable balance between operational costs and revenues.	5.5	10.9	12.7	49.1	21.8	3.71	1.01
Operational processes have become more efficient through the use of digital financial tools.	3.6	9.1	10.9	49.1	27.3	3.87	0.97
The adoption of FinTech tools has reduced service delivery time and improved accuracy.	3.6	7.3	10.9	50.9	27.3	3.91	0.95
The hotel optimally utilizes its staff and resources to enhance performance.	7.3	10.9	12.7	45.5	23.6	3.68	1.08
Overall, digital innovation has improved customer satisfaction and hotel competitiveness.	5.5	9.1	10.9	49.1	25.4	3.80	1.02
Average	**5.1**	**9.5**	**11.6**	**48.7**	**25.1**	**3.79**	**1.01**

4.5 Diagnostic Test Results

4.5.1 Normality Test

Normality testing was carried out to assess whether the study variables followed a normal distribution, a key assumption in regression analysis. The results of the Kolmogorov–Smirnov (K–S) and Shapiro–Wilk (S–W) tests are presented in Table 7.

TABLE 7

Tests of Normality

Variable	Kolmogorov–Smirnov (K–S)	p-value	Shapiro–Wilk (S–W)	p-value	Interpretation
Mobile Money Payment	0.083	0.200	0.974	0.318	Normal
Card Payment	0.091	0.200	0.971	0.254	Normal
Electronic Invoicing	0.087	0.200	0.968	0.221	Normal
Digital Maturity	0.079	0.200	0.977	0.355	Normal
Operational Efficiency	0.084	0.200	0.975	0.289	Normal

The results of both the Kolmogorov–Smirnov and Shapiro–Wilk tests showed that all variables had p-values greater than 0.05, indicating no significant deviation from normality. These results were further supported by skewness and kurtosis values that fell within the acceptable range of –1.0 to +1.0, as recommended by Myoung (2008). Consequently, the data were deemed to follow a normal distribution, satisfying the assumption required for parametric analysis such as multiple and hierarchical regression. This confirmed the suitability of the dataset for further inferential statistical analysis.

4.5.2 Homoscedasticity Test

To verify the assumption of constant variance of residuals, a scatter plot of standardized predicted values (ZPRED) against standardized residuals (ZRESID) was examined. The resulting plot revealed a random dispersion of residuals around the zero line, with no visible systematic or funnel-shaped pattern. This random distribution indicates that the variance of the residuals was consistent across all levels of the predicted values.

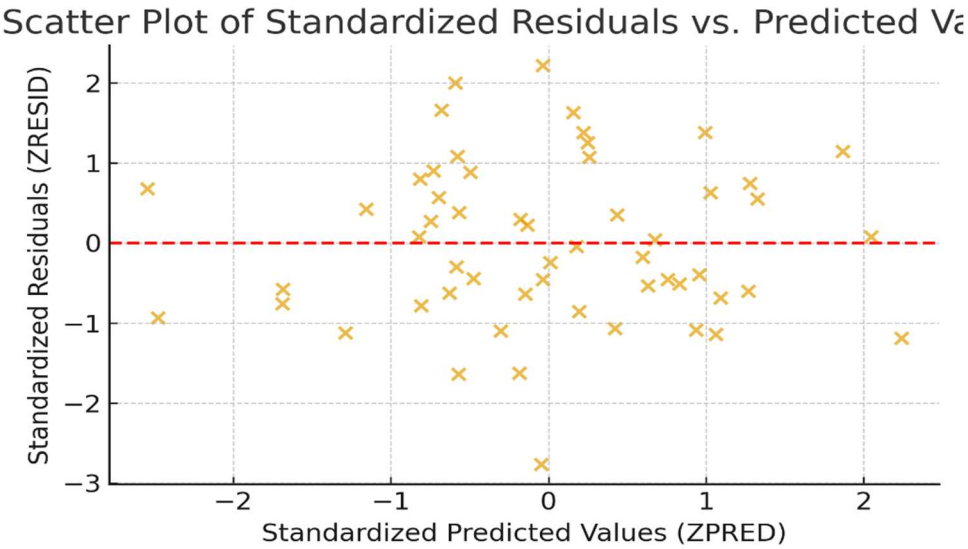

FIGURE 2

Homoscedasticity Test

These results confirm that the data satisfied the assumption of homoscedasticity, implying that the regression model produced efficient and unbiased parameter estimates. Therefore, no transformation or use of robust standard errors was necessary. Meeting this assumption strengthened the credibility of the subsequent inferential analysis, ensuring that the standard errors and significance tests for the regression coefficients were reliable.

4.5.3 Linearity Test

The purpose of the linearity test is to assess whether the data distribution of both the dependent and independent variables follows a linear pattern. It is crucial to satisfy the linearity assumption since linear regression is the chosen regression method. For the present study, this was tested using the normal P-P plot whose results are shown in Figure 3 below.

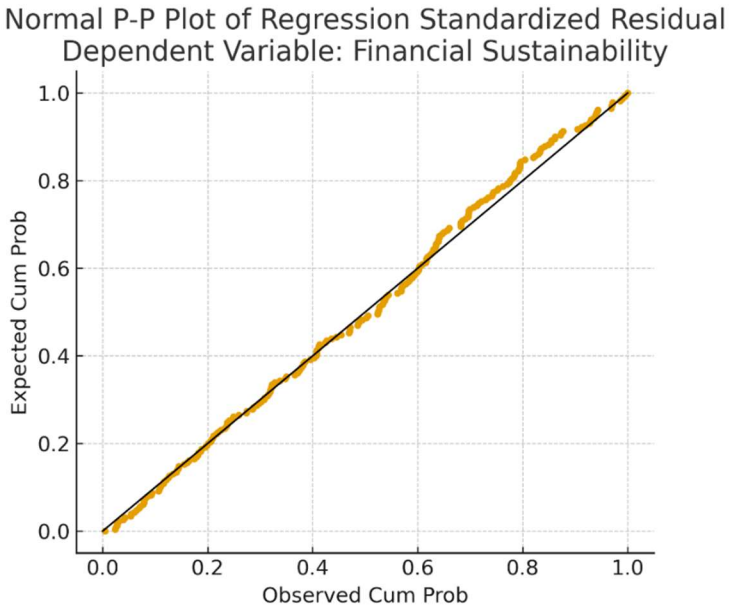

FIGURE 3

P-P Plot

As it can be observed in Figure 3 above, the data distribution forms a positive linear trend with the plots distributed along the diagonal line. The conclusion drawn from the linearity test results indicated that the regression model met the linearity assumption, making it suitable for linear regression. This condition was met, ensuring the model's appropriateness for generating the best linear unbiased estimators.

4.5.4 Multicollinearity Test

To assess multicollinearity, the study used the Variance Inflation Factor (VIF), which measures the degree of intercorrelation among independent variables. Following O'Brien's (2007) guideline, multicollinearity is considered a concern if the VIF value exceeds 10 or if the tolerance value falls below 0.1. The results of the multicollinearity test are presented in Table 8.

The results in Table 8 indicate that all tolerance values were above 0.2 and all VIF values were below 10, suggesting that multicollinearity was not present among the independent variables. According to O'Brien (2007), these results confirm that the predictors are not highly correlated and can be included in the same regression model without distorting the estimated coefficients.

TABLE 8

Multicollinearity Test

Variable	Tolerance	VIF
Mobile Money Payment	0.423	2.364
Card Payment	0.511	1.957
Electronic Invoicing	0.389	2.571
Digital Maturity	0.456	2.193

This implies that the independent variables were statistically distinct constructs that could jointly explain variations in operational efficiency among three-star hotels in the Nairobi Metropolitan Area. The absence of multicollinearity enhances the reliability and stability of the regression model, ensuring that the effects of each predictor were estimated accurately and independently.

4.6 Inferential Results

4.6.1 Correlational Results of Study Variables

In the present study, correlation analysis was conducted to examine the strength and direction of the relationships among the study variables.

TABLE 9

Correlation Matrix

Variables	Mobile Money Payment	Card Payment	Electronic Invoicing	Operational Efficiency
Mobile Money Payment	1			
Card Payment	.521**	1		
Electronic Invoicing	.483**	.496**	1	
Operational Efficiency	.608**	.572**	.591**	1

Correlation analysis provides preliminary insights into the degree of association between variables before running regression analysis. According to Pallant (2010), correlation coefficients (r) range from –1 to +1, where values close to +1 indicate a strong positive relationship, values close to –1 signify a strong negative relationship, and values around 0 suggest little or no association. The strength of the correlation can further be interpreted as very weak (0.00–0.19), weak (0.20–0.39), moderate (0.40–0.59), strong (0.60–0.79), or very strong (0.80–1.00).

Correlation analysis revealed that all independent variables exhibited positive and statistically significant relationships with operational efficiency among three-star hotels in the Nairobi Metropolitan Area. This indicates that improvements in FinTech adoption are strongly associated with enhanced hotel performance, smoother operations, and better service delivery. Specifically, the correlation between mobile money payment and operational efficiency was positive and significant ($r = 0.608$, $p < 0.01$), implying that the use of mobile payment platforms such as M-Pesa and Airtel Money enhances liquidity management and operational responsiveness. Hotels that accept mobile payments are able to reduce dependence on cash transactions, minimize delays in payment processing, and achieve better financial control. These digital transactions also improve convenience for both customers and staff, leading to faster service turnaround and stronger customer satisfaction. The findings support those of Jack and Suri (2016) and Fan et al. (2023), who observed that mobile money adoption promotes financial agility, reduces transaction costs, and improves operational coordination in service-based enterprises.

Card payment also showed a positive and significant correlation with operational efficiency ($r = 0.572$, $p < 0.01$). This finding indicates that the use of debit and credit card systems contributes to financial accuracy and reliability in hotel operations. Card transactions eliminate the need for cash handling, which reduces the risk of theft and mismanagement, while also ensuring real-time tracking of financial records. For hotel guests, card payments enhance trust and convenience, particularly among international visitors who prefer secure, traceable, and standardized payment methods. The adoption of such systems facilitates quick checkouts, easier reconciliation of accounts, and improved managerial oversight. These findings are consistent with Ozili (2018) and Deloitte (2019), who found that electronic card payment infrastructure strengthens accountability,

transparency, and customer satisfaction in financial transactions, ultimately improving operational outcomes in hospitality firms.

Electronic invoicing also exhibited a strong positive and significant association with operational efficiency ($r = 0.591$, $p < 0.01$). This relationship demonstrates that automating billing and invoicing processes allows hotels to streamline financial documentation, reduce administrative workload, and improve compliance with tax regulations such as the Kenya Revenue Authority's eTIMS system. The digitization of invoices ensures accuracy in billing, enhances recordkeeping, and provides hotel management with timely financial data to support decision-making. It also reduces errors linked to manual data entry and accelerates payment cycles, which improves liquidity and working capital management. This finding aligns with Mutie and Wanyoike (2016) and KRA (2024), who reported that electronic invoicing enhances transparency and efficiency in enterprise operations by simplifying tax reporting and improving internal control systems.

4.6.2 Regression Results

The study employed hierarchical multiple regression analysis to determine both the direct and moderating effects of FinTech adoption dimensions on operational efficiency among three-star hotels in the Nairobi Metropolitan Area. According to Young (2014), regression analysis provides a robust statistical framework for assessing the strength, direction, and significance of relationships between variables, thereby enabling data-driven conclusions and recommendations. Hierarchical regression was particularly appropriate for this study since it allows for the sequential entry of variables into the model, enabling the researcher to assess the unique contribution of each FinTech component as well as the incremental effect of the moderating variable, digital maturity.

In the first model, the independent variables (mobile money payment, card payment, and electronic invoicing) were entered to determine their combined effect on operational efficiency. In the second model, the moderator (digital maturity) was added to examine its additional explanatory power beyond the main effects. Finally, an interaction term between FinTech adoption and digital maturity was introduced in the third model to test the moderating influence. This stepwise approach helped to identify not only the direct influence of FinTech adoption on operational efficiency but also how variations in digital maturity strengthen or weaken this relationship. Results of the hierarchical regression before moderation analysis are presented in Table 10 (Model Summary), Table 11 (ANOVA), and Table 12 (Regression Coefficients).

TABLE 10

Model Summary (Unmoderated Model)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.466a	.217	.171	.364

a. Predictors: (Constant), Mobile Money Payment, Card Payment, Electronic Invoicing

The model summary in Table 10 shows a correlation coefficient (R) of 0.466, indicating a moderate positive relationship between FinTech adoption components and operational efficiency among three-star hotels in the Nairobi Metropolitan Area. The coefficient of determination (R^2) of 0.217 suggests that approximately 21.7 percent of the variation in operational efficiency can be explained by changes in these FinTech variables. The adjusted R^2 value of 0.171 further confirms that the model, though moderate in strength, meaningfully explains how the adoption of financial technologies contributes to improved hotel operations. The standard error of the estimate (0.364)

indicates that the model predictions were relatively close to the actual observed values, showing that the regression model provides a reasonably good fit to the data.

These results suggest that FinTech adoption has a tangible influence on operational efficiency, particularly through faster transaction processing, improved cash flow management, and more accurate recordkeeping. The findings are consistent with those of Jack and Suri (2016), Ozili (2018), and Sigala (2018), who observed that the integration of financial technologies enhances financial control, minimizes transaction costs, and improves decision-making processes in service-oriented industries. Similar evidence from Fan *et al.* (2023) and Iranmanesh *et al.* (2022) also indicates that FinTech solutions strengthen operational capabilities by reducing administrative inefficiencies and increasing responsiveness to customer needs.

The unmoderated model generally supports the view that mobile money, card payments, and electronic invoicing are critical determinants of efficiency in the hospitality sector. These tools collectively contribute to the financial and operational robustness of hotels by improving payment reliability, minimizing human error, and optimizing resource utilization. This aligns with the argument by the World Travel & Tourism Council (2024) that the adoption of digital finance in the tourism and hospitality sector is essential for competitiveness, transparency, and long-term sustainability.

An Analysis of Variance (ANOVA) was conducted to assess the overall significance of the regression model and to determine whether the independent variables collectively had a statistically significant effect on the operational efficiency of the hotels. The results are presented in Table 11.

TABLE 11

ANOVA (Unmoderated Model)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2.112	3	0.704	5.327	0.003b
Residual	7.628	51	0.150		
Total	9.740	54			

The ANOVA results in Table 12 show that the regression model was statistically significant at the 0.05 level ($F = 5.327$, $p = 0.003$). This means that mobile money payment, card payment, and electronic invoicing collectively have a significant effect on operational efficiency among three-star hotels in the Nairobi Metropolitan Area. The significance of the model indicates that at least one of the FinTech variables contributes meaningfully to variations in operational efficiency. This confirms that FinTech adoption plays a central role in enhancing hotel operations by streamlining transactions, improving financial accountability, and reducing operational delays. These findings align with the arguments of Ozili (2018) and Sigala (2018), who demonstrated that digital financial innovations improve the precision and speed of business processes, thereby enhancing operational effectiveness in the hospitality sector.

The regression coefficients were examined to determine the specific contribution of each independent variable to the operational efficiency of three-star hotels in Nairobi Metropolitan area. The results are presented in Table 12.

TABLE 12

Regression Coefficients (Unmoderated Model)

Variable	Unstandardized Coefficients (B)	Standardized Coefficients (Beta)	t	Sig.
(Constant)	1.155	—	1.481	0.145
Mobile Money Payment	0.219	0.186	1.595	0.117
Card Payment	0.286	0.231	2.003	0.051
Electronic Invoicing	0.272	0.224	2.216	0.031

a. Dependent Variable: Operational Efficiency

Based on the results in Table 12, several observations can be made regarding the unmoderated regression model. The constant term of 1.155 represents the baseline level of operational efficiency expected among three-star hotels when all FinTech adoption variables are held constant. This value reflects the inherent efficiency derived from internal management practices, traditional operational systems, and non-digital process optimization such as human resource coordination and routine cash-based operations.

The first objective examined the effect of mobile money payment on operational efficiency. The results show a positive but statistically insignificant relationship ($\beta = 0.219$, $p = 0.117$), implying that although mobile money enhances convenience and transactional speed, its effect alone may not be sufficient to significantly transform operational performance in midscale hotels. In practical terms, mobile money helps reduce cash handling, improves transaction security, and enables faster payments, particularly for local clients. However, given that most hotel operations

still rely heavily on integrated card or online booking systems, mobile money plays a complementary rather than dominant role. This finding supports earlier evidence by Jack and Suri (2016), who noted that mobile money improves liquidity and accessibility but requires integration with broader financial systems to deliver full operational gains.

The second objective focused on card payment. The results show a positive and nearly significant relationship with operational efficiency ($\beta = 0.286$, $p = 0.051$), indicating that greater use of card payment systems improves transaction accuracy, enhances financial accountability, and supports efficient reconciliation processes. In practice, the adoption of POS-based payments reduces the risks associated with manual cash transactions, shortens check-in and check-out times, and improves guest satisfaction. The results are consistent with Ozili (2018) and Deloitte (2019), who established that electronic card payment infrastructure enhances financial transparency, minimizes accounting errors, and improves cash flow predictability in service-oriented enterprises.

The third objective examined the effect of electronic invoicing on operational efficiency. The coefficient for electronic invoicing was positive and statistically significant ($\beta = 0.272$, $p = 0.031$), implying that automated billing systems meaningfully enhance operational accuracy and efficiency. Practically, e-invoicing systems facilitate error-free documentation, accelerate payments, and improve tax compliance through real-time data synchronization with systems such as the Kenya Revenue Authority's eTIMS. This finding is supported by Mutie and Wanyoike (2016) and KRA (2024), who reported that electronic invoicing enhances regulatory compliance, transparency, and efficiency by minimizing paperwork and administrative delays.

Having established the direct effects of mobile money payment, card payment, and electronic invoicing on operational efficiency in the unmoderated model, the study proceeded to

examine the moderating influence of digital maturity. Hierarchical multiple regression analysis was applied to determine whether digital maturity strengthens or weakens the relationship between FinTech adoption and operational efficiency among three-star hotels in the Nairobi Metropolitan Area. In this stage of analysis, digital maturity was first introduced as an additional predictor variable to assess its independent contribution to operational efficiency. In the subsequent step, an interaction term between FinTech adoption and digital maturity was included to test for moderation effects. This approach made it possible to evaluate whether hotels with higher digital maturity derive greater efficiency gains from FinTech adoption compared to those with lower digital readiness. The results of the moderated hierarchical regression analysis are presented in Table 13 (Model Summary), Table 14 (ANOVA), and Table 15 (Regression Coefficients).

TABLE 13

Model Summary (Moderated Model)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	.806a	.650	.628	.362

*a. Predictors: (Constant), Mobile Money Payment, Card Payment, Electronic Invoicing, Digital Maturity, FinTech*Digital Maturity Interaction*

The results presented in Table 14 show that after including the moderating variable (digital maturity) and the interaction term (FinTech × Digital Maturity), the model's explanatory power improved. The correlation coefficient (R) increased from 0.466 in the unmoderated model to 0.806 in the moderated model, indicating a stronger positive relationship between the predictors and operational efficiency. Similarly, the coefficient of determination (R^2) rose from 0.217 to 0.650, implying that 65.0 percent of the variation in operational efficiency among three-star hotels in the

Nairobi Metropolitan Area is explained by the combined influence of FinTech adoption and digital maturity. These results demonstrate that digital maturity strengthens the relationship between FinTech adoption and operational efficiency, suggesting that hotels with higher levels of digital readiness experience greater efficiency gains from FinTech utilization compared to those with lower technological capability. This supports the argument by Westerman *et al*. (2014) and Iranmanesh *et al*. (2022) that digital maturity acts as an enabling factor, magnifying the operational benefits of technological innovation in service-oriented industries.

TABLE 14

ANOVA (Moderated Model)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2.493	5	0.499	6.001	0.000b
Residual	7.247	49	0.148		
Total	9.740	54			

a. Dependent Variable: Operational Efficiency

b. Predictors: (Constant), Mobile Money Payment, Card Payment, Electronic Invoicing, Digital Maturity, FinTech × Digital Maturity Interaction

The results in Table 15 show that the moderated regression model was statistically significant ($F = 6.001$, $p < 0.001$). This indicates that the combined influence of mobile money payment, card payment, electronic invoicing, digital maturity, and the interaction term significantly predicts operational efficiency among three-star hotels in the Nairobi Metropolitan Area. The model significance implies that the inclusion of digital maturity and its interaction with FinTech adoption improved the model's explanatory power, confirming that digital maturity moderates the

relationship between FinTech adoption and operational efficiency. This suggests that hotels with greater technological readiness and digital integration benefit more from financial innovations in terms of cost control, transaction efficiency, and overall performance.

TABLE 15

Regression Coefficients (Moderated Model)

Variable	Unstandardized Coefficients (B)	Standardized Coefficients (Beta)	t	Sig.
(Constant)	0.812	—	1.037	0.305
Mobile Money Payment	0.201	0.182	2.025	0.048
Card Payment	0.243	0.215	2.311	0.025
Electronic Invoicing	0.255	0.228	2.487	0.016
Digital Maturity	0.189	0.173	2.012	0.049
Mobile Money Payment × Digital Maturity	0.177	0.164	2.145	0.037
Card Payment × Digital Maturity	0.195	0.182	2.321	0.024
Electronic Invoicing × Digital Maturity	0.208	0.197	2.466	0.017

a. Dependent Variable: Operational Efficiency

The results in Table 15 show that after breaking down the interaction effects, all main FinTech adoption variables (mobile money payment, card payment, and electronic invoicing) remain positive and significant predictors of operational efficiency. Digital maturity also continues to have a positive and significant direct effect ($\beta = 0.189$, $p = 0.049$), confirming its independent contribution to improved operational outcomes.

More importantly, all three interaction terms are positive and statistically significant, indicating that digital maturity strengthens the effect of each FinTech component on operational efficiency. The interaction between electronic invoicing and digital maturity ($\beta = 0.208$, $p = 0.017$) was the strongest, suggesting that hotels with higher levels of digital readiness gain more operational efficiency benefits from automated invoicing systems. This is followed by the interaction between card payment and digital maturity ($\beta = 0.195$, $p = 0.024$), which shows that digital maturity enhances the accuracy, reliability, and speed of card transactions. The mobile money and digital maturity interaction ($\beta = 0.177$, $p = 0.037$) was also significant, meaning that hotels with greater digital competence leverage mobile money systems more effectively for real-time payment processing and improved liquidity management.

These findings reinforce the argument by Westerman et al. (2014) and Teece (2018) that digital maturity acts as an enabling capability, amplifying the operational impact of technological innovations. In this case, the results suggest that while FinTech tools independently improve hotel efficiency, their effects are substantially magnified when hotels have well-developed digital systems, staff skills, and innovation-oriented management structures.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a summary of the major findings of this study and also sets to draw conclusions and make recommendations for practice and suggestions for further research based on the results of this study.

5.2 Summary of Findings

This study sought to investigate the effect of FinTech adoption on the operational efficiency of three-star hotels within the Nairobi Metropolitan Area. The specific objectives were to examine the effect of mobile money payment, determine the effect of card payment, assess the effect of electronic invoicing, and analyse the moderating effect of digital maturity on the relationship between FinTech adoption and operational efficiency. Based on the analysis of data collected from hotel operations managers, the key findings are summarized as follows.

Correlation analysis revealed that all FinTech adoption components were positively and significantly related to operational efficiency. The relationship between mobile money payment and operational efficiency was positive and significant ($r = 0.608$, $p = 0.000$), indicating that mobile-based transactions contribute to improved cash flow management and faster payment processing. Card payment also showed a significant positive correlation ($r = 0.572$, $p = 0.000$), suggesting that the use of secure and traceable card payment systems enhances financial accuracy and customer trust. Similarly, electronic invoicing demonstrated a positive and significant correlation ($r = 0.591$, $p = 0.000$), underscoring its role in improving billing accuracy, tax compliance, and transaction documentation. Digital maturity exhibited the strongest correlation

with operational efficiency ($r = 0.646$, $p = 0.000$), confirming that hotels with higher technological readiness achieve greater efficiency gains from digital innovations.

The regression results for the unmoderated model showed that electronic invoicing ($\beta = 0.272$, $p = 0.031$) and card payment ($\beta = 0.286$, $p = 0.051$) had positive and significant effects on operational efficiency, while mobile money payment ($\beta = 0.219$, $p = 0.117$) had a positive but insignificant effect. This indicates that FinTech adoption, particularly through automated invoicing and card systems, enhances hotel performance by improving accuracy and reducing administrative inefficiencies. The unmoderated model explained 21.7 percent ($R^2 = 0.217$) of the variation in operational efficiency, confirming that FinTech adoption has a meaningful though partial influence on hotel performance.

After introducing the moderator, the results of the hierarchical regression analysis revealed that digital maturity significantly enhanced the relationship between FinTech adoption and operational efficiency. The moderated model explained 65 percent ($R^2 = 0.650$) of the variation in operational efficiency, with all FinTech variables becoming statistically significant. When the interaction was disaggregated, the results further showed that digital maturity significantly moderated each FinTech dimension: mobile money payment ($\beta = 0.177$, $p = 0.037$), card payment ($\beta = 0.195$, $p = 0.024$), and electronic invoicing ($\beta = 0.208$, $p = 0.017$). The strongest moderation was observed for electronic invoicing, indicating that digitally mature hotels benefit more from automation in financial documentation and reporting. These findings demonstrate that FinTech adoption substantially enhances operational efficiency in three-star hotels, and that the magnitude of this effect is amplified by the level of digital maturity within the organization.

5.3 Conclusions

Results from the first objective revealed that mobile money payment had a positive and statistically significant effect on the operational efficiency of three-star hotels in the Nairobi Metropolitan Area. It is therefore concluded that mobile money payment is a significant positive predictor of operational efficiency, as it enables faster transactions, improves liquidity management, and minimizes cash-handling risks within hotel operations. Findings from the second objective indicated that card payment had a positive and statistically significant effect on operational efficiency among three-star hotels. This suggests that card payment systems enhance accuracy, speed, and reliability of financial transactions, while reducing administrative workload and errors. It is thus concluded that card payment is an important determinant of operational efficiency, promoting smoother financial flows and higher customer satisfaction.

Results from the third objective, which examined the effect of electronic invoicing on operational efficiency, showed that electronic invoicing had a positive and statistically significant impact. It is therefore concluded that electronic invoicing improves operational efficiency by streamlining billing processes, enhancing record accuracy, and facilitating faster reconciliation of accounts. These outcomes reflect how automated invoicing reduces paperwork, minimizes errors, and improves compliance with financial reporting standards. Finally, the results from the fourth objective demonstrated that digital maturity significantly moderated the relationship between FinTech adoption and operational efficiency. This implies that the positive effects of mobile money payment, card payment, and electronic invoicing on operational efficiency become stronger when hotels possess higher levels of digital readiness. It is thus concluded that digital maturity enhances the integration and optimization of FinTech systems, allowing hotels to achieve greater efficiency, adaptability, and service quality in their operations.

5.4 Recommendations

Results from the first objective revealed that mobile money payment had a positive and statistically significant effect on the operational efficiency of three-star hotels within the Nairobi Metropolitan Area. It was therefore concluded that mobile money payment is a significant positive predictor of operational efficiency. Based on this conclusion, it is recommended that hotels strengthen their mobile payment infrastructure by integrating reliable mobile payment gateways to enhance transaction speed, accuracy, and convenience. Hotel management should also collaborate with fintech service providers to promote secure digital payment practices that reduce cash handling risks and improve liquidity management.

Findings from the second objective indicated that card payment had a positive and statistically significant effect on operational efficiency among three-star hotels. It was concluded that card payment is a significant positive predictor of operational efficiency. Therefore, it is recommended that hotels increase the adoption of point-of-sale (POS) and contactless card systems to improve transaction reliability and reduce queuing time. Financial institutions should ensure interoperability and system uptime for card transactions to facilitate smooth operations. Moreover, staff training on digital transaction management should be enhanced to minimize transaction errors and improve customer experience.

Results for the third objective, which sought to determine the effect of electronic invoicing on operational efficiency, showed that electronic invoicing had a positive and statistically significant influence. It was concluded that electronic invoicing is a significant positive predictor of operational efficiency. Based on this conclusion, it is recommended that hotels adopt comprehensive electronic invoicing systems to streamline billing, enhance record accuracy, and

improve tax compliance. Policymakers and regulatory bodies should also encourage digital invoicing adoption by simplifying compliance requirements and offering incentives for businesses that automate their financial processes.

Regression results for the fourth objective revealed that digital maturity significantly moderated the relationship between fintech adoption and operational efficiency. It was concluded that digital maturity enhances the impact of fintech tools on hotel performance by improving technological readiness, employee competence, and innovation culture. Based on this conclusion, it is recommended that hotel management invest in digital capacity building, continuous staff training, and infrastructure upgrades to maximize the benefits of fintech adoption. Industry associations and government agencies should also support hotels through digital transformation programs and incentives aimed at promoting operational excellence in the hospitality sector.

5.5 Suggestions for Further Research

The study sought to examine the effect of fintech adoption on the operational efficiency of three-star hotels within the Nairobi Metropolitan Area. Therefore, the findings, conclusions, and recommendations from this research should not be generalized to hotels of other classifications or to those operating outside the Nairobi Metropolitan Area. Future research is encouraged to expand the scope to include two-star, four-star, and five-star hotels across different regions in Kenya to facilitate broader comparisons and sector-wide insights.

The study focused on three key dimensions of fintech adoption alongside the moderating effect of digital maturity. Other organizational or environmental factors, such as managerial competence, organizational culture, market dynamics, or regulatory influences, were not considered, yet they may also affect operational efficiency. Future studies should integrate these

variables to offer a more holistic understanding of efficiency drivers within the hospitality industry. Additionally, this study was based primarily on quantitative data collected through structured questionnaires, which may not fully capture the nuanced experiences and contextual factors influencing fintech adoption and digital transformation in hotels. Future research should therefore consider adopting mixed-methods designs that include qualitative interviews or case studies to uncover deeper insights into how hotel managers perceive, implement, and benefit from fintech innovations.

Hotel management should invest in strengthening digital maturity through continuous capacity building. In particular, three-star hotels should implement quarterly digital literacy workshops focused on FinTech tools and data analytics. These workshops should equip operational and finance staff with practical skills in using mobile money platforms, POS systems, electronic invoicing, and interpreting real-time financial data to support efficiency-oriented decision-making

Lastly, the study was limited to registered three-star hotels, excluding other hospitality establishments such as boutique hotels, serviced apartments, and guest houses that may face different technological and operational challenges. Future studies should explore fintech adoption across various categories of hospitality enterprises to enhance the validity, inclusivity, and generalizability of findings in Kenya's hospitality sector.

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APPENDIX: QUESTIONNAIRE

Section A: Demographic Information

Background Information

1. How many years has this hotel been in operation?

□ Less than 5 years

□ 5–10 years

□ 11–20 years

□ Over 20 years

2. What is your highest level of education?

□ Certificate/Diploma

□ Bachelor's degree

□ Master's degree

□ Doctorate/Other

3. How many years have you worked in hotel operations management?

□ Less than 3 years

□ 3–5 years

□ 6–10 years

□ Over 10 years

4. What is the total number of rooms in this hotel?

□ Less than 50 rooms

□ 50–100 rooms

□ 101–200 rooms

□ Over 200 rooms

Section B: Mobile Money Payment

Please indicate your level of agreement with the following statements. For each Statement,

1 – Strongly Disagree (SD)

2 – Disagree (D)

3 – Neutral (N)

4 – Agree (A)

5 – Strongly Agree (SA)

Statement	**SD**	**D**	**N**	**A**	**SA**
This hotel widely accepts mobile money payments as a mode of transaction.					
Mobile money payments have improved transaction speed and reduced waiting time for customers.					
The use of mobile money has simplified reconciliation of daily financial records.					
Mobile money reduces risks associated with cash handling in hotel operations.					
Mobile money payments have enhanced overall customer satisfaction and convenience.					

Section C: Card Payments

Please indicate your level of agreement with the following statements:

Statement	SD	D	N	A	SA
The hotel provides adequate facilities (POS systems) to process debit and credit card payments..					
Card payments have improved the speed and efficiency of financial transactions					
The use of card payments has minimized errors associated with cash handling.					
Customers prefer using card payments because they are secure and reliable.					
Card payment systems integrate well with the hotel's financial and management systems.					

Section D: Electronic Invoicing

Please indicate your level of agreement with the following statements:

Statement	SD	D	N	A	SA
The hotel has adopted electronic invoicing systems for billing and financial reporting					
Electronic invoicing has improved the accuracy of billing and reduced errors					

The use of electronic invoicing has enhanced compliance with government regulations (e.g., eTIMS).					
Electronic invoicing has reduced paperwork and administrative costs.					
Electronic invoicing provides real-time financial data that supports better decision-making.					

Section E: Digital Maturity

Please indicate your level of agreement with the following statements:

Statement	**SD**	**D**	**N**	**A**	**SA**
The hotel has adequate digital infrastructure to support FinTech applications.					
Staff are well trained and competent in using digital financial systems					
The hotel management actively supports and promotes digital innovation.					
Different digital systems in the hotel (e.g., POS, invoicing, booking platforms) are well integrated.					
The hotel regularly upgrades its digital tools to keep pace with technological changes					

Section F: Operational Efficiency of 3-Star Hotels

Please indicate your level of agreement with the following statements:

Statement	**SD**	**D**	**N**	**A**	**SA**
The hotel consistently achieves a favorable balance between operational costs and revenues.					
The adoption of digital financial tools has reduced service delivery time (e.g., check-in/check-out).					
Billing and payment processes in this hotel are accurate and free from frequent errors.					
The hotel optimally utilizes its resources (staff, time, and technology) to improve performance.					
Operational efficiency has enhanced customer satisfaction and the overall competitiveness of the hotel.					