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EFFECTS OF PAYER-PROVIDER AUTOMATION TECHNOLOGIES ON OPERATIONAL PERFORMANCE OF MEDICAL INSURANCE PROVIDERS IN NAIROBI CITY COUNTY, KENYA

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MBA 82005

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION AT STRATHMORE UNIVERSITY BUSINESS SCHOOL

2024

DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself.

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APPROVAL

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ABSTRACT

In the face of rising competition in the health insurance sector, insurers are under increasing pressure to adapt and evolve their payer capabilities. The change towards a patient-first system, spurred by technological improvements and shifting customer expectations in the midst of medical inflation, has necessitated an examination of and transformation of insurers' operational. Health insurance providers are actively embracing payer-provider automated technologies to automate their operations, reduce administrative burdens, minimize errors, reduce risk and achieve significant improvements in operational efficiency. Despite the ongoing transformation in the insurance sector, there is limited empirical evidence on the effect of payer provider automation technologies on medical insurance operational performance. The aim of this dissertation was to bridge the identified empirical gap by investigating the effect of payer provider automation technologies on medical insurance providers operational performance in Kenya. In addressing this, the researcher observed the objectives of determining the effect of electronic data interchange platforms, claims processing automation systems, mobile patient apps and online portals payer provider automation technologies on medical insurance providers operational performance in Kenya. The beneficiaries of such a study span various stakeholders, including; the government, the health insurance sector players, the general public and academia. This study was anchored on three theories; the Diffusion of Innovation Model to highlight the stages via which technology diffuses through organizations and is eventually accepted to assist operational performance. The Technological Acceptance Model is used to explain the acceptance behavior of firms that embrace technology to enhance operational performance. Lastly, the Dynamic Capabilities Theory is instrumental in explaining and expounding on the dynamic nature organizations utilize both the external and internal resources to ensure optimal operational performance. Moreover, the study was based on a positivism research philosophy since it aligns with the core concepts and approaches that the study is anchored on. A correlational research design was used in this study. The study population comprised of forty-five (45) medical insurance providers in Kenya licensed by the Insurance Regulatory Authority as at December, 2022. The unit of observation was the senior management staff from different departments of the medical insurance providers. The departments in question are: claims, information technology, operations, general managers/ heads of departments and managing directors/executive officers. The sample size of the study was 244 senior management staff of the 45 medical insurance providers. As for data analysis and presentation, the data was analyzed using SPSS software. Descriptive and inferential statistics including correlation and multiple regression analysis was used to analyze quantitative data. The results of the regression analysis show that the effects of electronic data interchange, automation of the claims process, mobile patient applications, and online portals are statistically significant. Based on its findings, the study concluded that Kenyan medical insurance providers' operational performance is influenced by their adopted innovations since client preferences and business demands are constantly changing and that innovation uptake helps businesses gain a competitive edge. The results of the regression analysis show that the effects of electronic data interchange, automation of the claims process, mobile patient applications, and online portals are statistically significant. Finally, the study concludes that, payer provider automation technologies have been embraced by medical insurance providers, improving the organization's operational performance and increasing sales income, market share, and customer satisfaction in service delivery.

Key words: *Electronic Data Interchange, Automation of The Claims Process, Mobile Patient Applications, Online Portals, Medical Insurance Providers, Operational Performance*

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LIST OF ABBREVIATIONS

AI: Artificial Intelligence

AKI: Association of Kenya Insurers

BPA: Business Process Automation

DCT: Dynamic Capabilities Theory

DOI: Diffusion of Innovation

DSR: Design Science Research

DFS: Digital Financial Services

ECM: Enterprise Content Management

EHRs: Electronic Health Record

EMR: Electronic Medical Records

HIS: Health Information System

HMO: Health Maintenance Organization

ICT: Information Communication Technology

IoT: Internet of Things

IRA: Insurance Regulatory Authority

LDA: Linear Discriminant Analysis

MIPs: Medical Insurance Providers

ML: Machine-Learning

MRP: Manufacturing Resource Planning

NHIF: National Health Insurance Fund

NHIS: National Health Insurance System

OMP: Operation Management Practices

PEOU: Perceived ease of use

R&D: Research & Development

RAI: Responsible Artificial Intelligence

RBV: Resource-Based View

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ROA:	Return On Asset
ROE:	Return On Equity
TAM:	Technological Acceptance Model
UHC:	Universal Health Coverage
US:	United States
VBR:	Value-Based Recruitment
WHO:	World Health Organization

DEFINITION OF TERMS

Automation Technologies:	Comprises all processes and work equipment that enable plants and systems to run automatically. These include machines, apparatus, equipment and other devices. Human intervention is minimal (Lenert, 2020).
Health Information Exchange:	Involves transmitting health-related data between facilities, payers, providers, and patients electronically (Lenert, 2020).
Health Information Technologies:	Refers to the electronic systems health care professionals – and increasingly, patients (McSwain, 2020).
Insurance:	An arrangement by which a company or the state undertakes to provide a guarantee of compensation for specified loss, damage, illness, or death in return for payment of a specified premium (Smith, 2019).
Medical inflation:	The incremental increase of costs related to medical treatment, trends and developments including costs of advances in treatments and procedures, factors arising from economic inflation and the increased availability of usage around the world (AKI, 2022).
Payer:	An entity that assumes financial responsibility for healthcare services. Payers can include health insurance companies, government programs, and self-insured employers (Shah, 2022).
Payer provider	The interaction and space between healthcare facilities providing healthcare service and healthcare service payers such as insurance companies (Brooks & Stiernstedt, 2022).
Payment provider automation:	Refers to the use of technology and automated processes to manage and facilitate payments between insurance companies, policyholders, and other relevant parties (Vijayalakshmi et al., 2023).
Provider:	An organization or individual that delivers medical services or care to patients. They include hospitals, physicians, nurses, pharmacists, laboratories, and various healthcare facilities (Singh, & Urolagin, 2021).

DEDICATION

This dissertation is dedicated to my family and work colleagues at Smart Applications International Ltd and my peers across the insurance industry who have supported me with the materials required for the research and moral support when needed.

CHAPTER ONE: INTRODUCTION

1.1 Introduction

This chapter highlights the evolving landscape of the healthcare industry, emphasizing the importance of medical insurance in Nairobi City County, Kenya. It underscores the role of automation technologies in improving efficiency and quality of care, setting the context for the research. The chapter also discuss the problem statement which identifies the existing challenges in the Kenyan medical insurance sector and the need to investigate the effects of payer provider automation technologies to address these issues. Further, the chapter includes the research objectives outlining the goals of the study and research questions guiding the study. Moreover, the study's scope is clarified, specifying its focus on payer provider automation technologies in the context of medical insurance operational within Nairobi City County, Kenya. Finally, the chapter underscores the importance of the research, noting its significance for policymakers, industry practitioners, and academia.

1.2 Background to the Study

Insurance firms' primary function is to relieve its customers of their risks and anxieties by guaranteeing to compensate them for any injuries, illnesses, or losses that could harm their property or lives (Ayoker, 2022). Typically, insurance businesses use middlemen like insurance agents and brokers rather than selling directly to customers. Insurance underwriters and medical insurance providers to act as payer providers (Baker, Logue, & Williams, 2021). The resulting effect is an interplay of medical insurance payer-provider with interconnected roles of healthcare payers and healthcare providers in the healthcare system. Healthcare payers finance healthcare services by collecting premiums or contributions from individuals, employers, or government sources in exchange for insurance coverage (Rawat et al., 2022). On the other hand, healthcare providers deliver medical services or care to insured patients, they submit claims to healthcare payers to request payment for the services provided to patients who are covered by insurance plans or government programs (Mangla, & Aggarwal, 2020).

The multiplicity of players in the medical insurance sector fosters competition as each player competes for market share and customers. As a result, medical insurance providers (MIPs) have been forced to find disruptive ways to create value and enhance their operational performance for competitive advantage. One of the trends noted in MIP space is the automation of processes using payer provider automation technologies to achieve higher operational performance (Gilbert et al., 2019; Singh, & Urolagin, 2021). Payer-provider automation technologies ensure effective communication and coordination between healthcare payers and healthcare providers through claims processing, reimbursement, and the provision of high-quality care to patients (Fenny et al., 2021). Accordingly, MIPs, the insurance and scheme administrators, use the payer-provider technology for the smooth operation of the healthcare system.

There are numerous payer-provider automation technologies in the medical insurance sector that reflect the evolving landscape of healthcare and insurance, as well as the broader trends in technology and healthcare policy. According to Brooks, and Stiernstedt, (2022) medical insurance payer provider automation technologies include electronic data interchange (EDI) platforms, claims processing automation systems and portals, eligibility and benefits verification platforms, electronic remittance advice (ERA), prior authorization automation systems (Peters, 2022). Further, payer-provider automation technologies include provider credentialing and enrollment systems, provider portals, electronic funds transfer (EFT) and automated clearing house (ACH) payments systems, telehealth and telemedicine integration platforms (Gilbert et al., 2019). Additionally, payer provider automation technologies encompass artificial intelligence (AI) and machine learning platforms, robotic process automation (RPA), mobile apps for patients, predictive analytics, and blockchain for secure data sharing (Rawat et al., 2021).

Payer-provider automation technologies have a substantial impact on the operational performance of MIPs. To begin with, payer-provider automation technologies aim to streamline interactions and processes between MIPs and healthcare providers (Wei et al., 2023). According to Sharma et al., (2023), payer provider automation technologies help automate MIP tasks related to claims processing, billing, and communication. On his part, Marović, (2021) asserts that payer provider automation technologies offer MIPs innovative

ways of managing medical schemes from a purchaser to a supplier such as a health insurance firm to a health care provider. According to Fenny et al., (2021) payer provider automation technologies offer a range of solutions and tools aimed at automating and streamlining administrative processes between healthcare payers and healthcare providers. Therefore, payer-provider automation technologies have a profound impact on MIPs operational performance by transforming the way they operate and deliver services through positioning them to thrive in a rapidly evolving insurance landscape.

1.2.1 Payer Provider Automation Technologies

In the field of medical insurance, payer provider automation technologies are innovative and potent instruments. They are broadly characterized as a mode of payment integrated with all auxiliary systems, including contracting, payment method-related accountability mechanisms, and management information systems (Dash et al., 2019). Therefore, payer provider automation technologies in the context of health systems achieve much more than just transferring payments to cover service expenses (Dubey et al., 2020). The payment systems used by the providers provides incentives. They include, for example, management information systems to facilitate provider payment methods and have a significant impact on the distribution of health care resources and the provision of services (Kommadi, 2021). They have built accountability systems between buyers and providers, which have a significant impact on the distribution of health care resources and the provision of services (Johnson et al., 2021).

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Payer technologies involve a range of digital tools and platforms used by healthcare payers. The development, implementation and adoption of these technologies is however influenced by several factors including leadership, financial and human capital, scale and size, as well as policies and strategies. Zenger and Folkman (2017) found that effective leadership plays a crucial role in driving the adoption of innovative technologies noting that strong leadership commitment and vision are necessary to champion technological innovation and digital transformation.

Nyakei et al. (2022) on the other hand noted that adequate financial resources are essential for investing in technologies as companies need sufficient capital to procure, develop,

implement, and maintain technology infrastructure, and digital platforms. Breznik and Lahovnik, (2016) further highlighted that the availability of skilled IT professionals and experts is critical for successful technology adoption. According to Kang'e (2020), the size and scale of insurance companies can influence their approach to technology adoption. Larger companies have greater resources and capabilities to invest in innovative technology solutions, undertake complex digital transformation initiatives, and navigate regulatory compliance requirements. Rawat, Rawat, Kumar, and Sabitha(2021) on the other hand brought out the importance of clear policies, strategies, and governance frameworks for guiding technology adoption and ensuring alignment with organizational goals and regulatory requirements.

Payer provider automation technologies are implemented to varying degrees and their scope transcends various activities. Payer-provider automation technologies include; claims processing technologies (Kommadi, 2021), eligibility verification automation, pre-authorization automation (Gottlieb et al., 2018), EDI platforms, RCM technologies, automated EHR systems, communication and collaboration automation as well as analytics and reporting. This study will focus on the most commonly adopted payer provider automation technologies disrupting the Kenyan market; EDI, payer-provider claims processing automation, payer-provider mobile apps and payer-provider online portals (IRA, 2022; AKI, 2022).

In the insurance industry, EDI is a vital tool that makes it easier for healthcare providers and insurance payers to share standardized data. According to Brooks and Stiernstedt, (2022) EDI is used to streamline various administrative processes, primarily related to claims processing and healthcare transactions. Ge (2021) reports that, EDI is the automated transfer of data in a specific format following specific data content rules between a health care provider and healthcare payers. Because EDI transactions are computerized, they may be processed more quickly and more affordably by healthcare providers as well as payers. Similarly, Peters (2022) notes that EDI in the insurance sector, particularly in claims processing, significantly reduces manual data entry, improves data accuracy, expedites reimbursement, and enhances overall operational efficiency. Nyakei et al. (2022) state that health financial institutions, medical providers, and patients can share asserts data related

to health services in real time through the digital platform Slade 360 by Savannah Informatics in Kenya. This feature significantly reduces account errors, scams incidents, and payment processing times. Nyakei et al. (2022) state that health financial institutions, medical providers, and patients can share asserts data related to health services in real time through the digital platform Slade 360 by Savannah Informatics in Kenya. This feature significantly reduces account errors, scams incidents, and payment processing times.

Payer-provider claims processing automation refers to the use of technology and automated processes to handle and streamline the submission, review, adjudication, and payment of healthcare claims between insurance payers and healthcare providers (Vijayalakshmi et al., 2023). This automation aims to make the claims processing workflow more efficient, reduce errors, and expedite reimbursements. Payer-provider claims processing automation not only reduces the administrative burden on healthcare providers but also enhances the efficiency and accuracy of the claims adjudication process (Kommadi, 2021). By automating these tasks, payers and providers can expedite reimbursement, reduce claim denials, and improve overall operational efficiency in the healthcare billing and payment workflow.

Payer-provider mobile apps in the insurance sector are mobile applications designed to facilitate communication, transactions, and information exchange between healthcare payers and healthcare providers. Shah, (2022) observes that these apps are typically available on smartphones and tablets and offer various features and functionalities to streamline administrative processes and improve the efficiency of healthcare interactions. Payer-provider apps aim to simplify the administrative aspects of healthcare interactions, making it more convenient for healthcare providers to interact with insurance companies, submit claims, and access important information related to patient coverage and payments (Manywanda, 2021). These apps can improve the efficiency of healthcare operations and enhance the overall experience for both providers and patients.

Payer-provider online portals in the insurance sector are web-based platforms that facilitate communication, collaboration, and transactions between healthcare payers and healthcare providers (Singh, & Urolagin, 2021). These portals offer a range of features and functionalities to streamline administrative processes, improve efficiency, and enhance communication between these two parties. Payer-provider online portals aim to simplify the administrative processes involved in healthcare billing and claims processing, ultimately improving the experience for both providers and patients while reducing administrative costs for insurers (Lauffenburger et al., 2021).

As at 2022, there were 6 established payer provider technology platforms in use by the medical insurance providers in Kenya as follows: - Medismart by Smart Applications International Ltd: This was the first payer provider system implemented in East Africa as from 2005. It incorporates the use of biometric smart card technologies and interconnected systems between the healthcare facilities and the medical insurance companies. Slade by Savannah Informatics: This was the second payer provider system implemented in Kenya as from 2016. It incorporates the use of a web based interconnected e-claims platform between the healthcare facilities and the medical insurance companies.

Another payer provider technology platforms in use in Kenya is Mtiiba by Carepay: This was the third player who came in to the Kenya market in 2018. It incorporates a medical savings wallet in collaboration with Safaricom. This is also a joint venture with AAR Insurance. Medbook by Medbook Ltd: was the fourth player in the Kenya market in 2019, birthed out of a collaboration between Strathmore University, iLab Africa and Medbook Kenya. Livia by Neotech Solutions Ltd: was the fifth player in the Kenya market in 2020, who combines payer provider technologies with the provision of telehealth. LCT by Liaison Insurance Brokers Limited: was the sixth player in the market in 2021, birthed out of a joint venture between Liaison Insurance Brokers and Compulynx Ltd.

1.2.2 Operational Performance of Medical Insurance Providers

The efficacy and efficiency with which a company carries out its fundamental operational procedures and produces the intended results is referred to as operational performance. Buer et al., (2021) notes that operational performance encompasses various aspects of an

organization's day-to-day operational and can be measured using key performance indicators (KPIs) aligned with the organization's goals and objectives. For Kaydos (2020) measuring and monitoring operational performance involves setting appropriate targets, collecting relevant data, and analyzing performance against established benchmarks or standards. Regular assessment and analysis allow organizations to identify areas for improvement, implement corrective actions, and drive operational excellence (Battesini et al., 2021). Therefore, some key elements of operational performance are; efficiency, quality, timeliness, flexibility, compliance and risk management, customer service, employee engagement and satisfaction, and continuous improvement.

Medical insurance providers use various performance indicators to assess their performance. These indicators help insurance companies evaluate their performance, make informed decisions, and enhance their services. Operational performance can be evaluated based on various dimensions, including claims processing efficiency (Battesini et al., 2021), customer service quality, technology integration, financial performance, and compliance with regulatory standards (Buer et al., (2021). Evaluating these aspects provides a comprehensive understanding of how payer-provider automation technologies impact the overall operational performance of medical insurance providers.

MIPs' claims processing efficiency can be assessed based on its Claims Processing Time with Shorter claims processing times indicating efficiency and responsiveness, leading to higher customer satisfaction. Another measure is their Claims Denial Rate with a low denial rate suggesting clear communication with policyholders and healthcare providers and minimized disputes. Further, MIPs' Customer Satisfaction Ratings are important indicators of their operational performance, with high customer satisfaction indicating a positive overall experience, which can lead to customer retention and referrals (Battesini et al., 2021)

Another important measure of MIPs' operational performance is their member Retention Rate with high retention rates indicating that policyholders are satisfied with their coverage and service. Similarly, MIPs' Complaint Resolution Time particularly, swift resolution of complaints contributes to customer satisfaction and trust in the insurance provider. Likewise, MIPs' Network Adequacy, the extent and accessibility of healthcare providers,

hospitals, and facilities within the insurance provider's network, enhances their operational performance (Buer et al., (2021). MIPs' Medical Loss Ratio (MLR) that exhibits the ratio of claims and healthcare expenses paid by the insurer to the premiums collected is an important determination of operational performance. What is more, MIPs' Fraud Detection and Prevention ability safeguards the insurer's financial stability and helps keep premiums affordable hence a high operational performance.

The financial performance of MIPs, typically measured by the company's profit margin is another key indicator of high operational performance. A healthy profit margin ensures the insurer's financial stability and ability to meet its obligations. Likewise, adherence to government regulations and compliance with industry standards helps avoid legal issues and maintains the insurer's reputation. Besides, the ability to meet financial obligations and claims without financial distress protects a company from insolvency issues which can have severe consequences on operational performance. Consequently, MIPs' operational performance indicators collectively help them assess their performance, meet regulatory requirements, enhance customer satisfaction, and ensure the long-term sustainability of their operations (Buer et al., (2021).

1.2.3 Relationship between Payer Provider Automation Technologies and Medical Insurance Operational Performance

Payer provider automation technologies serve as a bridge connecting various stakeholders, including insurance providers, healthcare facilities, and patients, and enables seamless interactions and transactions (Dash et al., 2019). Patients interact with payer technologies through various channels, such as mobile apps, online portals, and customer service centers. These technologies allow patients to access their insurance information, submit claims, check coverage details, and communicate with insurance representatives. Insurance companies on the other hand use payer technologies to manage their operations, interact with patients, and process claims. Payer technologies enable insurers to automate processes, reduce paperwork, and improve efficiency. According to Sternet al., (2022), payer technologies therefore enable data exchange and integration between patients, insurance companies, and other healthcare providers allowing for seamless sharing of

information, such as patient records, claims data, and coverage details, which is essential for providing timely and accurate care.

The daily operations of MIPs are significantly impacted by payer-provider automation technology. The adoption of automation technologies transforms the way these MIPs operate and deliver services. Automation technologies streamline various tasks, reducing the time and effort required for administrative work, data entry, and paperwork. Therefore, the MIPs process policies, claims, and other transactions more quickly, leading to higher productivity and capacity to handle a larger volume of business. Further, automation minimizes the risk of human errors in data entry and documentation resulting in improved accuracy leading to fewer mistakes in policy issuance, claims processing, and customer interactions.

Additionally, automation provides MIPs with real-time access to policy details, claims data, health facility and customer information hence enabling faster response times to customer inquiries and more informed decision-making. Moreover, automated communication tools enable MIPs to interact more efficiently with policyholders and healthcare providers leading to quicker resolution of issues and improved customer service. Likewise, automation technologies analyze large datasets to provide MIPs with valuable insights into customer preferences, market trends, and operational performance which then inform strategic decisions and marketing efforts. What is more, automation helps MIPs stay compliant with industry regulations, ensuring that policies and claims adhere to legal and contractual requirements. Automation also reduces the need for manual labor and paper-based processes, resulting in lower operational costs hence MIPs can allocate resources more efficiently, potentially increasing profitability.

Payer-provider automation technologies also improve MIPs operational performance by improving their brand value and competitiveness. According to Sternet al., (2022), automation allows MIPs to offer self-service portals and digital interfaces for policyholders, accordingly, their customers can access information, initiate claims, and make policy changes more easily, leading to a better customer experience. Likewise, automation enables MIPs to adapt to changing market conditions, regulatory updates, and emerging technologies more rapidly thus they can modify their processes and offerings to

remain competitive. Similarly, automation incorporate risk assessment and fraud detection algorithms, helping MIPs identify potential issues before they become significant problems. Further, as intermediaries grow their client base, automation technologies allow them to scale their operational without a proportional increase in administrative staff. For those reasons, MIPs that embrace automation differentiate themselves in the market by offering faster, more efficient services and more competitive pricing.

A payer provider payment system streamlines healthcare claims processing through automation to increase the speed of payment for services provided. According to TechTarget (2022), payer provider automation technologies remove common bottlenecks and disconnects in the flow of patient claims processing, leading to soaring productivity of medical insurance operational performance. In particular, three fundamental steps improve the operational performance of payer provider payment solutions for MIPs in terms of lower costs: digitizing documents to reduce the need for local paper scanning; automating workflows to index, route, and move documents; and integrating the EHR and Enterprise Content Management (ECM) system with HL7 integration to facilitate seamless data flow and enhanced transparency.

According to Kommadi (2021), automated data extraction and indexing assist in doing away with the time-consuming, traditional keyed data entry procedures, therefore lowering the possibility of errors. Improved cash flow is a result of prompt approvals, precise data entry, and insights derived from data analysis. Kuria (2022) further asserts, the payer provider payment system decreases time-to-payment from health providers' end thus cutting through the challenges of insurance correspondence handling. For instance, the payer provider payment system captures information from multiple document sources, matches the information to the patients' EHR thus increasing the speed of workflows. As a result, MIPs are able to easily manage healthcare information and patient claims and hence save time and enjoy higher operating margins.

Another impact of the payer provider payment system is that it minimizes manual work and potential errors thus increasing employee productivity and the speed by which claims are processed (Mambo & Moturi, 2022). Employees are able to handle authorization more efficiently and accurately, approve procedures faster, complete claim resolution faster and

automate report making (Lanfranchi, & Grassi, 2022). Payers are putting increased pressure on providers to shift their business practices to emphasize value—which is defined as the point where cost and quality converge—as the healthcare system continues to develop from more conventional payment methods (Nasiadko, 2021). In the end, value-based methods aim to alter the way provider groups operate in order to reduce healthcare costs and enhance patient care management.

Payer provider automation solutions, in accordance with Short (2019), can expedite processes and minimize the likelihood of reprocessing claims, which can lead to even more cost savings. Health insurance companies can therefore save a significant amount of money by utilizing payer provider automation technologies for medical claims processing. Payer provider automation systems, according to Holzman (2018), decrease errors in patient information verification and data matching. Furthermore, automation for processing healthcare claims is kept up to date with the most recent billing guidelines. Thus, payer-provider automation solutions improve overall client satisfaction and experience.

1.2.4 Medical Insurance Providers in Kenya

Considering the government's push for the private sector to participate in the delivery medical services in the 1980s and 1990s, the private insurance market first grew in tandem with the establishment of private hospitals (Mwaniki, 2017). The authorities loosened restrictions on private practice, gave medical professionals licenses to open their own clinics, and let them to work in both the public and private sectors. The concurrent introduction of the government's cost-sharing program led to a decline in the quality of care in public facilities, which in turn encouraged patients to seek treatment in private facilities. Employers who offered private health insurance as a benefit to their staff in an effort to draw in better candidates, lower absenteeism, and boost productivity further increased demand for private health insurance (AKI, 2020; IRA, 2022).

According to the IRA Kenya Insurance Performance report (2006), medical insurance was acknowledged as a type of insurance in Kenya in 2005. Since then, Kenyan medical insurance providers have registered with the regulating organization, and the sector has grown rapidly in recent years. In 2022, there were five licensed reinsurance businesses and

56 licensed insurance companies. Following a progressive increase throughout the years—33 in 2018, 31 in 2019, 34 in 2020, and 38 in 2021—medical insurance providers (MIPs) climbed to 45 in 2022. In 2022, the number of insurance surveyors decreased from 32 to 31.

Additional research revealed that the gross written premium went from KES 47.64 billion in 2021 to KES 54.89 billion in 2022, a 15.22% rise. From KES 34.64 billion in 2021 to KES 42.5 billion in 2022, the net earned premium climbed by 22.84%. Reinsurance surrendered fell by 7.78% in 2022, but net claims incurred and overall costs rose by 25.12% and 22.15%, respectively. Underwriting loss had a sharp increase of 191.98%, from KES 303 million in 2021 to KES 885 million in 2022 (AKI, 2022).

Based on the aforementioned data, medical insurance companies have a lot of room to grow in the future, particularly if they have systems in place to guarantee excellent operational performance. In order to significantly improve operational performance, medical insurance providers have recently shifted their attention to disruptive technologies (Shah, 2022; Deloitte, 2021; 2023).

1.3 Statement of the Problem

The scope of operational performance refers to the range of activities and metrics that are used to evaluate the effectiveness and efficiency of an organization's operations. It encompasses various aspects of an organization's activities, processes, and systems that contribute to its overall performance. Payer-provider automation technologies play a crucial role in shaping the operational performance of medical insurance providers by driving efficiency, accuracy, compliance, customer experience, data analytics, interoperability, and risk management. Embracing and leveraging these technologies can help insurance providers stay competitive, agile, and resilient in an increasingly complex and dynamic healthcare landscape.

The insurance sector has been undergoing digital transformation, with insurers and healthcare providers increasingly adopting automation technologies to streamline operational and improve performance. Indeed payer-provider automation technologies have been linked with reduced administrative costs, improved efficiency, and minimized

errors, making them an attractive investment for cost-conscious MIPs. Additionally, stringent regulations, continue to drive the adoption of automation technologies to ensure data security and compliance with healthcare laws hence improving operational performance. In a world that is rapidly becoming customer-centered, technology has made it possible for medical insurance providers to provide services that are pertinent to customers efficiently while improving their operational performance (Yego et al., 2021; Omerikwa, 2022).

Notwithstanding efforts made by medical insurance providers to improve their operational performance through payer-provider automation technologies, the uncertainty surrounding return on investment (ROI) is a common adoption challenge. MIPs often weigh the potential benefits against the costs and risks associated with implementing automation. The investment uncertainty challenge is exacerbated by the competing priorities and limited budgets, MIPs face hence deciding to invest in automation may mean deprioritizing other projects, which can impact ROI calculations for those projects. There have also been concerns over the challenging to quantify the specific benefits of automation technologies. According to some stakeholders, while there may be a clear expectation of improved efficiency, reduced errors, and enhanced patient care, assigning precise financial values to these benefits can be uncertain. On the contrary, industry experts' advice that ROI uncertainty is a challenge, MIPs that carefully plan and execute their automation strategies achieve significant benefits over time through improved operational performance.

There are insufficient studies that examine the impact of payer-provider automation technologies on the operational efficiency of medical insurance providers in Kenya, despite conflicting opinions on the matter. For example, the goal of Ntwali et al.'s (2020) study was to evaluate how claims management affected insurance companies' financial performance. In underdeveloped nations like Kenya, Boore et al. (2020) investigated how blockchain technology may be used to enhance the security and interoperability of e-health systems for the benefit of many stakeholders. The study conducted by Kiptoo et al. (2021) investigated the correlation between risk management and the financial performance of insurance companies in Kenya between 2013 and 2020. The goal of Omerikwa's (2022) study was to determine how innovative methods affected the National Hospital Insurance

Fund's performance in Kenya. In their work from 2022, Mambo and Moturi investigated the use of data mining to identify fraud in Kenyan health insurance claims.

While empirical research on the impact of payer-provider automation technologies in Kenya may be limited, it is possible to address the identified research gap. Therefore, this study sought to establish the effect of payer-provider automation technologies on the operational performance of medical insurance providers in Kenya. Such a study provides valuable insights into the benefits and challenges of automation through payer provider technologies and how they impact the Kenyan medical insurance industry operational performance, ultimately leading to more informed decision-making and policy development.

1.4 General Objective

The main purpose of this study was to assess the effect of payer-provider automation technologies on operational performance of medical insurance providers in Kenya.

1.4.1 Specific Objectives

i. To establish the effect of electronic data interchange platforms on the operational performance of medical insurance providers in Kenya.
ii. To determine the effect of claims processing automation on the operational performance of medical insurance providers in Kenya.
iii. To examine the effect of mobile patient apps on the operational performance of medical insurance providers in Kenya
iv. To establish the effect of online portals on the operational performance of medical insurance providers in Kenya.

1.5 Research Questions

i. What is the effect of electronic data interchange platforms on the operational performance of medical insurance providers in Kenya?
ii. To what extent does claims processing automation affect the operational performance of medical insurance providers in Kenya?

iii. What is the effect of mobile patient apps on the operational performance of medical insurance providers in Kenya?

iv. What is the effect of online portals on the operational performance of medical insurance providers in Kenya?

1.6 Scope of the Study

The geographical, substance, and temporal scope of this were presented as follows. Determining the study's boundaries or limit without having a scope that was either too tiny to investigate or too big to manage was the primary focus of the scope. Nairobi-based medical insurance providers were the subject of the investigation. The study period was restricted to October 2023 through December 2023. The period or the time frame was selected as a specific observation window to witness payer provider automation technologies on medical insurance providers' operational performance in Kenya.

1.7 Significance of the Study

The beneficiaries of a study on the effect of payer-provider automation technologies on medical insurance operational performance span various stakeholders, including; the government, the health insurance sector players, healthcare facilities, the general public and academia.

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1.7.1 The Government

The study will continue to be unique in that it takes a comprehensive approach to analyzing how payer provider automation technologies affect the operational performance of medical insurance, as determined by the government and its agencies. The majority of industries struggle with issues of accountability, efficiency, and transparency—three factors that are essential to the utilization of payer provider technologies. Governments will be encouraged to automate payers and providers for public healthcare programs, such as the proposed universal healthcare coverage scheme, by the study's findings. The study will actually help legislators find and advocate for suitable legislation that will guarantee payer provider automation improves the payment and operational procedures in the health sector, hence fostering the industry's viability.

1.7.2 The Health Insurance Sector Players

Companies offering automation technologies, software solutions, or insure-tech innovations can benefit from the study's findings. It can validate the effectiveness of their products and services, help identify areas for improvement, and guide future developments to better meet the needs of health insurance providers and healthcare organizations.

Insurance companies and health plans are direct beneficiaries of such a study. They can gain insights into the impact of automation technologies on their operational efficiency, cost savings, and customer satisfaction and thus overall operational performance. The study can help insurers identify best practices, assess the ROI of implementing automation, and make informed decisions regarding technology investments.

Medical service providers, such as hospitals, clinics, and healthcare organizations, can also benefit from the study's findings. Understanding the effect of payer-provider automation technologies can help healthcare providers align their processes and systems with insurers, streamlining administrative tasks, improving claims processing, and enhancing revenue cycle management.

1.7.3 The General Public

The study will be of great significance to the general public to embrace payer provider automation technologies as a key contributor to medical insurance operational performance in Kenya and thus provide cooperation in the use of the same. Moreover, by examining the effect of automation technologies on medical insurance operational performance, insurers can improve their processes, leading to faster claims processing, reduced administrative delays, and enhanced customer service. Insured individuals may experience smoother interactions with their insurers, quicker reimbursement, and improved overall satisfaction. Such forms of demand and impact are essential to not only support the growth of payer provider automation but also to promote medical insurance sustainability and in tandem grow the medical insurance reach and penetration through affordability of medical insurance products which is a direct benefit to the public.

1.7.4 Academicians and Future Researchers

In terms of academics, this study will not only aid in the conception of payer provider automation technologies on medical insurance operational performance by fulfilling the goals outlined in this chapter. However, it will also improve the body of research on the impact of payer provider automation technologies on the operational performance of medical insurance, adding to the body of current empirical research on the topic's effectiveness.

1.7.5 The World Health Organization

The World Health Organization has a clear objective in the promotion of universal health coverage of which one of the key aspects is medical insurance sustainability and reach, be it private or public. UHC involves making sure that no one has financial hardship and can obtain the health services they require at the appropriate time and location (WHO, 2019). Additionally, according to WHO (WHO, 2019), over 100 million people are forced into extreme poverty each year as a result of out-of-pocket medical expenses. For this reason, medical insurance is a crucial mitigating strategy that is ingrained in WHO's work stream on health system governance and financing.

This research will therefore serve towards providing data to this WHO work stream on how sustainable medical insurance programs can be developed and replicated across countries through payer provider automation technologies to address the Universal Health Coverage agenda.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The chapter provides a thorough analysis of numerous hypotheses that have an impact on medical insurance operational performance and are related to payer provider automation technology. The goal is to identify research gaps, evaluate the contributions made by prior studies, and acknowledge the efforts that have been done through a critical examination of the empirical literature and critique of the review. The concepts that capture the important factors and bind them together are used to explain the conceptual framework, with a focus on the characteristics of medical insurance operational performance and payer provider automation technologies.

2.2 Theoretical Review

A theoretical review is a thorough examination of existing theories in light of the objectives of the study. This study was anchored on three theories; the diffusion of innovation model (DOI) to highlight the stages via which technology diffuses through organizations and is eventually accepted to assist operations. The technological acceptance model was used to explain the acceptance behavior of firms that embrace technology to enhance operations. In summary, the dynamic capacities theory played a crucial role in elucidating the way in which providers leverage both internal and external resources to maintain optimal operations.

2.2.1 Diffusion of Innovation Theory

Rogers first proposed the Diffusion of Innovation (DOI) hypothesis in 1962, which claims that "diffusion is the process of communicating invention for a period of time to members of a community utilizing certain channels." The many stages that a person or company goes through while adopting technology are described by Rogers (2003). The knowledge phase, the persuading phase, the choice phase, the execution phase, and the confirmation phase are these (Rogers, 2003). The adoption process is influenced by ideas about the technology's properties, including compatibility, relative benefit, complexity, observability, and trialability. An individual discovering the existence of new technology

and looking for information about it are characteristics of the knowledge phase (Rogers et al., 2003).

At the point of persuasion, the person develops a good or negative attitude toward the new technology, but this attitude does not always translate into acceptance or rejection of the new technology (Brown & Duguid, 2000). The individual decides whether to accept and make full use of the new invention during the decision phase or to reject it. The new technology is put into use during implementation, while the decision-maker seeks confirmation of their choice during the confirmation phase (Oliveira & Martins, 2010). The DOI model considers the person, organizational structure, and external factors of a corporation as significant backdrops to innovation (Valente, 2010). Thus, this model focuses on the factors that influence technology adoption.

The DOI model can be criticized for its static nature, as it does not adequately account for the dynamic and iterative nature of innovation adoption (Brown & Duguid, 2000). In today's rapidly evolving technological landscape, innovations may undergo continuous modifications, making the diffusion process more complex than what the DOI model depicts. Some critics argue that the theory portrays diffusion as a static process, overlooking the dynamic interactions, feedback loops, and co-evolutionary dynamics that occur between innovators, adopters, and the broader socio-technical system over time. The theory could benefit from a more dynamic and systemic perspective that considers feedback mechanisms and adaptation processes.

The study will therefore enhance the theory by involving integrating concepts from the Dynamic Capabilities Theory, which emphasizes an organization's ability to adapt and respond to changing environments.

According to DOI theory, technology's predicted benefits for assisting enterprises are the driving force behind adoption. In accordance with this paradigm, a person's or an organization's decision to accept a technology or not is greatly influenced by their perception of the technology's influence (Rogers, 1962; 2003). People fall into the groups of early adopters, early majority, late majority, and laggards as a result of these perceptions. In this sense, compared to the rest, early adopters are happy with the impact of technology

sooner. So, technology is more likely to be accepted if it provides quick fixes (Rogers et al., 2003).

This theory is relevant to the current study as it will help understand which payer-provider-automation technologies have been adopted by MIPs. By applying the Diffusion of Innovation Theory to the payer-provider-automation technologies adopted by MIPs, the researcher will gain a deeper understanding of the payer provider automation technologies that have been adopted most and to what levels by the MIPs. The theory suggests that some MIPs may be more willing to adopt some payer-provider-automation technologies early, while a majority of adopters come in the middle and later stages. The theory will come in handy in understanding which payer provider automation technologies and what operational performance aspect motivates these MIPs to adopt. This knowledge can inform strategies for promoting adoption, addressing barriers, and maximizing the benefits of these technologies in integrated medical insurance plans.

2.2.2 Technology Acceptance Model

Fred Davis advanced the Technological Acceptance Model (TAM) in 1989. According to the model, opinions of the technologies' utility and usability have a substantial impact on how quickly businesses or organizations embrace new technologies. Perceived utility, according to Davis (1989), is the user's conviction that utilizing the technology will enhance their performance, well-being, or deservingness. Additionally, perceived simplicity of use, according to Davis (1989), relates to the user's perception that utilizing the technology will be simple. The Technology Acceptance Model (TAM) comes to the conclusion that the two definitions of perceived usefulness and ease of use of the technologies describe how users behaved before embracing the technology.

A theoretical framework known as the Technology Acceptance Model (TAM) is used to analyze and forecast how people or organizations will accept and embrace new technologies (Davis et al., 1989). It focuses on people' attitudes and beliefs around the adoption of technology. Regarding MIPs' adoption of payer-provider automation technologies, TAM can offer important insights into the variables affecting the choice to implement and utilize these technologies (Venkatesh et al., 2003). Perceived usefulness, as

it relates to payer-provider automation systems, is the degree to which these technologies are thought to be advantageous and able to expedite claims processing, lower error rates, enhance communication, and enhance overall operational performance.

Perceived ease of use (PEOU) refers to the user's perception of how user-friendly and accessible the technology is. PEOU is crucial because if MIPs professionals find payer-provider automation technologies too complex or time-consuming to use, they may resist adoption (Legris et al., 2003). Attitude toward using payer-provider automation technologies is influenced by perceived usefulness and perceived ease of use. A positive attitude toward using these technologies is more likely to lead to their adoption. Behavioral intention in TAM refers to the user's intention to adopt and use a technology (Venkatesh & Davis, 2000). In the context of payer-provider automation technologies, it implies the likelihood that MIPs or professionals will adopt these technologies in their daily practices.

The TAM may be criticized for lack of contextual specificity, as it does not account for variations in adoption behaviors across different contexts, cultures, and organizational settings. This limits its applicability in diverse environments where adoption decisions may be influenced by unique contextual factors (Venkatesh et al., 2003). Additionally, TAM assumes a static relationship between the key constructs and does not explicitly account for the dynamic and contextual nature of technology adoption. Users' perceptions of usefulness and ease of use may change over time as they gain experience with the technology or as external factors (e.g., changes in technology features, market conditions) evolve.

The study will address this critique by contextualizing the TAM to specific settings and populations specifically MIPs. As such, TAM offers a useful framework for comprehending the variables influencing the uptake of MIPs (payer-provider automation technology). MIPs are able to make well-informed judgments regarding the deployment of automation technologies by evaluating perceived utility, ease of use, attitudes, intentions, and actual use in achieving operational performance.

2.2.3 Dynamic Capabilities Theory (DCT)

The Schumpeterian innovation theory (1934), which asserts that a competitive advantage can be achieved by creating disruptions to the existing resources and recombining them to create the most recent functional capabilities within an organization, is where the concept of dynamic capabilities first emerged. These competencies allow companies, via their leadership, to formulate hypotheses regarding changing consumer preferences, industry and business environment issues, technological advancements, and realign resources and activities. Businesses that use dynamic capabilities can outperform rivals that might put efficiency ahead of innovation or who don't pay enough attention to how their customers' requirements are changing. It entails ongoing detecting, grabbing, and changing (Teece, 2017). Thus, this theory aims to clarify the variables that facilitate or hinder an organization's ability to adjust to changes in the external environment, which ultimately results in the maintenance or acquisition of a competitive advantage.

Companies constantly find themselves in a state of intense competition in a dynamic environment, despite the long-standing assumption that they will be able to see opportunities, maximize their use, and therefore do the much-needed reconfiguration of resources and capabilities (Breznik & Lahovnik, 2016). Being able to revitalize and recreate the company's resources and use them in a different way is a sign of managerial aptitude. According to Mohamed (2015), marketing aptitude is said to as a long-term requirement for competitive advantage because it entails utilizing pertinent and previously acquired market knowledge to effectively handle potential shifts.

Technological competence is the ability of a company to leverage its resource base to adapt and apply IT; Research & Development (R & D) capability is the inclination to use knowledge to spread innovation by looking for opportunities both inside and outside the organization; Competitive advantage is largely dependent on the competencies of human resources (Breznik & Lahovnik, 2016).

Some scholars have raised concerns about the tension between DCT's emphasis on dynamic capabilities and its treatment of capabilities as relatively stable and enduring over time. While dynamic capabilities involve the ability to adapt and change in response to environmental shifts, they are also shaped by existing organizational routines, structures,

and cultures, which may hinder rapid adaptation and innovation in practice. Moreover, DCT provides limited guidance to managers on how to develop, nurture, and leverage dynamic capabilities in practice. The theory often remains abstract and conceptual, offering few actionable insights or practical recommendations for firms seeking to enhance their competitive advantage through dynamic capabilities. As a result, managers may struggle to translate DCT's theoretical principles into actionable strategies and organizational practices.

Despite these critiques, the theory of dynamic capabilities in strategic management centers on the capacity of an organization to adjust, incorporate, and reorganize its internal assets and competencies in reaction to swiftly transforming external circumstances. In the context of Medical Insurance Providers (MIPs) and their operational performance, dynamic capabilities theory can offer insights into how MIPs can effectively respond to industry changes, regulatory shifts, and emerging technologies to improve their performance. It provides a strategic framework for MIPs to enhance their operational performance by being proactive, adaptive, and innovative in the face of dynamic healthcare industry conditions. By applying the principles of dynamic capabilities, the study will be able to understand how MIPs build resilience, improve efficiency, and better serve their policyholders in an evolving healthcare landscape.

2.3 Empirical Review

2.3.1 The Effect of Electronic Data Interchange (EDI) Platforms on Medical Insurance Providers' Operational Performance

Chandra et al. (2022) performed a study to better understand the role of digital technology and the instruments of Industry 4.0 in the context of the COVID-19 pandemic, particularly in developing and emerging nations. The exploration configuration utilized was a desk research survey. The example size comprised 14 applicable articles gathered from different information bases. The following main discussion areas emerged from the established findings: Advanced innovations and Industry 4.0 instruments, likely applications and current applications. Corresponding to electronic information exchange (EDI) stages on clinical protection suppliers explicitly, the discoveries revealed that EDI empowers quicker

and more straightforward correspondence of clinical information. EDI likewise holds the possibility to diminish costs and further develop administrations, as it considers the fast transmission of clinical approvals and protection claims. Moreover, EDI assists with removing pointless desk work and gives admittance to continuous data, which can work on the precision of information.

Teresia looked into Nairobi City County's private health institutions' performance and the electronic data exchange system (2022). In addition to two representatives from the IT departments of the chosen private hospitals, the survey, which was intended to function as a census, included all of Nairobi's registered private hospitals. A questionnaire was used in the collection of the primary data. The findings showed that real-time processing in mobile electronics is made possible by electronic data interchange, which does away with the need for sending, receiving, and entering order data on computers. Additional investigation showed that there is a significant decrease in one-on-one client interaction when electronic data interchange is outsourced. Consequently, it was found that a greater reliance on an outside provider for data centers could lead to security issues and require extra precautions like establishing infrastructure and incurring unexpected costs.

In the Attaran (2022) study, the difficulties and prospects of using blockchain technology in the healthcare industry are outlined, along with a summary of the blockchain-related health goods and the major businesses providing solutions for various applications. The study reviewed the literature and looked for studies that mentioned the term "blockchain in healthcare" in their abstracts, titles, or keywords. The outcome showed that blockchain can enhance data integrity, provenance, access control, and interoperability in the healthcare industry. The distributed nature of blockchain technology, coupled with its clear information structure and unchangeable records that are stored across all participating users, can aid in lowering the associated costs.

The study came to the conclusion that technology could be utilized to improve patient engagement, help ensure patient information is available, allow direct and secure communication between patients and providers, and promote family health management. It could also be used to safely coordinate and combine information from multiple providers.

The current study aims to investigate three characteristics that are essential to an effective payer provider automation technology: scope, degree, and quality of implementation. The paper's focus was focused on quality.

A study by Nyangena et al. (2021) aims to assess the degree of inter-HIS communication in Kenya. The HIS Interoperability Maturity Toolkit was developed by MEASURE Evaluation and the Health Data Collaborative Digital Health and Interoperability Working Group to quantitatively evaluate the readiness of interoperability capabilities. The people who are members of the Ministry of Health's Digital Health Technical Working Group made up the study's sample. Most domains were at the lowest two levels of maturity, with the exception of the subdomains of HIS governance structures, defined national enterprise architecture for HIS, defined technical standards for data exchange, nationwide communication network infrastructure, and capacity for hardware operations and maintenance. The highest level of domain maturity was "emerging," and no other levels existed. This study is relevant to the EDI platforms used by medical insurance firms since knowing the interoperability maturity level is essential for a successful deployment.

The influence of introducing electronic prior authorization on drug filling in an electronic health record system in a big healthcare system was examined by Lauffenburger et al. in 2021. The authors used generalized estimating equations to compare e-preauthorization prescriptions with non-e-preauthorization prescriptions for the same insurance plan, medication, and site, prior to as well as following e-preauthorization implementation. This allowed them to assess primary retention, or the percentage of prescriptions filled within 30 days, by matching e-preauthorization prescriptions with non-e-preauthorization prescriptions. The study found that implementation issues including insurance heterogeneity and misfiring may have reduced the program's efficacy, which has ramifications for other health informatics initiatives used in outpatient treatment. The study found that although e-preauthorization was becoming more popular as a way to streamline script filling, adoption had no effect on medication adherence.

Eckert and Osterrieder (2020) indicate that digital transformation has increased relevance in the business models of insurance companies. Innovation in insurance companies through

digital technologies, platforms, and other infrastructures offers a wide range of entrepreneurial activities in the insurance companies. It has, however, led to increased challenges, especially within the IT department and the core enablers and preventers. Eckert and Oster Rieder’s research provides an in-depth analysis of recent developments in digital technologies like AI and cloud computing, and its applications in the insurance industry. In their research, they have reviewed literature from various academic sources, industrial studies and other publications of the supervisory authorities. As a result, based on the research, one points out the reorients of an insurer and interdependencies between the digital technologies. As a result, the study's findings stress the need for comprehensive digital strategies at insurance firms.

Saldamli et al. (2020) conducted research to prevent health insurance fraud by developing a system of securities that will monitor all insurance activities by effectively integrating data and all insurance companies. The research design used in this study is a qualitative research approach, including interviews with healthcare experts and surveys from medical insurance providers. The study utilized a sample size that included healthcare providers and insurance companies who provided information on how EDI technology can improve payer-provider relations in medical insurance. The study established that the high need for EDI platforms in medical insurance companies is meant to increase transparency and security of protecting the patient and the payer.

The research by Aerts and Bogdan-Martin sought to identify the challenges faced by low- and middle-income countries when attempting to implement digital health solutions. The research was qualitative in nature, with over two hundred papers reviewed and over a hundred significant players interviewed. Based on the findings, digital health systems need to have the following six pillars in place: a national digital health strategy; policy and regulatory frameworks that support innovation while protecting security and privacy; universal access to digital infrastructure; component interoperability; effective partnerships; and sufficient funding. The article focuses on EDI systems used by medical insurance firms and highlights the importance of considering legal and regulatory frameworks to ensure data privacy and security.

Level 5 hospitals in Kenya's public health system were the focus of Mbugua and Namada's (2019) investigation of the effects of IT integration on hospital productivity. Using a causal, non-experimental, cross-sectional study design, they empirically explored the relationship between the degree to which hospitals have integrated information technology and their operational performance. To choose their final pool of 164 subjects, they used a method known as "stratified random sampling." The findings revealed that the integration of IT had a major impact on operational performance, accounting for 44.9% of the variation in that parameter. The findings also lent credence to the idea that government contracts could play a mediating role between IT integration and successful operations. Electronic data exchange (EDI) solutions have the ability to contribute to these aims by improving coordination across the many parts of Kenya's health sector and amplifying the effect of IT integration on operational performance.

2.3.2 The Effect of Claims Processing Automation on the Operational Performance of Medical Insurance Providers

The role of the Ayushman Bharat Digital Mission (ABDM) in shaping India's public digital health narrative was examined by Sharma et al. in 2023. The study looked into Indian health insurance providers using a cross-sectional research design. The study found that the health claim exchange (HCX) platform developed under the ABDM is successful in addressing the issues facing the health insurance sector and enhancing the patient experience in terms of timely service delivery. In order to facilitate the automation of the health insurance claims processing workflow, it offers an open, machine-readable, auditable, verifiable, explainable, and interoperable standard communication protocol between payer, provider, and beneficiary. It offers an open standard that makes it possible to automate communication between the parties, handle a large number of claims, and make it easier to settle claims quickly and verifiably.

At the core of this insurance reset, according to Deloitte (2023), is customer loyalty and retention, both of which are heavily influenced by customer interactions with their insurers. Specifically, the claims experience—which, in the case of medical insurance, is influenced by medical service providers in their interactions with insured members at the point of service—drives these two growth engines. Claims operations, which have historically been

viewed as the products of a "reactive back office," will thus need to develop into a potent differentiator that is inventive, uncompromising in its efficiency, endowed with a diverse workforce, and able to provide impressive outcomes.

The transformation of the insurance claims process, the adoption of new technologies, a networked partner ecosystem, and a talent model that prioritizes technical claims handling and data science capabilities are the main factors that will likely enable the future of claims. As the number of no-touch insurance claims processes rises, use of new technology should alleviate the strain of an aging workforce. Claims specialists will also require more technical proficiency in order to benefit from the faster and higher volume of information that is now available.

Sood et al. (2022) characterized the source's intent as an analysis of blockchain's effect on the non-life insurance sector. To this end, we conducted a comprehensive literature evaluation of blockchain applications in the insurance industry as part of our research design. According to the results of the study, just a fraction of insurance providers are exploring and implementing blockchain solutions. This entails the computerization of claim filing, fraud detection, and cash flow monitoring. In addition to reducing insurance firms' administrative costs, this technology aids in reducing disparities connected to false claims by tracking the customer's history. The importance of this research lies in the fact that it is one of the few to examine the relationship between blockchain and non-life insurance.

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Kemboi (2022) examined whether claims digitalization has an impact on insurance firms' ability to provide services in Kenya. The study used a descriptive survey approach with a sample size equal to all 56 insurance companies in Kenya to accomplish this. He used Google Forms to send out questionnaires, and then transferred the data to spreadsheet programs like Excel and SPSS for further processing. The results showed a robust beneficial correlation between digitalizing claims and providing services. Among the many aspects of claims digitalization, claims automation was the most consequential. However, the impact of self-service tools and interaction with third-party suppliers was quite minor. According to the findings, it is necessary to fully digitalize the claims process by

incorporating self-service capabilities, end-to-end claims automation, and databases of third-party suppliers.

Amponsah et al. (2022) looked into whether or not machine learning methods mixed with blockchain technology could aid in identifying and preventing healthcare fraud, namely in the claims processing sector. To make sense of the raw claims data, the researchers used a decision tree categorization technique. Health insurance information was used to calculate a suitable sample size for this investigation. According to the findings, the optimal method had a classification accuracy of 97.96% and a sensitivity of 98.09%. This result revealed the proposed strategy was successful in improving the blockchain smart contract's ability to detect fraud with a 97.96% degree of accuracy. This study's findings also showed that automation using machine learning and blockchain technology has the potential to be an efficient tool for spotting and combating healthcare fraud.

Kajwang (2022) conducted this research to learn how the advent of Big Data Analytics will affect the field of insurance fraud management. For this desktop literature study, we used Google Scholar to find the most influential and foundational journal papers and references published in the past decade. The research showed that insurance companies may use Big Data Analytics to cut costs and boost results by acquiring greater insight from larger data sets. Research also suggests that insurers' underwriting processes could benefit greatly from the automation of insurance claim processes and the use of digital insurance control mechanisms. Understanding how Big Data Analytics might be beneficial for the insurance sector, as well as the strategy of structuring better cost-benefit evaluations and scenario planning to address potential unfavorable repercussions, are all areas in which this source makes a distinctive theoretical and practical contribution.

The goal of Rawat, Rawat, Kumar, and Sabitha's research from 2021 was to determine how machine learning algorithms could assist insurance businesses in identifying trends in different Insure-tech segments and branches. Two datasets were employed in the investigation, and claim analysis was conducted using several categorization techniques. According to the study's findings, claim analysis can be used to understand the demographics and claiming behaviors of consumers, which can then be used to modify policies and determine more affordable premiums for them. The policies can also be

adjusted to track the insurance company's profit/loss ratio by comprehending its acceptance tendencies. The current study focuses on medical insurance businesses, whereas the study by Rawat et al. was more broadly focused on insurance companies.

According to Dubey, Bhatnagar, and Bhatia (2020), innovations aimed at expediting the claims process are not solely focused on enhancing client convenience. They are also intended to lower the expenses incurred by insurers in handling those claims. According to their survey of claims managers at top insurers, ineffective procedures and a deficiency in digitalization are common complaints about the claims management process. However, some insurers such as Tata-AIG in India and Suncorp in Australia, are now filing and recording insurance claims using automated digital platforms. Within minutes, insurers have successfully processed claims by using AI to interpret first-notice-of-loss photographs.

Applications utilized by payers and providers of care, as well as life sciences businesses, are the focus of Davenport and Kalakota's (2019) proposed study of the effects of AI on healthcare. The research design used was a qualitative systematic review examining AI applications' usage and potential impacts in the healthcare industry. No specific sample size was defined, as the focus was on casting a wide net across the different aspects of AI applications in healthcare. The findings of this research pointed to several impacts that healthcare providers must consider while implementing AI in their operations. The study found that AI can do healthcare duties almost as well as, if not better than, humans. However, operational problems and ethical considerations may delay broad automation of healthcare professional employment for some years. Additionally, the findings indicate that AI applications could positively affect the operational performance of medical insurance providers through automation of their claims processing operations.

2.3.3 The Effect of Mobile Patient Apps on the Operational Performance of Medical Insurance Providers

Halima and Yassine's (2022) study aimed to examine how the rise of app-based mobile patients has affected the efficiency and effectiveness of Morocco's health insurance markets. To ensure that all factors associated with the adoption of mobile patient systems

are taken into consideration, a mixed methods research design will be used. Specifically, the research design involved a quantitative survey and two focus group interviews to gain an understanding of the effect of mobile patient apps on operational performance. To ensure a representative sample size, the qualitative portion included four participants, and a total of 200 participants took the survey. The study established that mobile patient apps significantly impact the efficiency, effectiveness, and retention of Moroccan health insurers. Consequently, researchers plan to look into the potential effects of the COVID-19 pandemic, as well as the difficulties and restrictions of mobile patient systems.

The research undertaken by Wilson et al. (2022) includes two programmatic case studies that analyze the challenges and successes of adopting Digital Financial Services (DFS) for health with the goal of increasing access to Universal Health Coverage. This research employs a mixed methods process assessment strategy, combining primary and secondary data to address three issues. Primary data came from in-depth interviews with a variety of stakeholders, including program implementers, developers, and users in Rwanda and Kenya. Participants included program administrators, software designers, and end users of the two applications under review. According to these data, mobile patient apps do improve the efficiency of healthcare insurers' daily operations. The participants reached a consensus that DFS enhanced the responsiveness of health systems, enabled programs to adapt digital services to new regulations or features suggested by clients, and enhanced access to high-quality data for better administration and higher service quality. Program managers and some beneficiaries have complimented the convenience of digital functions over paper-based approaches, and both primary and secondary statistics indicate that these implementations helped to expand access to health insurance.

According to Kuria (2022), the medical insurance industry is witnessing a significant transition towards digital transformation, driven by the need for value-based treatment, operational excellence, patient experience, and cost reduction. Payer provider automated technologies range from artificial intelligence and machine learning to mobile apps and software that helps doctors' clinical judgments. By creating a thorough picture of a user's entire health, digitization helps reduce risk and costs. The platforms assist in connecting patients with healthcare professionals. Furthermore, securing data dominance in the

insurance industry can be achieved by maximizing customer experience and digital tools. For instance, several insurance firms employ the mobile technology platform M-TIBA to improve efficiency and transparency in the healthcare system (Kuria, 2022).

A systematic review conducted by Bokolo (2021) assessed the impacts of telemedicine and eHealth as a proactive measure to work on clinical care during the pandemic. Methods included a systematic search for relevant articles followed by a review of the results. The sample comprised different peer-reviewed journal articles, policy documents and reports published between January 2020 and September 2020. The study's conclusions center on the significance of telemedicine and contemporary applications such as mobile applications used during the epidemic, as well as regulations implemented throughout the world to promote its management. It also included the capability of telemedicine and eHealth to provide convenient, safe, successful, and "green" healthcare services. Furthermore, it was recommended that telemedicine and eHealth supportive platforms such as mobile patient apps can be used as convincing instruments for providing quality clinical treatment during times of health emergency.

Renner-Micah et al.'s (2020) analysis of the implementation of national health insurance in a developing country provides insight into the knock-on effects on the development and use of digital infrastructure. A qualitative, interpretive case study with institutional theory as the analytic lens. Institutional, normative, and cultural-cognitive influences were studied using a sample from Ghana, a poor nation. Findings identified three institutional facilitators (a health-seeking culture, widespread usage of mobile networks, and appropriate rules and regulations). The research lay the groundwork for understanding the institutional enablers and constraints surrounding digital platform development and use for national health insurance, which is crucial for determining the impact of mobile patient apps on the operational performance of medical insurance providers.

Shitanda et al. (2020) set out to find out to what extent blockchain technology affects insurance businesses' bottom lines in Kenya. Researchers employed a stratified random sample technique to select 16 of 52 insurance providers depending on their service region, and then used qualitative and quantitative methods to compile descriptive data. The poll indicated that the inability to communicate with clients, the inability to verify payment

data, the misappropriation of clients' premiums, the loss of payment records, and legal reporting systems were among the most significant obstacles to collecting and processing payments from/to consumers. Businesses are aware of blockchain technology, but the results showed that they have not yet implemented it. The benefits of applying block chain technology for insurance firms were also discussed, such as how it may increase transparency, data security and integrity, and digitizing speed; decrease fraud; and speed up claim settlements. The study concluded with a call for the establishment of policy guidelines for the activities of insurance companies.

2.3.4 The effect of online portals on the operational performance of medical insurance providers

Yinusa et al. (2023) examined the precarious situation of present healthcare systems and the necessity for pragmatic adjustment to establish balance between demand and capacity. The research team behind this study set out to measure how online payer-provider portals affect the efficiency with which health insurers go about their daily business. To do this, they conducted a literature analysis focusing on healthcare funding models, medical entrepreneurship, and macro-, meso-, and micro-level healthcare aspects. The sample size included 42 studies that provided relevant information for this review, including 17 macro-level studies, 9 meso-level studies, and 16 micro-level studies. The findings indicated the need to develop a healthcare financing model to promote and safeguard the health system. Furthermore, this model should safeguard human welfare and sustain socioeconomic development. The findings also showed that the online portals connecting payers and providers contributed to the proficiency of healthcare insurers.

Gordon and Rudin (2022) assesses the effect of payer-provider online portals on the operational performance of medical insurance providers, by interviewing US-based subject matter experts (SMEs). In this study, the authors used a semi-structured online interview to learn more about the benefits, drawbacks, and potential applications of AI-powered portals for payers and providers. Participating in the study were a total of twelve healthcare SMEs from various settings, including public health, private sector, universities, EHR vendors, governments, and standards organizations. The study identified six main use case

areas that might produce value utilizing AI-based portals: administrative, social services, population health and value-based care, public health, patient-facing, and clinician-facing. However, the benefits from these examples have yet to materialize because of unique challenges for each use case.

The goal of Kipkosgei's (2022) research was to ascertain whether Kenyan insurance companies' delivery of top-notch services was correlated with their use of digitalization and online social media. He used a descriptive cross-sectional survey as his study method for this. As per the IRA 2020 report, 56 insurance companies with a Kenyan business license made up the study population. The study's findings showed that the increasing usage of social media and other digital technologies raised the caliber of services provided by the insurance sector. Achieving seamless operations and quality service delivery was possible because to the incorporation of tangible elements such as responsiveness, reliability, assurance, and empathy into service delivery.

Cheng et al. (2022) determines the impact of internet-based health care systems on China's health care delivery system. It relies on two distinct sets of information: billing data from one of the four platforms and data scraped from the Internet health platforms using web-scraping technologies. It aims to assess the effect of payer-provider online portals on the operational performance of medical insurance providers. The results of the research provide a hopeful narrative on how service delivery in the online market is distinct from the traditional physical market and explain how China has been able to make rapid strides in digital health by leveraging the e-commerce, logistics, and communications capabilities of major Internet enterprises. In addition, Internet medical consultations provided nationally through one of China's major health platforms increased by 75% during the peak of the pandemic in March 2020.

A healthcare smart contract solution for managing medical data and streamlining intricate medical operations was introduced by Khatoon in 2020. He talked about the most recent blockchain research in the healthcare industry and put into practice an Ethereum-based healthcare management system. Only research that presents a novel healthcare solution, algorithm, method, methodology, or architecture was included in the systematic review study. The healthcare management system based on smart contracts and blockchain

technology has demonstrated how decentralization principles may be used in the medical ecosystem to manage vast amounts of data and simplify complicated medical processes. The authors presented a novel method for managing medical records that uses smart contracts to provide accessibility, auditability, and interoperability.

In order to computerize the NHIF patient claim form, Haule, Dida, and Sam's (2019) study sought to analyze the requirements for developing a module for data interchange between the Care2x hospital system and the NHIF claim management system. The goal was to shorten wait times for patients, cut down on the amount of time doctors had to spend caring for NHIF-insured patients, and streamline the process of sending NHIF treatment forms to NHIF for approval. The requirements for the module's development were gathered by the authors using both qualitative and quantitative methodologies.

The outcomes demonstrated how promising the incorporation of the data exchange module is for resolving the current issues. The Care2x HIS and NHIF Claims management System data exchange module will decrease the time and expense associated with printing claim forms while also improving the accuracy of claims that are submitted. While the current study aims to comprehend a private sector product, the previous study concentrated on a public sector item (NHIF).

2.3.5 Effect of payer provider automation technologies on operational performance of MIPs

The goal of Omerikwa's (2022) study was to determine how innovative methods affected the National Hospital Insurance Fund's performance in Kenya. Product, process, market, and technological innovations were the main topics of the study. Adopted was a quantitative descriptive research design. The 148 workers from the ICT, operations, finance, and marketing departments of the NHIF headquarters in Upper Hill, Nairobi, made up the population of interest. Closed-ended questionnaires were utilized to gather primary data, and stratified random sampling was applied. The data were analyzed using both descriptive and inferential statistics, and a multiple regression model was utilized to determine the relationship between the factors under investigation. Product innovation and the National Hospital Insurance Fund's operational performance in Kenya were found

to be somewhat positively correlated, as were process innovation and operational performance, mobile patient applications and operational performance, and technological innovation and operational performance.

The study of Osoro and Wairimu (2022) concentrated on the difficulties associated with managing fraud in the insurance sector. Because they guarantee the availability of a healthy and productive workforce, healthcare insurance companies are the most significant in the economy. As a result, it was challenging to determine the impact of fraud on their financial performance. In Nairobi County, Kenya, healthcare insurance businesses' financial performance was examined in relation to information and communication technology in this study. Correlation research design and mixed methods were used in the study. Eighty respondents made up the sample size used in the study. After evaluating the connection between healthcare insurance firms' financial success and information sharing, the highest number of the respondents attested to investing in data analytics and biometric identification. In the regression analysis, the collinearity statistics showed tolerance results on information communication having a significant impact on financial performance.

A study conducted by Manywanda (2021) examined different machine learning (ML) models in order to assess how accurate health claims automation was. This was accomplished by calculating the accuracy using the supervised machine learning model. Linear Discriminant Analysis (LDA), Naïve Bayes, and K-Nearest Neighbor were the supervised machine learning models employed. After conducting experiments, it was found that the K-Nearest Neighbor model performed best on both small and large datasets, yielding a 99.9% accuracy rate when used to determine the accuracy of claims. The study's conclusions included the possibility that machine learning (ML) could help insurers overcome their difficulties in implementing automated claims processing.

In their work from 2021, Yego, Kasozi, and Nkurunziza compared machine learning classifiers in two phases. Phase I involved comparing eight machine learning models based on how well they predicted insurance adoption using data from the 2016 Kenya FinAccessHousehold Survey. Using data from the 2019 Kenya FinAccess Household Survey, random forest and XGBoost were compared with four deep learning classifiers in

Phase II, using Phase I as a baseline. The random forest model with the highest F1-score, accuracy, and precision was trained on oversampled data.

Random forest was also shown to have the largest area under the receiver operating characteristic curve, making it the most reliable model for predicting insurance uptake. Finally, income, bank usage, and the capacity and willingness to assist others were found to be the most significant factors in predicting insurance uptake as deduced from the random forest model. Therefore, it is necessary to create and market low-income-based products, and bancassurance is one possible avenue through which insurance products could be distributed.

Using the Design Science Research (DSR) methodology, Johnson, Albizri, and Harfouche's (2021) study produced a Responsible Artificial Intelligence (RAI) solution that assisted hospital managers in identifying claims that might be contested. Hospitals nationwide lose over $262 billion a year as a result of denied claims; it is estimated that one in seven health insurance claims in the US are denied. Patients are overburdened by this pervasive issue, which also severely disrupts cash flow. Preventing claim denials prior to insurance claim submission thereby enhances revenue cycle acceleration, boosts profitability, and promotes patient well-being.

Under the direction of five guiding principles, this framework makes use of six AI algorithms, divided into white-box and glass-box categories, and uses cross-validation to adjust hyperparameters and identify the optimal model. The findings demonstrate that an area under curve (AUC) rate of 0.83 is produced by the white-box algorithm (AdaBoost) model, surpassing all other models. The main takeaways from this study were to assist providers in decreasing operational expenses and improving the effectiveness of insurance claim procedures, as well as to assist patients in concentrating on their healing rather than handling appeals.

Kiptoo, Kariuki, and Ocharo (2021) looked at the connection between risk management and the insurance companies' financial performance in Kenya from 2013 to 2020. As of December 31, 2020, 51 insurance companies with a Kenyan operating license provided the data. Utilizing regression analysis, the findings demonstrated how risk management has a major impact on insurance companies' financial performance. The findings specifically

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show that credit risk has a negative and substantial impact on financial performance. The findings imply that businesses do poorly when their share of non-performing receivables exceeds their entire amount of receivables. In order to prevent non-performing receivables and enhance performance, insurance companies should implement credit management systems to guarantee receivables are collected within the allotted time.

Singh and Urolagin's research from 2021 is centered on applying artificial intelligence, more precisely machine learning, to automate health insurance claims. The traditional, manual methods of deciding whether to accept or reject a claim in the health insurance business are no longer practical in today's world, where every piece of information gathered from records is considered information and every piece of this information is crucial to future decisions. However, artificial intelligence—the capacity of machines to think and act as intelligently as a human—is taking over the globe. By using those skills instead of the more conventional claim evaluation method, we are able to create a system that is not only quick and efficient but also able to identify previously unknown trends and patterns in the data.

The goal of Kang'e (2020) study was to determine how performance is affected by temporary advantages, with a focus on the effects of novel products, distribution strategies, market intelligence, and strategic alliances. A descriptive survey design was utilized in the study, which was aimed at managers, assistant managers, and supervisors. The study was grounded in the dynamic capacities perspective of the company and institutional theory. Each of the five departments, that is sales, strategy, finance, operations, and customer service, had four responders chosen at random. These are the divisions within the 19 private insurance firms where the information was gathered. A sample of 308 people was obtained from the 380 intended responders. After the data was evaluated, conclusions that were both descriptive and inferential were found and explained. It was discovered that although novel products forecast the performance of Kenya's private health insurance market. Furthermore, performance was highly impacted by the firms' size and age, which were considered control variables for the firm.

The suitability of data mining approaches for identifying fraudulent health insurance claims was examined in a 2019 study by Moturi. Classification models were employed to direct

the entire process of knowledge discovery in order to accomplish this. Predictive models were constructed using classification techniques, such as K-Nearest Neighbor, Decision Tree, and Naïve Bayes. The results of multiple trials demonstrated that the Naïve Bayes model performs effectively in identifying fraud in claims, with a classification accuracy of 91.790% and a testing hit rate of 74.12%. Based on the criteria taken from the Naïve Bayes model, a prototype was created that, if implemented, will reduce expenses by identifying fraud while it is being perpetrated. The study found that in order to minimize financial loss and enhance patient care, digital fraud detection in health insurance firms needs to be created immediately.

The goal of Nduyu and Magutu's (2018) study was to determine how Nairobi City's insurance brokers' operational performance related to their use of operation management practices (OMP). A design of exploration was employed. 53 insurance brokers in Nairobi City were the target population of the study, and since the population was too small to sample, a census was conducted. The five OMPs under examination were applied, albeit to differing degrees, by the insurance brokers questioned. Product and service design came in second on the list, and machine and equipment maintenance came in first.

The insurance industry faces a number of difficulties, including inadequate documentation of quality control systems and maintenance plans. The number of claims has increased over the last four years, the number of accounts held has only slightly increased, and the time taken to resolve claims has decreased, all of which indicate that the performance of the insurance companies has improved. The operation management methods and the insurance performance are correlated linearly.

2.4 Gaps in the Literature

Additional research that examined the implementation of e-procurement processes in diverse firms were included in the empirical review. A few of the research that were given revealed contradictory outcomes from the different techniques. Based on the literature review, the study identified several methodological and empirical gaps, which are enumerated in Table 2.1 below;

Table 2.1 Summary of Empirical Literature Gaps

Author	Title	Methodology	Findings	Research Gap	Type of Gap
Chandra et al. (2022)	The role of digital technology and the instruments of Industry 4.0 in the context of the COVID-19 pandemic, particularly in developing and emerging nations	The exploration configuration utilized was a desk research survey.	EDI empowers quicker and more straightforward correspondence of clinical information. EDI likewise holds the possibility to diminish costs and further develop administrations, as it considers the fast transmission of clinical approvals and protection claims	The study focused on the Covid-19 context while the current focus is a post-Covid 19.	Contextual gap
Teresia, (2022)	Electronic data interchange system and performance of private health institutions in Nairobi City County, Kenya	The study was designed as a census and included all of Nairobi's registered private hospitals as well as two (11) representatives from the IT departments of the selected private hospitals.	The results revealed that in mobile electronics, electronic data interchange enables real-time processing by eliminating operations such as transmitting, receiving, and inserting order data on computers.	The study focused on the impact of EDI from a healthcare provider perspective while the focus of the current study is medical insurance companies	Methodological gap
Sharma et al., (2023)	The Ayushman Bharat digital mission (ABDM) in making of India's Digital Health Story.	The study used a cross-sectional research design to investigate health insurance companies in India.	The study established that, to overcome the challenges of the health insurance industry and to improve the patient experience in delivering services on time, health claim exchange (HCX) platform formulated under the ABDM is effective. It provides an	The study focused on India and was limited to claims process automation systems only.	Contextual gap

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			interoperable, machine-readable, auditable, verifiable, explainable, and open standard-based communication protocol between payer, provider, and beneficiary to enable automation of the claims processing workflow for health insurance.		
Kemboi (2022)	Impact of claims digitalization on insurance firms' ability to provide services in Kenya	The study used a descriptive survey approach with a sample size equal to all 56 insurance companies in Kenya to accomplish this	The results showed a robust beneficial correlation between digitalizing claims and providing services. Among the many aspects of claims digitalization, claims automation was the most consequential.	The study focused on all insurance companies while the current study will focus on MIPs.	Empirical gap
Halima and Yassine's (2022)	How the rise of app-based mobile patients has affected the efficiency and effectiveness of Morocco's health insurance markets	The research design involved a quantitative survey and two focus group interviews to gain an understanding of the effect of mobile patient apps on operational performance.	The study established that mobile patient apps significantly impact the efficiency, effectiveness, and retention of Moroccan health insurers.	The study focused on health insurance market in general while the current study will focus on MIPs.	Contextual gap
Gordon and Rudin (2022)	The effect of payer-provider online portals on the operational performance of medical insurance providers	The authors used a semi-structured online interview to interview US-based subject matter experts (SMEs)	Patient-facing, clinician-facing, population health and value-based care, public health, administrative, and social services are the six major categories of use cases that could generate value using AI-based portals, according to the study.	The study focused on a more developed nation (US) hence the findings could not be generalized to Kenya.	Empirical gap

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2.5 Conceptual Framework

The conceptual framework seeks to identify payer provider automation technologies on medical insurance operations in Kenya. The independent variables and dependent variable of the study are also shown in Figure 2.1.

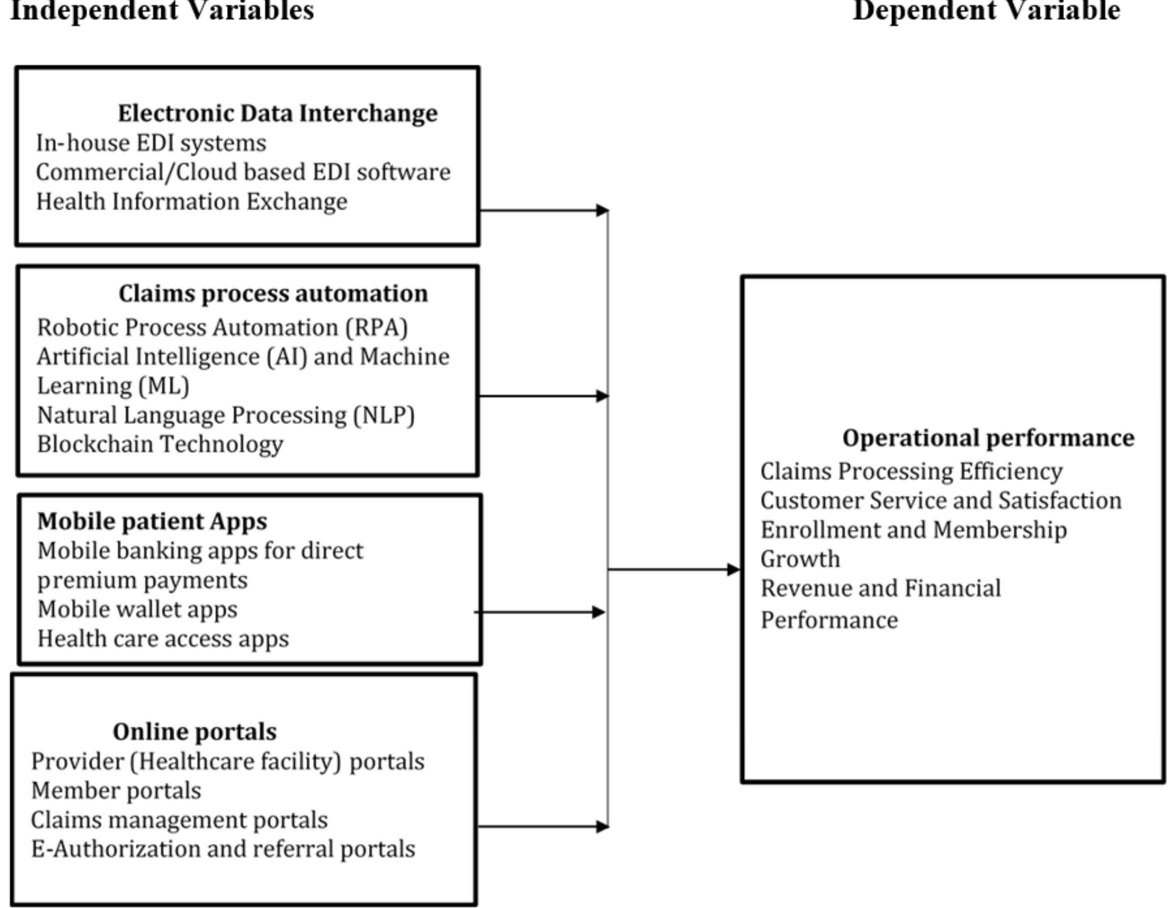

Figure 2.1 Conceptual Framework

2.5.1 Operationalization of Study Variables

The variables will be operationalized as shown in Table 2.2;

Table 2.1 Operationalization of Variables

Variable	Indicator	Operationalization	Source	Measure	Data Analysis
Payer provider automation technologies	Electronic Data Interchange	In-house EDI systems Commercial/cloud based EDI software Health Information Exchange (HIE)	Brooks and Stiernstedt, (2022)	5-point Likert Scale Ordinal variable	Descriptive and Inferential measures
	Claims process automation	Robotic Process Automation (RPA) Artificial Intelligence (AI) and Machine Learning (ML)	(Gottlieb et al., 2018)	5-point Likert Scale Ordinal variable	Descriptive and Inferential measures
	Mobile patient Apps	Mobile banking apps for direct premium payments Mobile wallet apps Health care access apps	(Singh, & Urolagin, 2021)	5-point Likert Scale Ordinal variable	Descriptive and Inferential measures
	Online portals	Provider portals Member portals Claims management portals Authorization and referral portals	(Kommadi, 2021)	5-point Likert Scale Ordinal variable	
Operational performance	Operational Performance	Claims Processing Efficiency Customer Service and Satisfaction Enrollment and Membership Growth Revenue and Financial Performance	Kaydos (2020)	5-point Likert Scale Ordinal variable	Descriptive and Inferential measures

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research Philosophy

The investigator's philosophy, or the scholar's underlying paradigm views about reality and truth in general, and the research subject in particular, traditionally served as the study's compass. The research philosophy employed in this study was positivism. In order to understand social and phenomena of nature, positivism is a research philosophy that places a strong emphasis on scientific methods and empirical observation. It stresses the significance of empirical observation, which means gathering data through sensory experiences and direct measurement. Therefore, researchers sought to collect objective, measurable, and observable data. Moreover, positivism often prioritizes quantitative data, which can be measured and expressed in numerical terms. Researchers use statistical analysis to test hypotheses and make generalizations about populations. Likewise, positivist research is interested in identifying cause-and-effect relationships between variables. It looks to examine if variations in one variable may be linked to variations in another. Finally, the goal of positivist research is to extrapolate results from a sample to a wider population. Statistical methods are frequently employed to draw conclusions about populations from sample data. As a result, positivism was the research philosophy employed in this study because it is consistent with the fundamental ideas and methods that form the basis of the investigation.

3.2 Research Design

According to Kothari (2017), a research design is a study roadmap for addressing a research topic in accordance with the study's objectives. A sort of non-experimental research design called correlational research was employed in this study to look at the correlations between two or more variables. Instead of changing variables, researchers examine whether changes in one variable are related to changes in another in correlational studies. Finding a relationship or association between two or more variables is, therefore, the main goal of correlational research. For the current study, a correlational research strategy is used since it enables the researcher to choose a sample from a wider population, and the results are applicable to that community as well. It is also valuable for this study in understanding

relationships between variables in real-world settings thus it helped identify the effect of payer provider automation technologies on medical insurance operational performance in Kenya.

3.2 Target Population

A population can be defined as the collection of all entities that adhere to a common set of characteristics (Paton, 2002). It is the cosmos from which a sample and illustration are drawn. The study's participants comprised all Kenyan medical insurance providers. There are 45 licensed medical insurance providers operating in Kenya (AKI, 2022). The study targeted the management cadre involved in claims, information technology and operations activities of the companies as presented in the table below. The choice of management cadre was informed by the fact that they are involved in the formulation and overseeing the implementation of organization strategies including adoption of payer-provider automation technologies for enhance operational performance of the organization. Therefore, the target population provided comprehensive understanding of various aspects of the insurance business, including technology infrastructure, and overall operations in addition to the identification of industry standards and the implementation of successful strategies across the board.

Table 3.1 Target Population

Management Level	Target Population
Claims	185
Information Technology	135
Operations	175
General Managers/ Heads of Departments	90
MDs/CEOs	45
Total	**630**

3.3 Sample Design and Sample Size

A sample, in the words of Robson and McCarran (2016), is a subset of the population. It enhances other resources and cuts down on the researcher's time. Samples that are stratified, proportional, and purposefully chosen will yield the required sample size. According to Kothari (2010), the stratified random sampling method procedure yields a

more representative sample drawn from a relatively homogeneous community and approximates the total population measures with remarkable precision. When evaluating the sample title of specific common qualities, several sub-groups are used. The sample size for the investigation was established using the Yamane formula. The formula looked something like this:

$n=N/ [1+N (έ)^{2}]$

Where;

n is the end sample,

N represents the entire population size

έ is the margin of error in the study

The sample for the study was therefore be given as:

$n= 630/ [1 + 630 (.05)^{2}] = 244$ respondents'

As shown in Table 3.2, the determined sample size was allocated proportionately among the various demographic strata. A sampling strategy (a way to find study participants) called proportionate sampling is used when a population is made up of many subgroups with drastically different features. Based on each subgroup's proportionate representation of the overall population, the number of participants from that group was determined.

Furthermore, purposive sampling—also referred to as judgmental or selective sampling—is a non-probability sampling strategy employed in research methodology, according to Campbell et al. (2020). It entails choosing samples or participants according to predetermined traits or standards that support the goals of the study. Thus, in accordance with IRA (2021), the researcher purposefully chose the 244 respondents from among the claims managers, IT managers, and operations managers of each of the 45 registered medical insurance plans. The researcher relied on the help of the Association of Kenya Insurers and human resource managers from the each of the medical insurance providers in identifying the right personnel sought to participate in the study.

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Table 3.2 Sample Size

Management Level	Target Population	Proportion	Sample Size
Claims	185	30%	73
Information Technology	135	21%	51
Operations	175	28%	69
General Managers/ Heads of Departments	90	14%	34
MDs/CEOs	45	7%	17
Total	**630**		**244**

3.4 Data Collection Methods

After the researcher successfully defended the proposal at Strathmore University, the data collection process was started. The researcher received a letter of introduction outlining the goal of this activity when the proposal was accepted by the institution. The researcher then composed a letter requesting a meeting with the medical insurance providers' top management team in order to gather data at their facility. This appointment letter was accompanied by a copy of the introductory letter.

Prior to being standardized for testing, the questionnaire underwent validity and reliability tests. To make sure the questionnaires are valid and reliable, pretests were conducted on a variety of respondents from the selected sample size.

The survey conducted a pretest of the questionnaire with a sample of 10% (N = 24) of the sample respondents who were not included in the main research. The pre-test results were analyzed, and the answers were used to resolve issues such as poorly formulated questions and questions that did not elicit the anticipated responses (Charlton, 2000). Four

experienced research assistants were hired by the researcher to help with data collecting when it was determined that the questionnaires were valid and reliable. In order to establish a connection with the respondents and explain the goal of the study, the researcher and four research assistants conducted the surveys in-person with the respondents.

3.5 Data Collection Instruments

The process of obtaining pertinent data is known as data collection, and the tools used to measure information on variables of interest in a recognized, systematic manner are known as data collection instruments. This allows one to weigh results, test hypotheses, and respond to research questions that have been stated (Castillo, 2009). For this investigation, both primary and secondary data were gathered. Semi-structured questionnaires were employed by the researcher to gather primary data from the selected medical insurance providers' responders. A questionnaire is the most effective tool for gathering primary data quickly and in big quantities, according to Silverman (2016).

The questionnaire was therefore chosen because it will facilitate the collection of copious amounts of rich data, be simple to conduct, and save time. Both closed-ended and open-ended questions were included in the questionnaire. The respondents felt free to express their differing viewpoints because the questions were left open-ended. The 5-point Likert scale included in the closed-ended questions allowed for the analysis of respondents' levels of agreement and disagreement with the various research variables. Additionally, the questionnaires were separated into five main sections, the first of which contained questions on the demographics of the respondents and the remaining four of which contained questions about the study variables.

On the other hand, secondary data was collected from existing data generated by authoritative sources including; government publications, sectorial reports, websites, books, journal articles, internal records on the operational performance of the medical insurance providers.

3.6 Reliability and Validity

Pre-testing of the questionnaires was conducted among officials from the medical insurance providers who were not involved in the main study. 24 respondents representing 10% of the sample respondents were included and questionnaires provided to them (Sekaran & Bougie, 2016). The validity and reliability of the data collection instruments were ascertained by the researcher thanks to the pre-test.

3.6.1 Reliability of the Instruments

Reliability is defined by Creswell & Creswell (2017) as the extent to which a research tool produces consistent data or results following multiple trials. Cronbach's Alpha (Cronbach, 1951) was employed in this work to assess the validity of the suggested constructs. Cronbach's alpha, which is a measure of an item's internal consistency or interrelatedness, is well-known for its stability and adaptability (Tavakol & Dennick, 2011). Any value between zero (no internal consistency) and one (full internal consistency) can be assigned to the alpha. According to Nunally (1978) and Clarkson (1995), an alpha value of 0.7 should be the minimal amount deemed acceptable, with values of 0.8 and higher contributing minimally to the reliability of the scale. According to Churchill and Peter's (1984) research, a measurement scale is deemed reliable if its alpha value is at least 0.7. If it is greater than 0.9, the scale is deemed redundant. These findings are consistent with the arguments made by the authors before. While a high alpha value (>0.9) would indicate that some items are redundant because they would be evaluating the same question under a different name, a low alpha value would indicate inadequate inter-relatedness between items or heterogeneous constructs (Streiner, 2003).

3.6.2 Validity of the Instruments

Validity means that the conclusions drawn from the research results are correct and make sense (Taylor, Bogdan & DeVault, 2015). In other words, validity is how well the results of the analysis of the data match up with the thing being studied. It can be measured in three ways: content validity, construct validity, and face validity. Content-related validation means showing that the test's content or test items are directly related to and measure the most important qualifications and requirements for the study (Taylor et al.,

2015). According to Taylor et al. (2015), construct-related validation necessitates demonstrating that the test measures the construct or characteristic it purports to assess and that this trait is crucial to the study's objective. Finally, face-related validity states that ambiguity or a lack of clarity can be shown by blank spots, incorrect replies, or inconsistencies. Test items that elicited these kinds of reactions in the pilot study ought to be modified or eliminated entirely (Taylor et al., 2015).

This study aimed to accomplish two types of validity: construct validity and content validity, guided by the previously mentioned notion. The methods suggested by Cooper and Schindler (2013) were used to seek content validity. These methods include locating current scales in the literature, creating a data collection tool, and distributing it to conveniently chosen experts in the fields of operations performance and information technology. Changes that raise issues with clarity, comprehensiveness, relevance, purpose, and necessary depth will be included. Peers pursuing an MBA at Strathmore University evaluated the instrument once more, and the supervisors' professional judgment was then considered. This was done to make sure that the items on the measurement scales had been appropriately translated from theory, measuring the study's constructs in an appropriate manner. Zikmund (2003) states that a measure has also attained face validity when specialists can clearly see that it covers the notion to a sufficient degree. Keyser Meyer Olkin (KMO) and Barlette's test of sphericity were employed in the study to assess construct validity.

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3.7 Data Analysis

We started by verifying the accuracy and completeness of the quantitative data. After that, the information was coded and entered into SPSS version 25, a statistical tool for social sciences, for analysis (Carlin, 2016). Both descriptive and inferential statistics were used in the data analysis. Standard deviation, means, percents, and frequencies were the components of descriptive statistics. On the other hand, inferential statistics employed a correlation analysis to ascertain the relationship between the indicators of the dependent variables and e-learning elements. Conversely, categories, themes, and patterns were used to arrange the qualitative data that was gathered using open-ended questions in the questionnaire and interview guide. After that, the researcher made general statements

concerning observed attributes for each theme (Sekaran & Bougie, 2016). In addition, the study conducted a multiple regression analysis to determine the relationship between payer provider automation technologies and operational performance of MIPs in Kenya.

The regression model is; ($Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$):

Whereby Y = Operational performance of MIPs in Kenya

X_1 = Electronic data interchange

X_2 = Claims process automation

X_3= Mobile patient apps

X_4= Online portals

and β_0 β_1 β_2 β_3 and β_4 are the regression equation coefficients for each of the variables discussed whereas ε = error term.

3.8 Ethical Considerations

The investigator obtained all the necessary authorizations and letters from pertinent authorities to gather data and ensure the privacy of the information given to the participants. Along with asking for voluntary involvement in the study, the researcher also required the respondents to sign a consent form before they could answer the questionnaire. The researcher also gave respondents the assurance that their responses would remain private and that the data would only be utilized for academic study. Additionally, it was proposed that they withheld their identify by not including the names of the respondents in the research materials.

CHAPTER FOUR: PRESENTATION OF RESEARCH FINDINGS

4.1 Introduction

This chapter describes the methods used for data analysis and provides the findings according to the design of the research tool. The background data, the breakdown of specific goals, and the regression summary are all presented in the first part. An overview of the study is given at the end.

4.2 Response Rate

To display the representative from the sample size, the response rate was examined. The trustworthiness of the research findings is greatly dependent on the response rate. A low response rate could reduce the data's statistical power and jeopardize the accuracy of the findings. Additionally, it can make it more difficult for the researcher to extrapolate the findings to the wider target audience. This is made more difficult by the possibility that a low response rate indicates non-response bias in the sample. If there is an uneven non-response among the participants with respect to exposure and/or outcome, a low response rate may result in sampling bias.

The study administered 244 questionnaires to managers and supervisors of the medical insurance providers in Nairobi city county, Kenya and the results are as shown in Figure 4.1.

Figure 4.1 Response Rate

Source: Research Data (2022)

Mugenda and Mugenda (2003) and Kothari (2004) state that a descriptive study should have a response rate of greater than 50%. This response rate was appropriate for use in the quantitative analysis since it can serve as the foundation for drawing conclusions about the research sample.

4.3 Background Information

Those who responded were asked to provide background data on their gender, age, job title in ICT, role in the medical insurance industry, and decades of employment at the organization.

4.3.1 Gender of Respondents

The respondents were asked to indicate their gender and the results are as shown in Figure 4.2

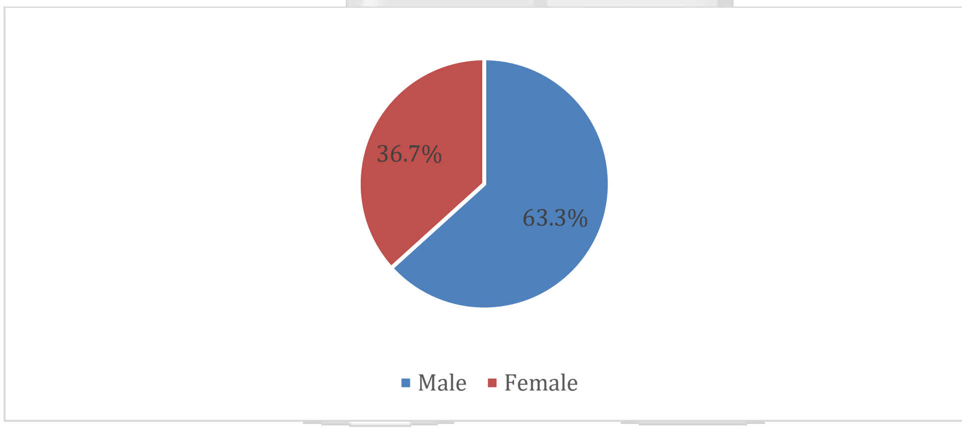

Figure 4.2 Gender of Respondents

Source: Research Data (2022)

The findings indicate that 63.3% of the respondents were men and 32.4% were women, making up the bulk of the sample. This suggested that there were more men than women among the managers and supervisors of the medical insurance companies in Nairobi City County, Kenya. Zaid, Wang, Adib, Sahyoun, and Abuhijleh (2020) cite substantial data supporting the notion that gender diversity enhances corporate performance. Gender diversity in an organization has the potential to enhance openness and have a favorable

impact on corporate governance, particularly in those that lack robust external supervision systems.

4.3.2 Age of the Respondents

The respondents were asked to indicate their age bracket and the results are as shown in Table 4.1.

Table 4.1 Age of the Respondents

	Frequency	Percent
below 35 years	47	33.8
36 – 45 years	68	48.9
46– 55 years	22	15.8
56 years and above	2	1.4
Total	**139**	**100**

The majority of respondents (48.9%) were found to be between the ages of 36 and 45, followed by those under 35 (33.8%). The largest age group was 56 years and older, at 1.4%, followed by those between 46 and 55, at 15.8%. This suggested that the medical insurance providers' managers and supervisors were middle-aged or older. A 2017 study by Zenger and Folkman, a leadership development firm, found that younger leaders are rated as substantially more effective than older ones. A workforce made up of a variety of age groups implies that the company benefits from the unique skills and qualities that each generation can offer.

4.3.3 Level of Education

When asked what their greatest degree of education was, the respondents provided information, the results of which are displayed in Table 4.2.

Table 4.2 Level of Education

	Frequency	Percent
Diploma	20	14.4
Bachelor's Degree	28	20.1
Master's Degree	86	61.9
Doctorate	5	3.6
Total	**139**	**100**

The findings showed that 61.9% of the respondents had earned a master's degree, with bachelor's degree holders making up 20.1% of the sample. Additionally, 14.4% of respondents held a diploma, while 3.6% of respondents held a doctorate. As indicated by the level of education outcomes, the majority of respondents in this situation shared having a master's degree as their educational attainment, indicating that they were sufficiently educated, capable of understanding the questions posed, and able to respond thoughtfully. Mesároš et al. (2017) state that a manager's education degree is a prerequisite for improved performance and outcomes. The education level implied that obtaining a higher level of education improves the prerequisite for effective outcomes in the organization's management for the personnel. A good education and a wealth of knowledge are just one requirement for getting good results.

4.3.4 Position in the Medical Insurance Sector

We respectfully requested that respondents specify their role within the medical insurance industry. Table 4.3 presents this role distribution.

Table 4.3 Position in the Medical Insurance Sector

	Frequency	Percent
Claims specialist	45	32.4
Operational specialist	18	12.9
Underwriting specialist	9	6.5

Health insurance lead	54	38.8
Business development	7	5
Case Management	6	4.3
Total	**139**	**100**

The majority of respondents (38.8%) were health insurance leads, followed by claims specialists (32.4%), operational specialists (12.9%), underwriting specialists (6.5%), business development specialists (5%), and case managers (4.3%), according to the study's findings. This suggests that the bulk of responders were health insurance practitioners and experts in various roles.

4.3.6 Number of Years of Service in the Institution

When asked how long they had been at each institution, the respondents gave their answers, which are displayed in Table 4.4.

Table 4.4 Number of Years of Service in the Institution

	Frequency	**Percent**
Less than five years	95	68.3
11-15 years	40	28.8
16 years and above	4	2.9
Total	**139**	**100**

The results indicated that most of the respondents had been in the medical insurance providers in Nairobi city county, Kenya for less than 5 years and this was represented by 68.3% followed by those with between 11-15 years at 28.8%, while 2.9% had 16 years and above. The more the duration of work in a sector is likely to reflect more experience.

4.3.7 Implementation of Payer Provider Automation Technologies

The study sought to identify whether payer provider automation technologies were implemented in any of the processes of the medical insurance provider under study. Results were analyzed as in Table 4.5 below.

Table 4.5 Implementation of Payer Provider Automation Technologies

	Frequency	Percent
Yes	133	95.7
No	6	4.3
Total	**139**	**100**

According to the study findings, majority of the respondents (95.7%) agreed that there are payer provider automation technologies implemented in their institution while 4.3% were of the contrary opinion. This implies that there are payer provider automation technologies implemented in the medical insurance providers in Nairobi city county, Kenya.

4.3.8 Payer Provider Automation Technologies Used

The respondents were asked to rate their degree of agreement with the payer provider automation technologies that their company used in the study. Table 4.6 presents the study's results.

Table 4.6 Payer Provider Automation Technologies Used

	N	Mean	Std. Deviation
Patient access mobile apps	139	2.741	0.606
Claims Processing automation	139	2.907	0.537
Provider management	139	3.058	0.611
Electronic Data Interchange (EDI)	139	3.115	0.638

Online provider portals	139	3.072	0.709
Pre-Authorization Automation	139	1.014	0.208
Telehealth and Remote Monitoring	139	3.058	0.787

According to the study findings, majority of the respondents strongly disagreed that there existed Pre-Authorization Automation in their institution (mean=1.014), Patient access mobile apps (mean=2.741) and Claims Processing automation (mean=2.907). In addition, the respondents disagreed that there exists provider management (mean=3.058), telehealth and remote monitoring (mean=3.058), online provider portals (mean=3.072) and electronic data interchange (EDI) (mean= 3.115).

4.4 Descriptive Statistics

The descriptive findings for online portals, mobile patient apps, claims process automation, and electronic data interchange are shown in this section. The findings for highly (5) agree and agree (4) were combined as agree for presentational purposes, whereas the results for strongly disagree (1) and disagree (2) were combined as disagree.

4.4.1 The Effect of Electronic Data Interchange (EDI) Platforms on Medical Insurance Providers' Operational Performance

On a scale of 1 to 5, with 5 representing strong agreement, 4 agree, 3 neutral, 2 disagree, and 1 representing strong disagreement, the survey assessed the respondents' degree of agreement with the various statements on the Data Interchange (EDI) Platforms. The results are displayed in Table 4.7.

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Table 4.7 The Effect of Electronic Data Interchange (EDI) Platforms on Medical Insurance Providers' Operational Performance

	N	Mean	Std. Deviation
In-house EDI systems designed to handle high volumes of transactions efficiently.	139	3.734	0.906
Commercial EDI software licensed or purchased commercial EDI software from third-party vendors.	139	3.842	0.950
Cloud-based EDI platforms provided as Software-as-a-Service (SaaS)	139	3.640	0.868
Health Information Exchange (HIE)	139	3.626	0.919
Enterprise Resource Planning (ERP) Systems (ERP-Based EDI) for seamless integration of financial and administrative data with EDI functions.	139	3.648	0.947
Application Programming Interfaces (APIs) and integration platforms	139	3.662	0.945

According to the study findings, majority of the respondents agreed on the statements on commercial EDI software licensed or purchased commercial EDI software from third-party vendors (mean=3.842), in-house EDI systems designed to handle high volumes of transactions efficiently (mean=3.734), Application Programming Interfaces (APIs) and integration platforms (mean=3.662), Enterprise Resource Planning (ERP) Systems (ERP-Based EDI) for seamless integration of financial and administrative data with EDI functions (mean=3.648), cloud-based EDI platforms provided as Software-as-a-Service (SaaS) (mean= 3.640) and Health Information Exchange (HIE) (mean=3.626),

4.4.2 The Effect of Claims Processing Automation on the Operational Performance of Medical Insurance Providers

Using a scale of 1 to 5, where 5 represents highly agree, 4 represents agree, 3 represents neutral, 2 represents disagree, and 1 represents strongly disagree, the study assessed the respondents' degree of agreement with the various statements on the Claims Processing Automation. The results are displayed in Table 4.8.

Table 4.8 The Effect of Claims Processing Automation on the Operational Performance of Medical Insurance Providers

	N	Mean	Std. Deviation
Robotic Process Automation (RPA) that automate the data entry of claims information, perform validation checks on claims data, and automatically check the status of claims and send updates to providers.	139	3.525	0.988
Smart contracts on a blockchain that automate claims processing by executing predefined actions (e.g., payment) when specific conditions are met.	139	3.590	0.824
Claims Management Software that automates the entire claims lifecycle, from submission to payment and provides decision support tools.	139	3.730	0.943
Automated Denial Management that predict potential claim denials and handle the appeals process, including generating appeal letters and tracking the status of appeals.	139	3.737	0.934
Payment Automation including electronic funds transfer (EFT) and electronic remittance advice (ERA)	139	3.784	0.915
Customer Relationship Management (CRM) Tools that automate communications with healthcare providers and policyholders.	139	1.072	0.259

Based on the study findings, majority of the respondents agreed on the statements on payment automation including electronic funds transfer (EFT) and electronic remittance advice (ERA) (mean=3.784), automated denial management that predict potential claim denials and handle the appeals process, including generating appeal letters and tracking the

status of appeals (mean=3.737), claims management software that automates the entire claims lifecycle, from submission to payment and provides decision support tools (mean=3.730), smart contracts on a blockchain that automate claims processing by executing predefined actions (e.g., payment) when specific conditions are met (mean=3.590) and that Robotic Process Automation (RPA) that automate the data entry of claims information, perform validation checks on claims data, and automatically check the status of claims and send updates to providers (mean=3.525). On the other hand, respondents disagreed on the statement that Customer Relationship Management (CRM) Tools that automate communications with healthcare providers and policyholders (mean=1.072).

4.4.3 The Effect of Mobile Patient Apps on the Operational Performance of Medical Insurance Providers

On a scale of 1 to 5, with 5 representing highly agree, 4 agree, 3 neutral, 2 disagree, and 1 representing severely disagree, the study assessed the respondents' degree of agreement with the various statements on the mobile patient apps. The results are displayed in Table 4.12. On a scale of 1 to 5, with 5 representing highly agree, 4 agree, 3 neutral, 2 disagree, and 1 representing severely disagree, the study assessed the respondents' degree of agreement with the various statements on the mobile patient apps. The results are displayed in Table 4.9.

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Table 4.9 The Effect of Mobile Patient Apps on the Operational Performance of Medical Insurance Providers

	N	Mean	Std. Deviation
The MIP has partnered with banks or financial institutions to offer mobile banking apps for direct premium payments and managing insurance-related finances.	139	3.058	0.787
Dedicated mobile apps that include payment functionality to provide policyholders with a comprehensive insurance experience, including premium payment options.	139	3.396	0.839
Healthcare payment apps that offer policyholders the ability to manage healthcare-related payments	139	3.662	0.839
Insurance Aggregator Apps that aggregate insurance-related services, including premium payments, from multiple insurance providers.	139	3.712	0.870
Telemedicine Apps that include payment features for services rendered by virtual healthcare providers.	139	3.648	0.859
Text messaging payment services that allow policyholders to receive payment links via text messages, making it convenient to make payments using mobile devices.	139	3.561	0.835

As per the study findings, majority of the respondents agreed on the statements on insurance aggregator apps that aggregate insurance-related services, including premium payments, from multiple insurance providers (mean=3.712), healthcare payment apps that offer policyholders the ability to manage healthcare-related payments (mean=3.662), telemedicine apps that include payment features for services rendered by virtual healthcare

providers (mean=3.648), text messaging payment services that allow policyholders to receive payment links via text messages, making it convenient to make payments using mobile devices (mean=3.561) and that dedicated mobile apps that include payment functionality to provide policyholders with a comprehensive insurance experience, including premium payment options (mean=3.396). On the other hand, the respondents were neutral on the statesmen that the MIP has partnered with banks or financial institutions to offer mobile banking apps for direct premium payments and managing insurance-related finances (mean=3.058),

4.4.4 The effect of online portals on the operational performance of medical insurance providers

On a scale of 1 to 5, with 5 representing highly agree, 4 agree, 3 neutral, 2 disagree, and 1 representing severely disagree, the study assessed the respondents' degree of agreement with the various claims on the internet portals. The results are displayed in Table 4.10.

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Table 4.10 The effect of online portals on the operational performance of medical insurance providers

	N	Mean	Std. Deviation
Provider portals for claims submission, eligibility verification, payment and reimbursement information, and prior authorization requests.	139	3.635	0.865
Member portals for policy information, claim status, premium payment and provider directory.	139	3.626	0.903
Claims management portals for end-to-end claims processing, claim tracking, and claims attachments.	139	3.725	0.799
Authorization and referral portals for pre-authorization, and authorization status.	139	3.763	0.813
Electronic Remittance Advice (ERA) portals for payment remittance and reconciliation tools.	139	3.741	0.793
Appeals and dispute resolution portals for claims appeals, for dispute resolution.	139	3.763	0.839
Quality reporting and performance measurement portals for data submission and performance analytics.	139	3.784	0.883
Telehealth and virtual visits portals for virtual consultations and billing and payment.	139	1.014	0.208

According to the study findings, majority of the respondents agreed on the statements on quality reporting and performance measurement portals for data submission and performance analytics (mean=3.784), authorization and referral portals for pre-authorization, and authorization status (mean=3.763), appeals and dispute resolution portals for claims appeals, for dispute resolution (mean=3.763), Electronic Remittance

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Advice (ERA) portals for payment remittance and reconciliation tools (mean=3.741), claims management portals for end-to-end claims processing, claim tracking, and claims attachments (mean=3.725), provider portals for claims submission, eligibility verification, payment and reimbursement information, and prior authorization requests (mean=3.635) and on member portals for policy information, claim status, premium payment and provider directory (mean=3.626). On the other hand, respondents disagreed on the statement on telehealth and virtual visits portals for virtual consultations and billing and payment (mean=1.014),

4.4.5 Effect of payer provider automation technologies on operational performance of MIPs

On a scale of 1 to 5, where 5 represents highly agree, 4 represents agree, 3 represents neutral, 2 represents disagree, and 1 represents strongly disagree, the study assessed the respondents' degree of agreement with the various claims on payer provider automation technology. The results are displayed in Table 4.11.

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Table 4.11 Effect of payer provider automation technologies on operational performance of MIPs

	N	Mean	Std. Deviation
Efficient and accurate claims processing brought about by payer provider technologies enables the organization to handle a large volume of claims from healthcare providers and ensure timely reimbursement.	139	3.396	0.813
These systems enable the organization to establish and maintain a strong network of healthcare providers such as managing provider relations, and ensuring an adequate network to meet the needs of their policyholders.	139	3.496	0.896
They ensure the organization achieves effective customer service by facilitating responsiveness to policyholders' needs to access services, providing clear and accurate information.	139	3.763	0.839
Cost containment without compromising the quality of care through efficient utilization management involving reviewing medical necessity, pre-authorization of procedures, and managing utilization of healthcare services.	139	3.784	0.883
Sound financial management by controlling administrative costs, and ensuring solvency. Effective financial management enables insurers to maintain competitive pricing, meet financial obligations, and sustain their operational performance	137	3.657	0.835
Compliance with regulations related to licensing, reporting, privacy, and consumer protection.	138	3.688	0.878
Quality Improvement involving implementing quality measurement programs, conducting audits, and collaborating with healthcare providers to promote evidence-based practices and patient safety.	139	3.266	0.786

According to the study findings, majority of the respondents agreed on the statements on cost containment without compromising the quality of care through efficient utilization management involving reviewing medical necessity, pre-authorization of procedures, and managing utilization of healthcare services (mean=3.784), they ensure the organization

achieves effective customer service by facilitating responsiveness to policyholders' needs to access services, providing clear and accurate information (mean=3.763), compliance with regulations related to licensing, reporting, privacy, and consumer protection (mean=3.688), sound financial management by controlling administrative costs, and ensuring solvency. effective financial management enables insurers to maintain competitive pricing, meet financial obligations, and sustain their operational performance (mean=3.657), these systems enable the organization to establish and maintain a strong network of healthcare providers such as managing provider relations, and ensuring an adequate network to meet the needs of their policyholders (mean=3.496) and efficient and accurate claims processing brought about by payer provider technologies enables the organization to handle a large volume of claims from healthcare providers and ensure timely reimbursement (mean=3.396). On the other hand, respondents were neutral on the statement on quality improvement involving implementing quality measurement programs, conducting audits, and collaborating with healthcare providers to promote evidence-based practices and patient safety (mean=3.266).

4.5 Correlation Analysis

To determine the effects of innovations on the operational performance of medical insurance companies, correlation and regression analysis were conducted. The effects of innovations on the operational performance of medical insurance companies were determined by correlation analysis as shown in table 4.12.

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Table 4.12 Correlation Analysis

	Operational performance	Electronic Data Interchange (EDI)	Claims process automation	Mobile patient Apps	Online portals
Operational performance	1				
Electronic Data Interchange (EDI)	0.83	1			
Claims process automation	0.66	0.21	1		
Mobile patient Apps	0.74	0.18	0.49	1	
Online portals	0.54	0.13`	0.11	0.14	1

Source; Researcher (2023)

The correlation findings established there was a strong positive relation between electronic data interchange and the operational performance of medical insurance providers in Kenya (r = .83, sig = .000). The tests further revealed a strong positive relation between claims process automation (r = .66, sig = .000) and the operational performance of medical insurance providers in Kenya. The findings above confirmed there was a strong positive relation between mobile patient apps and the operational performance of medical insurance providers in Kenya (r = .74, sig = .000). Lastly, the study confirmed a moderate positive and significant positive relation between online portals and the operational performance of medical insurance providers in Kenya (r = .54, sig = .000).

4.6 Diagnostic Analysis

The research conducted diagnostic check before the regression tests to ensure the observations adopted met linear regression assumptions.

4.6.1 Autocorrelation Test

The autocorrelation test was performed using the Durbin-Watson statistic with the aim of the tests being to confirm if there are any serial correlation problems in the model.

Table 4.13 Autocorrelation Results

Model	Durbin-Watson
1	1.603

a. Predictors: (Constant), Mean Mobile, Mean EDI, Mean Online Portal, Mean Claims

b. Dependent Variable: Mean Operation Performance

Source; Researcher (2023)

The Durbin-Watson statistic as a rule of thumb should range between 1.5-2.5 and the results above revealed that the study had no serial correlation since the D-W = 1.603. This confirmed there was no serial correlation violations hence the predictions of the model were accurate.

4.6.2 Collinearity Test

The research conducted collinearity check to estimate whether there was any linear dependency between the predictor variables adopted. Both tolerance value and variance inflation factors were utilized in the test. The results are as shown below.

Table 4.14 Collinearity Results

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	EDI	.502	1.992
	Claims Processing	.421	2.373
	Online Portal	.448	2.230
	Mobile Apps	.384	2.601

a. Dependent Variable: Operational Performance

Source; Researcher (2023)

As a standard rule the tolerance values should be above 0.1 and the variance inflation factors less than 10. The findings above indicated that the selected variables met the criteria

stated as the VIF was below 10 and tolerance value above 0.1 for all the variables thus showing there was no collinearity issues in the variables selected.

4.6.3 Normality Test

The survey further conducted normality tests to ensure the data utilized for the research was from a normal distribution. The results of the normality p-p plot indicated the observations fitted along the normality line which confirmed the data was normally distributed thus can be applied in the regression tests.

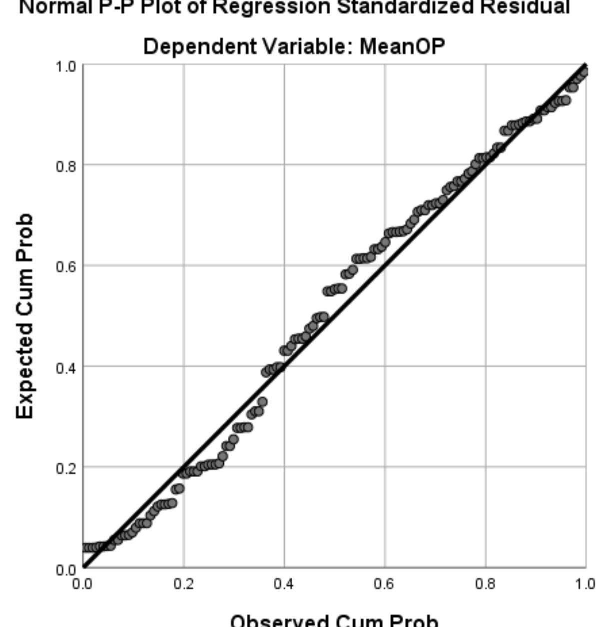

Figure 4.3 Normal P-P Plot

Source; Researcher (2023)

4.7 Regression Analysis

In order to test how test how Electronic Data Interchange (EDI), Claims process automation, Mobile patient Apps and Online portals impacts on the operational performance of medical insurance providers in Kenya, multiple regression was done.

4.6.1 Model Summary

Table 4.15 Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.916[a]	.839	.799	1.211

a. Predictors: (Constant), Electronic Data Interchange (EDI), Claims process automation, Mobile patient Apps, Online portals

The findings shown in Table 4.15 demonstrate that the business efficiency of healthcare insurance providers in Kenya was significantly impacted by Electronic Data Interchange (EDI), Claims process automation, Mobile patient Apps, and Online portals, as seen by the r value of 0.916. The independent factors explained 83.9% of the variability in the operational performance of Kenya's medical insurance providers, according to the R squared of 0.839.

4.6.2 ANOVA

Table 4.16 ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	145.224	4	36.306	20.844	0.000
	Residual	233.428	34	1.742		
	Total	**378.652**	**138**			

a. Dependent Variable: Operational performance of medical insurance providers in Kenya

b. Predictors :(Constant), Electronic Data Interchange (EDI), Claims process automation, Mobile patient Apps, Online portals

Source: (Researcher, 2023)

According to table 4.16 ANOVA results, the F statistics value was 20.844, and the p-value was 0.00<0.05. Given that the P-value is substantial, this suggests that the model is both

significant and well-suited for the research. This suggests that business ethics—including electronic data interchange (EDI), automation of the claims process, mobile patient applications, and online portals—will improve the operational efficiency of Kenya's health insurance companies.

4.6.3 Coefficients

Table 4.17 Coefficients[a]

	Unstandardized Coefficients		Standardized[1] Coefficients[1]		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	4.123	0.364		11.3269	0.000
Electronic Data Interchange (EDI)	0.712	0.241	0.134	2.95435	0.005
Claims process automation	0.671	0.234	0.121	2.86752	0.007
Mobile patient Apps	0.634	0.301	0.172	2.10631	0.042
Online portals	0.549	0.222	0.142	2.473	0.025

a. Dependent Variable: Operational performance of medical insurance providers in Kenya

Source: (Researcher, 2023)

The overall regression model for this model was:

$$Y = 4.123 + 0.712 \times \text{Electronic Data Interchange (EDI)} + 0.671 \times \text{Claims process automation} + 0.634 \times \text{Mobile patient Apps} + 0.549 \times \text{Online portals} + \acute{\varepsilon}$$

Medical insurance providers in Kenya see improved operational performance as a result of Electronic Data Interchange (EDI). It shows that the operational performance of Kenya's health insurance providers will rise by 0.712 units for every unit increase in Electronic Data Interchange (EDI). The operational performance of medical insurance

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providers in Kenya was positively impacted by claims process automation, resulting in an increase in operational performance of 0.671 units as a consequence of a unit increase.

Additionally, mobile passenger apps demonstrated a favorable influence on Kenyan medical insurance providers' operational performance, meaning that a unit improvement in these players' operations results in an increase of 0.634. Additionally, online portals demonstrated a beneficial impact on Kenyan medical insurance companies' operational performance, resulting in a 0.549 improvement in business efficiency for each unit increase.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The results, findings, and suggestions of the research regarding the impact of pay provider automation technologies on the operational performance of medical insurance providers are compiled in this chapter.

5.2 Summary of Findings

Determining the impact of Electronic Data Interchange (EDI) on the operational performance of medical insurance providers was the study's primary goal. The results of the correlation study showed a favorable and significant relationship between the operational performance of medical insurance providers and Electronic Data Interchange (EDI). The findings of the coefficient regression demonstrate a favorable and substantial relationship between Medical Insurance Providers' operational success and Electronic Data Interchange (EDI).

The second goal of the study was to evaluate how claims process automation affected the medical insurance companies' operational performance in Nairobi City County, Kenya. The results of the correlation analysis demonstrated a robust positive association between small and medium-sized business success and claims process automation. The results of the regression analysis show a positive and significant correlation between the operational performance of medical insurance providers and claims process automation.

The third goal of the study was to evaluate the effects of mobile patient apps on the medical insurance providers' operational performance in Nairobi City County, Kenya. A robust positive association between the success of small and medium-sized businesses and mobile patient apps was revealed by the correlation study. The regression analysis indicates a favorable and substantial relationship between Mobile patient Apps and medical insurance providers' success.

Evaluating the impact of online portals on the operational performance of medical insurance providers in Nairobi City County, Kenya, was the fourth goal of the study. The results of the correlation research demonstrated a robust and favorable association between internet portals and health insurance companies' performance. The regression analysis

indicates a favorable and substantial relationship between online portals and the success of medical insurance providers.

5.3 Discussion of Findings

The objective of this study was to determine the effect of payer-provider automation technologies on the operational performance of medical insurance providers. The variables of interest were Electronic Data Interchange (EDI), Claims process automation, Mobile patient Apps and Online portals on organizational operational performance of medical insurance providers.

5.3.1 Electronic Data Interchange (EDI) and Operational performance

The study's first objective sought to determine the impact of Electronic Data Interchange (EDI) on the operational performance of health insurance providers. The study revealed that Electronic Data Interchange (EDI) had a positive and significant effect on the operational performance of medical insurance providers. The study's findings align with Chandra et al.'s (2022) research as both studies underscore the advantages of EDI in healthcare operations, such as facilitating faster and more straightforward communication of clinical data, reducing costs, and enhancing services through the rapid transmission of information. There is alignment between the study and Teresia's research in recognizing the positive influence of EDI on real-time processing and efficiency within healthcare settings.

The study findings further align with Attaran (2022) who acknowledged the potential of technology to enhance data integrity, access control, and interoperability in the healthcare sector. The study's emphasis on the importance of interoperability and digital communication systems in healthcare operations aligns with Nyangena et al. (2021) research as both studies underscore the significance of understanding the maturity level of interoperability capabilities for successful technology deployment in healthcare settings. The studies are consistent with Mbugua and Namada's investigation into the effects of IT integration on hospital productivity in Level 5 hospitals in Kenya's public health system with the studies highlighting the potential of technology to enhance coordination and efficiency across various parts of the healthcare sector.

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Eckert and Osterrieder (2020) also recognized the increasing relevance of digital transformation and technology in the insurance industry. The findings on the importance of EDI platforms in improving payer-provider relations in medical insurance align with Saldamli et al.'(2022) research who emphasizes the role of EDI technology in enhancing transparency, security, and efficiency in healthcare operations. The study also resonates with Aerts and Bogdan-Martin's research on the challenges faced by low- and middle-income countries in implementing digital health solutions. Both studies underscore the importance of having a robust digital infrastructure, interoperability, and data security measures in place, which are essential considerations when implementing technologies like Electronic Data Interchange (EDI) in the healthcare sector.

5.3.2 Claims process automation and Operational performance

The study's second goal was to determine the impact of claims process automation on the operational performance of health insurance providers. The study revealed that claims process automation had a positive and significant effect on the operational performance of medical insurance providers. The study findings echo the sentiments expressed by Amponsah et al. (2022) regarding the efficacy of automation, particularly when combined with machine learning and blockchain technologies, in identifying and preventing healthcare fraud in the claims processing sector. Similarly, Sharma et al. (2023) highlighted the success of platforms like the health claim exchange (HCX) developed under the Ayushman Bharat Digital Mission (ABDM) in addressing sectoral challenges and enhancing patient experiences through timely service delivery. These findings collectively reinforce the notion that automation technologies hold significant potential for streamlining operations and improving service delivery in the healthcare insurance sector, both in Kenya and globally.

Moreover, the emphasis on customer loyalty and retention in Deloitte's study (2023) underscores the importance of claims operations as a key determinant of customer satisfaction. By enhancing efficiency and responsiveness through automation, insurers can bolster their competitive edge and foster stronger relationships with their clientele. This aligns with the study's focus on operational performance as a critical aspect of insurance providers' success.

However, the study disputed the findings in certain studies. For instance, while Kemboi's research (2022) emphasized the importance of fully digitalizing the claims process, including self-service capabilities and interaction with third-party suppliers, the study specifically highlights the significant impact of claims process automation, with comparatively minor effects observed for self-service tools and third-party interactions. This difference suggests potential differences in the efficacy or implementation of automation strategies. Furthermore, while the study focuses specifically on the operational performance of medical insurance providers in Nairobi City County, Kenya, other studies offer broader insights into the transformative potential of automation technologies across various segments of the insurance industry (Rawat et al., 2021; Dubey et al., 2020; Davenport & Kalakota, 2019). These studies highlight the benefits of automation, ranging from cost reduction and fraud prevention to enhanced customer experiences and more efficient claims processing.

5.3.3 Mobile patient Apps and Operational performance

The study's third objective sought to determine the impact of mobile patient apps on the operational performance of health insurance providers. The study revealed that mobile patient apps had a positive and significant effect on the operational performance of medical insurance providers. Halima and Yassine's study (2022) in Morocco highlighted the significant impact of mobile patient apps on the efficiency, effectiveness, and retention of health insurers, echoing the positive correlation found in the research. Similarly, Wilson et al. (2022) demonstrated through programmatic case studies in Rwanda and Kenya that mobile patient apps enhance the efficiency of healthcare insurers' daily operations, leading to improved responsiveness of health systems and expanded access to health insurance. Moreover, Kuria (2022) emphasized the growing trend of digital transformation in the medical insurance industry, with mobile apps playing a crucial role in facilitating value-based treatment, operational excellence, patient experience, and cost reduction. The adoption of mobile technology platforms like Smart Virtual Access further reinforces the significance of mobile apps in improving efficiency and transparency within healthcare systems.

The findings were also in line with Bokolo's systematic review (2021) which underscored the importance of telemedicine and eHealth applications, including mobile patient apps, particularly during health emergencies like the COVID-19 pandemic. These platforms not only provide convenient and safe healthcare services but also contribute to the overall quality of clinical treatment. Furthermore, Renner-Micah et al.'s (2020) analysis of the implementation of national health insurance in Ghana highlighted the institutional facilitators that promote the development and use of digital infrastructure, including mobile apps. This institutional support is crucial for maximizing the impact of mobile patient apps on the operational performance of medical insurance providers.

However, Shitanda et al. (2020) found in their study in Kenya that despite the potential benefits of blockchain technology in improving transparency, data security, and fraud prevention in insurance businesses, the adoption of such technologies, including mobile patient apps, was still limited. This suggests that while the potential benefits are recognized, there may be barriers to adoption that need to be addressed to fully leverage the advantages of mobile patient apps in improving operational performance.

5.3.4 Online portals and Operational performance

The study’s final goal was to determine the impact of online portals on the operational performance of health insurance providers. The study revealed that online portals had a positive and significant effect on the operational performance of medical insurance providers. The study findings were corroborated by Yinusa et al. (2023) who conducted a literature analysis that highlighted the contribution of online portals connecting payers and providers to the proficiency of healthcare insurers, aligning with the research findings. Similarly, Gordon and Rudin (2022) identified various potential applications of AI-powered portals for payers and providers, indicating their potential value in enhancing operational performance. Moreover, Kipkosgei's (2022) research emphasized the correlation between the increasing usage of social media and other digital technologies with the improvement of service quality in the insurance sector, underscoring the positive impact of digitalization on operational performance.

Furthermore, Cheng et al. (2022) provided insights into how internet-based health care systems, including online portals, have positively influenced China's healthcare delivery system. Their findings corroborate the notion that online portals play a crucial role in enhancing operational efficiency and service delivery in the healthcare sector. Cheng et al. (2022) also provides a hopeful narrative on how service delivery in the online market is distinct from the traditional physical market and explain how China has been able to make rapid strides in digital health by leveraging the e-commerce, logistics, and communications capabilities of major Internet enterprises. In addition, Internet medical consultations provided nationally through one of China's major health platforms increased by 75% during the peak of the pandemic in March 2020.

Additionally, Khatoon's (2020) discussion on blockchain technology's application in healthcare management systems further supports the idea of leveraging digital solutions, such as online portals, to streamline medical operations and manage vast amounts of data effectively. Haule, Dida, and Sam's (2019) study in Tanzania focused on the computerization of patient claim forms to streamline processes and improve efficiency, highlighting specific requirements and challenges faced in their context. While their study does not directly assess the impact of online portals on operational performance, it shows the importance of addressing practical considerations and technical requirements to realize the full potential of digital solutions in healthcare settings.

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5.4 Conclusion

Based on its findings, the study came to the conclusion that Kenyan medical insurance providers' operational success is influenced by their innovation strategy. Since client preferences and demands are constantly changing, innovation helps businesses gain a competitive edge while also meeting customer needs or specifications through improved product or service quality. The results of our regression analysis show that payer provider technologies innovation has a major impact on medical insurance providers' operational performance. Among these medical insurance providers, the effects of electronic data interchange (EDI), automation of the claims process, mobile patient applications, and online portals are statistically significant.

Thus, the study comes to the conclusion that payer provider innovations improve the operational performance of medical insurance businesses. Finally, payer provider automation technologies have been embraced by medical insurance providers, improving the organization's overall business performance and increasing sales income, market share, and customer satisfaction in service delivery.

5.4 Recommendations

The results of the study demonstrate how significantly pay provider automation technologies affect medical insurance providers' operational performance. In particular, the finding that Electronic Data Interchange (EDI) and operational performance have a very significant positive association highlights the significance of effective data exchange systems in raising overall efficiency. It is advised that medical insurance companies give the implementation and integration of EDI systems a priority in order to take advantage of this relationship. By streamlining communication processes with healthcare providers, reducing administrative burdens, and expediting claims processing, EDI implementation can lead to tangible improvements in operational efficiency and customer satisfaction.

Similarly, the study revealed a strong positive relationship between claims process automation and operational performance. This underscores the value of automating claims processing workflows to accelerate claims adjudication, minimize errors, and improve accuracy. To capitalize on this relationship, medical insurance providers should invest in advanced automation solutions that handle claims submission, verification, adjudication, and payment processes seamlessly. By leveraging automation technologies, insurers can achieve greater efficiency, reduce processing times, and enhance overall operational performance.

Furthermore, the correlation results indicating a positive and significant relationship between mobile patient apps and operational performance highlight the potential of digital health solutions to drive improvements in the insurance industry. To leverage this relationship, medical insurance providers should focus on enhancing the functionality, accessibility, and user experience of their mobile patient apps. By offering features such as real-time claims tracking, secure document uploads, appointment scheduling, and

telemedicine services, insurers can enhance customer engagement, streamline processes, and ultimately improve operational performance.

Similarly, the positive and significant relationship between online portals and operational performance underscores the importance of digital platforms in facilitating seamless interactions between insurers and policyholders. To capitalize on this relationship, medical insurance providers should invest in the development and optimization of online portals that provide users with easy access to essential services and information. By offering intuitive navigation, personalized content, and self-service functionalities, insurers can enhance customer satisfaction, reduce administrative overhead, and improve overall operational performance.

5.5 Limitations of the Study

Because some of the concerns discussed are unique to medical insurance providers, the study's conclusions may not apply universally to other Kenyan organizations and other healthcare actors within the medical ecosystem. It was limited to the medical insurance providers in Nairobi County. Nonetheless, it is thought that the research deals with pay provider automation technology in health insurance companies. The four variables affecting organizational operational performance that were the focus of the study were Electronic Data Interchange (EDI), Claims Process Automation, Mobile Patient Apps, and Online Portals. One restriction was the respondents' worry of secrecy, which was allayed by informing them that their information was kept private and that their answers would only be utilized for study.

5.6 Areas for Further Research

Future researchers should conduct longitudinal studies to assess the sustained effects of payer-provider automation technologies on the operational performance of medical insurance providers in Nairobi City County, Kenya. Investigate how these technologies evolve over time and their ongoing influence on efficiency, cost-effectiveness, and customer satisfaction in the insurance sector.

Future researchers should compare the effects of different payer-provider automation technologies, such as Electronic Data Interchange (EDI), claims process automation, mobile patient apps, and online portals, on the operational performance of medical insurance providers within the addition of other tertiary drivers of payer- provider technologies such as leadership, capital, skills, size and policies which were beyond the scope of this study. With these tertiary drivers consideration, future researches can explore which technologies have the most significant impact on key performance indicators with these tertiary drivers as intervening variables and determine best practices for implementation and optimization in further particular context.

More so, research work could be conducted examining the perspective of various players such as healthcare providers such as hospitals and healthcare consumers such as patients, intermediaries and Government on how payer provider automation technologies have impacted their access and utilization of medical insurance services/products.

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APPENDICES

Appendix A: Participant Information & Consent Form

Dear Participant,

I am currently a student at Strathmore Business School, pursuing a Master of Business Administration degree. As part of the School's requirements, I am required to conduct a research survey on my area of specialization. I am currently undertaking a study to analyze the "Effect of Payer Provider Automation Technologies on Operational Performance in Kenya of Medical Insurance Providers in Nairobi County, Kenya". This research is being done under the supervision of Dr. Bernard Shibwabo who can be reached via Strathmore Business School.

In order to compete the research, I need to obtain research information from Medical Claims, Medical Underwriting, Medical Operations and ICT staff drawn from the various Medical Insurance Providers in Nairobi County, Kenya.

Kindly grant me about 10 to 15 minutes of your appointed time to complete the questionnaire.

Your participation in the survey is entirely voluntary and the researcher will ensure your anonymity is guaranteed throughout the research. The study data will only be used for the stated academic purposes and will not be shared with any unauthorized parties.

I thank you for your participation and the valuable time, which you are willing to spend on this endeavour.

Researcher

Name: Harrison Muiru

Sign: ………………………….. **Date: November 2023**

Respondent

Sign: ……………................... **Date: ………………**

Appendix B: Letter of Introduction

The Managing Director.
CIC General Insurance Ltd,
P.O Box 12345.
NAIROBI 00200.
Dear Sir,

RE: REQUEST FOR PARTICIPATION IN MBA RESEARCH DISSERTATIONON EFFECT OF PAYER PROVIDER TECHNOLOGIES ON OPERATIONAL PERFORMANCE OF MEDICAL INSURANCE PROVIDERS IN NAIROBI COUNTY, KENA

Reference is made to the subject.

As a student at Strathmore University Business School, my course work necessitates that I conduct and submit a research dissertation report for which I am carrying out a study on the "Effect of Payer Provider Automation Technologies on Operational Performance in Kenya of Medical Insurance Providers in Nairobi County, Kenya."

The study is aimed at contributing to the body of knowledge on this important aspect that is intended to contribute positively to medical insurance sustainability and growth. The study entails questionnaire-based interviews with various medical insurance personnel in order to gather data.

I therefore seek your approval to engage with you and your organization’s medical insurance personnel in participating in this interview process, solely for the purposes of

this study. Your confidentiality is assured, and a copy of the report will be archived in the Strathmore Business School Library for future researchers to peruse.

Yours faithfully,

Harrison Mugo.

Appendix C: Questionnaire

Instructions: This study seeks to collect data on “the effect of payer provider technologies on operational performance of medical insurance providers in Nairobi County, Kenya”.

All information provided will be handled with the highest ethical standards.

Please tick () the appropriate answer

Section A: Personal Information

1) What is your Gender?

   [ ] Male

   [ ] Female

2) What is your Age Bracket?

   [ ] Below 35 years

   [ ] 36 – 45 years

   [ ] 46– 55 years

   [ ] 56 years and above

3) What is your highest level of Education?

   [ ] Diploma

   [ ] Bachelor’s Degree

   [ ] Master’s Degree

   [ ] Doctorate

4) Which one of the following best describes your position in the ICT sector? Please proceed to question 5, in case you are not in ICT but in insurance operations.

   [ ] Chief Information Officer

   [ ] Information Technology Manager

   [ ] Business Systems Manager

   [ ] Other ____________________

5) Which one of the following best describes your position in the medical insurance sector? Please skip this question, in case you are in ICT and already answered question 4 above.

   [ ] Claims specialist

   [ ] Operational specialist

   [ ] Underwriting specialist

   [ ] Other ____________________

6) Please indicate your number of years of service in the institution.

   [ ] Less than five years

   [ ] 6-10 years

   [ ] 11-15 years

   [ ] 16 years and above

7. Are payer provider automation technologies implemented in any of the processes in your organization?

   Yes [ ]

   No [ ]

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8. To what extent do you agree that the stated range of payer provider automation technologies used in your organization? Please state your response as per the key: 1 = Strongly Disagree, 2 = Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree.

	1	2	3	4	5
Patient access mobile apps					
Claims Processing automation					
Provider management					
Electronic Data Interchange (EDI)					
Online provider portals					
Pre-Authorization Automation					
Telehealth and Remote Monitoring					
Other …………………………………………………………………… ……………………………..					

Section B: The effect of electronic data interchange (EDI) platforms on operational performance medical insurance providers in Kenya

7. Has your organization adopted electronic data interchange (EDI) platforms to improve its operational performance?

   Yes [ ]

   No [ ]

8. Medical insurance providers use various types of Electronic Data Interchange (EDI) platforms to facilitate data exchange and streamline their operations. To what extent has your organization adopted the following EDI platforms? Please state

your response as per the key: 1 = No extent, 2 = Small extent, 3= Moderate extent, 4= Great extent, 5= Very great extent.

	1	2	3	4	5
In-house EDI systems designed to handle high volumes of transactions efficiently.					
Commercial EDI software licensed or purchased commercial EDI software from third-party vendors.					
Cloud-based EDI platforms provided as Software-as-a-Service (SaaS)					
Health Information Exchange (HIE)					
Enterprise Resource Planning (ERP) Systems (ERP-Based EDI) for seamless integration of financial and administrative data with EDI functions.					
Application Programming Interfaces (APIs) and integration platforms					

Section C: The effect of payer-provider claims processing automation on operational performance medical insurance providers in Kenya

9. Has your organization adopted prayer provider claims processing automation to improve its operational performance?

   Yes [ ]

   No [ ]

10. Medical insurance providers use various types of payer provider claims processing automation. To what extent has your organization adopted the following payer provider claims processing automation systems? Please state your response as per the key: 1 = No extent, 2 = Small extent, 3= Moderate extent, 4= Great extent, 5= Very great extent.

	1	2	3	4	5
Robotic Process Automation (RPA) that automate the data entry of claims information, perform validation checks on claims data, and automatically check the status of claims and send updates to providers.					

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Smart contracts on a blockchain that automate claims processing by executing predefined actions (e.g., payment) when specific conditions are met.					
Claims Management Software that automates the entire claims lifecycle, from submission to payment and provides decision support tools.					
Automated Denial Management that predict potential claim denials and handle the appeals process, including generating appeal letters and tracking the status of appeals.					
Payment Automation including electronic funds transfer (EFT) and electronic remittance advice (ERA)					
Customer Relationship Management (CRM) Tools that automate communications with healthcare providers and policyholders.					

Section D: The effect of mobile payment Apps on operational performance medical insurance providers in Kenya

11. Has your organization adopted mobile payment Apps to improve its operational performance?

    Yes [ ]

    No [ ]

12. MIPs adopt various types of mobile payment apps to facilitate premium payments, reimbursements, and other financial transactions with policyholders. These apps enhance convenience and accessibility for policyholders while streamlining payment processing for insurers. To what extent has your organization adopted the following payer provider claims processing automation systems? Please state your response as per the key: 1 = No extent, 2 = Small extent, 3= Moderate extent, 4= Great extent, 5= Very great extent.

	1	2	3	4	5

The MIP has partnered with banks or financial institutions to offer mobile banking apps for direct premium payments and managing insurance-related finances.					
Dedicated mobile apps that include payment functionality to provide policyholders with a comprehensive insurance experience, including premium payment options.					
Healthcare payment apps that offer policyholders the ability to manage healthcare-related payments					
Insurance Aggregator Apps that aggregate insurance-related services, including premium payments, from multiple insurance providers.					
Telemedicine Apps that include payment features for services rendered by virtual healthcare providers.					
Text messaging payment services that allow policyholders to receive payment links via text messages, making it convenient to make payments using mobile devices.					

Section E: The effect of payer-provider online portals on operational performance medical insurance providers in Kenya.

13. Has your organization adopted payer-provider online portals to improve its operational performance?

    Yes [ ]

    No [ ]

14. MIPs typically adopt various online portals to facilitate interactions between healthcare payers and healthcare providers. These portals serve different purposes and are designed to streamline administrative processes, claims management, and communication between the two parties. To what extent has your organization adopted the following payer provider online portals? Please state your response as

per the key: 1 = No extent, 2 = Small extent, 3= Moderate extent, 4= Great extent, 5= Very great extent.

	1	2	3	4	5
Provider portals for claims submission, eligibility verification, payment and reimbursement information, and prior authorization requests.					
Member portals for policy information, claim status, premium payment and provider directory.					
Claims management portals for end-to-end claims processing, claim tracking, and claims attachments.					
Authorization and referral portals for pre-authorization, and authorization status.					
Electronic Remittance Advice (ERA) portals for payment remittance and reconciliation tools.					
Appeals and dispute resolution portals for claims appeals, for dispute resolution.					
Quality reporting and performance measurement portals for data submission and performance analytics.					
Telehealth and virtual visits portals for virtual consultations and billing and payment.					

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Section F: Effect of payer provider automation technologies on operational performance of MIPs

9. Do payer provider automation technologies affect medical insurance operational performance in your organization?

   Yes [ ]

   No [ ]

10. To what extent do you agree with the following statement on the effect of payer provider automation technologies on medical insurance operational performance in

your organization? Please state your response as per the key: 1 = Strongly Disagree, 2 = Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree.

	1	**2**	**3**	**4**	**5**
Efficient and accurate claims processing brought about by payer provider technologies enables the organization to handle a large volume of claims from healthcare providers and ensure timely reimbursement.					
These systems enable the organization to establish and maintain a strong network of healthcare providers such as managing provider relations, and ensuring an adequate network to meet the needs of their policyholders.					
They ensure the organization achieves effective customer service by facilitating responsiveness to policyholders' needs to access services, providing clear and accurate information.					
Cost containment without compromising the quality of care through efficient utilization management involving reviewing medical necessity, pre-authorization of procedures, and managing utilization of healthcare services.					
Sound financial management by controlling administrative costs, and ensuring solvency. Effective financial management enables insurers to maintain competitive pricing, meet financial obligations, and sustain their operational performance					
Compliance with regulations related to licensing, reporting, privacy, and consumer protection.					
Quality Improvement involving implementing quality measurement programs, conducting audits, and collaborating with healthcare providers to promote evidence-based practices and patient safety.					

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THANK YOU FOR YOUR INPUT AND COOPERATION!

Appendix D: Sample Size Table

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

Appendix E: Ethical Approval Confirmation

7th December 2023

Mr Muiru Harrison
harrison.muiru@strathmore.edu

Dear Mr Muiru,

RE: Effect of Payer Provider Technologies on the Operational Performance of Medical Insurance Providers in Nairobi County, Kenya

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU-masters** research proposal. Your application reference number is **SU-ISERC1922/23.** The approval period is from **7th December 2023 to 6th December 2024.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 72 hours of notification.
iv. Any changes anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-ISERC within 72 hours.
v. Clearance for the export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to the expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days of completion of the study to SU-ISERC.

Before commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) https://research-portal.nacosti.go.ke/ and obtain other clearances needed.

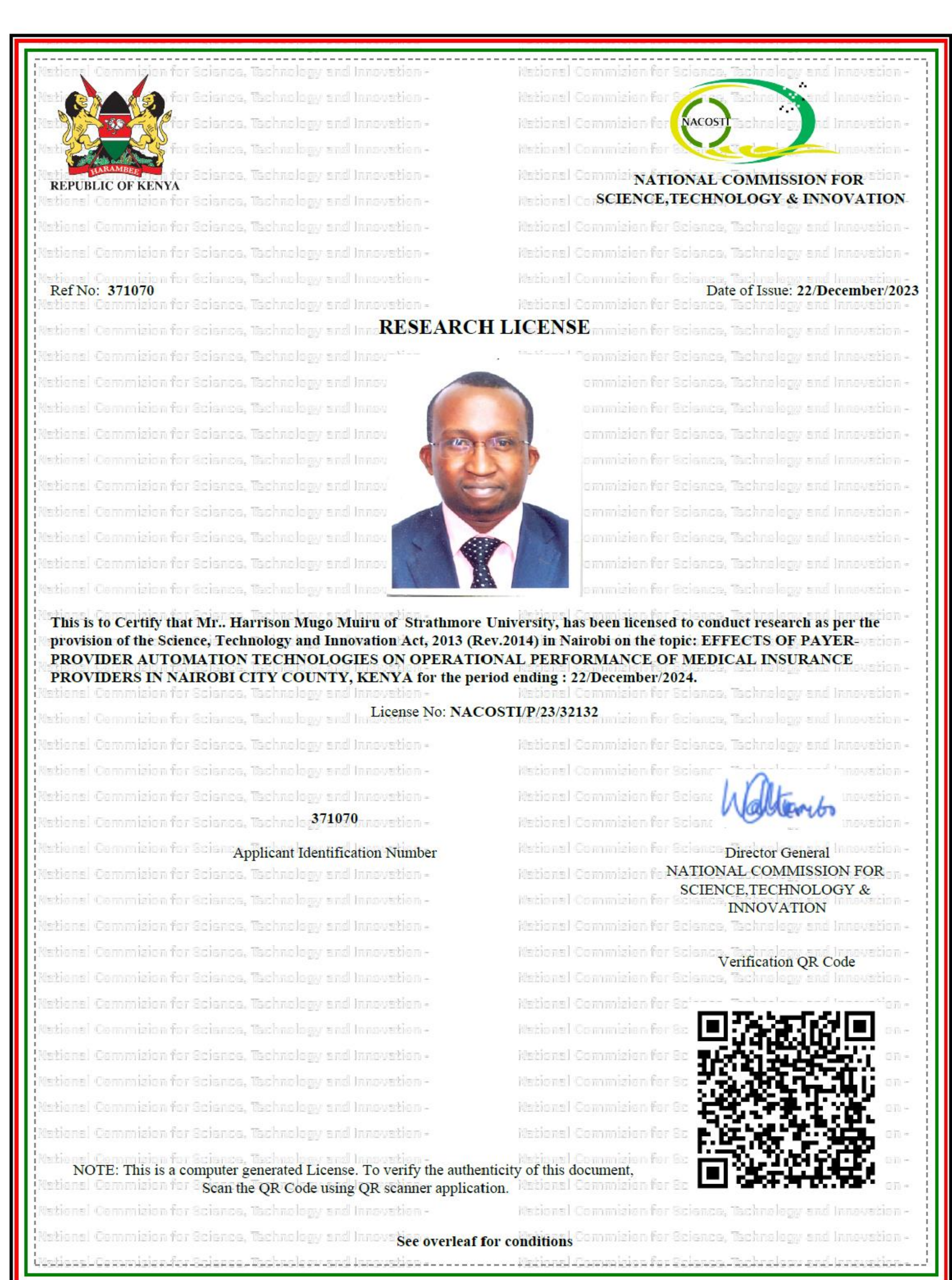
Yours sincerely,

Mr Ambrose Rachier,
Chairperson; SU-ISERC

STRATHMORE UNIVERSITY INSTITUTIONAL SCIENTIFIC AND ETHICAL REVIEW COMMITTEE
(SU-ISERC)
07-Dec-2023
Email:ethicsreview@strathmore.edu
P.O BOX 59857-00200
NAIROBI-KENYA

Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email admissions@strathmore.edu www.strathmore.edu

Appendix F: NACOSTI Research License



REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 371070

Date of Issue: 22/December/2023

RESEARCH LICENSE

This is to Certify that Mr.. Harrison Mugo Muiru of Strathmore University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: EFFECTS OF PAYER-PROVIDER AUTOMATION TECHNOLOGIES ON OPERATIONAL PERFORMANCE OF MEDICAL INSURANCE PROVIDERS IN NAIROBI CITY COUNTY, KENYA for the period ending : 22/December/2024.

License No: NACOSTI/P/23/32132

371070

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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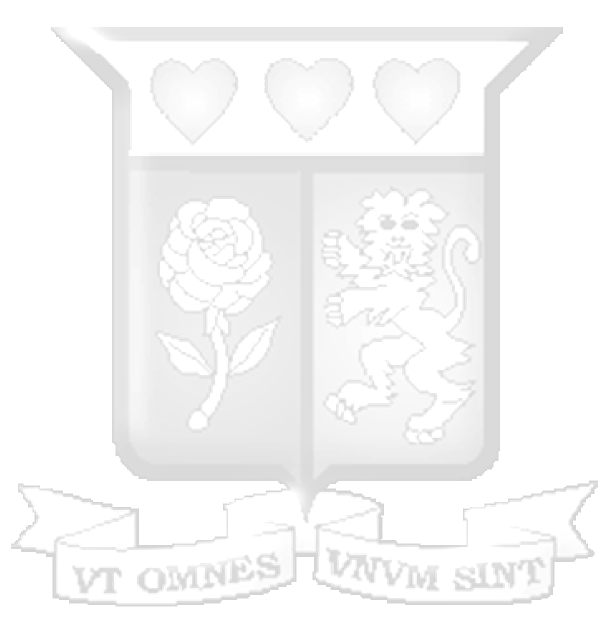
See overleaf for conditions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