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DEVELOPING A DIGITALISATION FRAMEWORK FOR SERVICE DELIVERY IN THE PUBLIC HEALTHCARE SECTOR OF ZIMBABWE: THE MODERATING EFFECT OF ORGANISATIONAL CULTURE

By

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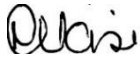
Signature:  **Date: 14 February, 2025**

DECLARATION

I, Mandizvidza Paidamoyo (C13121886O), declare that this PhD study is my own effort and is a true reflection of research executed by me. This research study in full or part thereof has not been submitted for examination for any degree at any other university/institution.

Student Signature  **Date: 14 February, 2025**

DEDICATION

I dedicate this thesis to my incredible family; my parents Idah and the late Wilfred Mandizvidza. To my late father, Dad I hope wherever you are, you are proud of your daughter, you have been my guidance, hope and strength throughout the entire thesis journey. To my sisters Agnes Mukonka Mujuru and Tagoverwa Mandizvidza I appreciate the support till date.

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ABSTRACT

This study sought to establish a digitalisation framework for service delivery in the public healthcare sector of Zimbabwe. The main objective of this study was to develop a Digitalisation framework for service delivery for the sector. The research was a quantitative study approach rooted in the positivism paradigm anchored on descriptive research design. The population of registered public health care staff that are currently employed in Harare Metropolitan Province was 129,164. Rao soft sample size calculator was used to determine the absolute sample size of 384 respondents as drawn from the entire population. Probability sampling method was used in this study to ensure that the sample being studied was representative of the population of interest. Structured questionnaire was used as data collection instrument. The study took a two-pronged approach to achieve the intended results, namely the statistical approach and the framework development approach. Data was analysed using descriptive and inferential statistics using SPSS and AMOS. Structural Equation Modelling (SEM) was used to examine the study hypothesis to come up with a digitilisation practice framework to enhance service delivery in the public healthcare sector. Data was presented in the form of tables, figure and graphs. The results indicate that Ubiquity has a moderate positive effect on service delivery ($\beta = 0.500$, $p < 0.001$), suggesting that broader access to digital tools enhances responsiveness and continuity of care. Reliability also showed a moderate impact ($\beta = 0.517$, $p < 0.001$), and concerns about system downtimes and unstable connectivity disrupting workflows were raised. Skills and Knowledge emerged as the strongest predictor ($\beta = 0.546$, $p < 0.001$), with participants highlighting the importance of digital training and noting that tech-savvy staff navigated systems more effectively. Innovation had a weaker but still significant effect ($\beta = 0.348$, $p < 0.001$), possibly due to limited staff involvement in system development; several respondents expressed frustration over top-down implementation approaches that reduced buy-in. Information Intensity showed the weakest significant impact ($\beta = 0.125$, $p = 0.048$), as some respondents noted persistent manual reporting and delayed system outputs, limiting data-driven decisions. Lastly, Culture had a small yet significant direct effect ($\beta = 0.111$, $p = 0.003$), underlining the role of attitudes, openness to change, and resistance was highlighted and fear of job loss and adherence to old routines were barriers to digital adoption. However, culture as a moderator has a strong and highly significant coefficient ($\beta = 8.227$, $p < 0.001$) highlighting the importance of integrating cultural considerations into digitalisation strategies to maximize their impact on service delivery. The study highlighted that digitalisation plays a pivot role in improving service delivery; it also creates convenience and increases efficiency in patient health management. There is need to invest in technological infrastructures, back-up power solutions and training of the staff so that service delivery is improved. The findings showed that entrenched beliefs and strong attachments to traditional practices and methods of service delivery may hinder the implementation due to resistance to change. The study recommended that the Government of Zimbabwe through the Ministry of Health and Child Care should adopt and implement the Digitilisation Framework Model for service delivery developed by this study as a beacon to achieve NDS 1, SDG 8 and Vision 2030 targets.

Key Words: *Digitalisation, Service Delivery, Ubiquity, Information Intensity, Innovation, Skill, Knowledge, Reliability*

LIST OF ACRONYMS

AI	Artificial Intelligence
AMOS	Analysis of Moment Structures
ANOVA	Analysis of Variance
AVE	Average Extracted Variance
BSC	Balanced Score Card
BTS	Bartlett's Test of Sphericity
CA	Competitive Advantage
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CMB	Common Method Bias
CR	Composite Reliability
CUT	Chinhoyi University of Technology
DisV	Discriminant Validity
eCRM	Electronic customer relationship management
EU	European Union
eHealth	Electronic Health
eHDSI	eHealth Digital Service Infrastructure
GDP	Gross Domestic Product
GFI	Goodness of Fit Index
HCAHPS	Hospital Consumer Assessment of Healthcare Providers and Systems
HIV	Human Immunodeficiency Virus
HTMT	Heterotrait-Monotrait Ratio of Correlations
ILO	International Labour Organisation
KMO	Kaiser-Meyer-Olkin
MDG	Millenium Development Goals
MOHCC	Ministry of Health and Child Care
NDS1	National Development Strategy 1 and Development
RBV	Resource Based View
RCZ	Research Council of Zimbabwe
RMR	Root Mean Square Residual

RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Model
VIF	Variance Inflation Factors

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CHAPTER 1

Introduction

This chapter focuses on the background to the study, statement of the problem, research objectives, questions, hypothesis as well as the study's significance to the academia, policy and practice. The global healthcare landscape is undergoing rapid transformation driven by the integration of digital technologies into service delivery systems. Digitalisation the application of digital tools and technologies to improve existing processes has become a central strategy for enhancing the efficiency, accessibility, and quality of health services (Vial, 2019; Mergel et al., 2019). From electronic health records to telemedicine and health data analytics, digital innovations are reshaping how care is delivered, especially in response to growing demands for patient-centred, cost-effective, and data-driven health systems (Dodgson et al., 2020).

In developing countries such as Zimbabwe, the adoption of digitalisation in public health presents both promising opportunities and complex challenges. While digital tools offer the potential to improve service delivery, reduce inefficiencies, and support evidence-based decision-making, their successful implementation is often constrained by factors such as infrastructure limitations, resistance to change, inadequate training, and misalignment with cultural and organisational norms (Maguire et al., 2020; Mwendwa et al., 2021). These barriers underscore the need for a context-specific understanding of digitalisation one that goes beyond technological capability to include human, organisational, and cultural dynamics.

A growing body of research highlights that digital transformation in public health is not merely a technological shift but a strategic and cultural one. It involves the redesign of workflows, the empowerment of staff, and the creation of agile, adaptive systems that can respond to changing health needs (Westerman & Farr, 2021; Kokkinakos et al., 2019). Moreover, studies show that for digitalisation to produce measurable improvements in service delivery, it must be implemented with attention to both technical infrastructure and the social environment in which healthcare operates (Mergel et al., 2019; Rogers, 2020).

Despite increasing interest in health digitalisation, there remains a gap in the literature regarding how digital technologies are being integrated into Zimbabwe's public healthcare sector, particularly in high-volume, resource-constrained institutions. Most existing frameworks have

been developed in high-income settings and may not fully account for the contextual realities of developing countries (Vial, 2019; Alhassan et al., 2022). This study seeks to address that gap by developing a digitalisation framework specifically tailored to improving service delivery in Zimbabwean public hospitals. By examining how key elements such as ubiquity, reliability, skills and knowledge, innovation, information intensity, and culture interact to shape service outcomes, this research aims to provide practical insights and contribute to both local policy development and the broader academic discourse on digital health transformation.

1.1 Background

Electrical tools have been used for many years, but the Internet and other new technologies created a flood of interesting and innovative ways to provide and enhance customer value. Not only did this challenge the fundamental basics of traditional way of service delivery, but it also helped to shape the practice of modern techniques and improve the delivery of a service. Coupled with the fact that the rate at which change takes place will not slow down, but accelerate, the biggest challenge facing local healthcare practitioners will be to become globally competitive in terms of improving efficiencies (Pretorius, 2016:74).

Maximilian et.al (2021) asserts that the medical services are provided in processes that are subject to the division of labour as well as inter-sector care networks. More so, digital technologies enable need-oriented solutions and the provision of preventative, clinical and rehabilitative services. Yadav, (2020) further highlighted that in these three areas, it becomes evident what impacts forms of treatment, care concepts, the image of the medical profession, and the role of patients: digital health, big data and 3D printing technology. Reddy (2021) supports the same claim and further highlights that new diagnostic and therapeutic approaches are developed with the support of IT management in the context of a “precision medicine” approach.

The advancement of technology has not only created new ways for service delivery but also enabled patients to be consulted and treated in a better efficient way and it also helps the health practitioners to be more thorough and provide more accurate results after consultation. Since digitalisation is still a new and under explored concept in Zimbabwe’s public Kokkinakis healthcare sector, it is the aim of this study to develop a digitalisation framework to enhance service delivery in the public Kokkinakis healthcare sector.

Digitalisation has become a transformative force across various sectors, including healthcare, where it is reshaping how services are planned, delivered, and evaluated. It extends beyond simply converting analogue information into digital formats, it reflects a broader shift in organisational operations, value creation, and service delivery models (Vitale et al., 2020; Knudsen, 2020). In healthcare, this transformation includes the adoption of tools such as electronic health records, telemedicine platforms, mobile health applications, and data-driven decision support systems. These technologies are enabling institutions to improve efficiency, increase access, and enhance the quality of care.

While digitisation represents the foundational step of encoding analogue data into digital form, digitalisation encompasses the strategic and structural reconfiguration of systems and processes to leverage digital capabilities (Schallmo & Williams, 2018; Reis et al., 2020). It is not merely a matter of replacing paper with screens, but rather redesigning workflows, decision-making structures, and service models around digital opportunities. In doing so, digitalisation brings about both operational and cultural changes, requiring institutions to re-evaluate how people, technology, and processes interact within the service environment (Knudsen, 2020).

In the context of developing countries like Zimbabwe, digitalisation in the public Kokkinakis healthcare sector presents both opportunities and challenges. On one hand, it offers a chance to overcome longstanding issues such as inefficiency, limited access to specialist care, and poor data quality. On the other, its implementation is often hindered by infrastructure constraints, skills shortages, and resistance to change. These sociotechnical barriers underscore the importance of understanding how digitalisation interacts with organisational culture, staff capabilities, and policy environments elements that are central to the success or failure of digital initiatives (Vitale et al., 2020).

This study builds on these insights by exploring the role of digitalisation in enhancing service delivery in Zimbabwe's public healthcare system. It focuses on how key digital enablers such as ubiquity, reliability, innovation, skills and knowledge, and information intensity interact with organisational culture to influence performance outcomes. In doing so, the study aims to develop a framework that reflects the realities of Zimbabwe's health institutions and contributes to both

practice and policy development in the era of digital transformation. In today's rapidly evolving digital landscape, transforming health service delivery has become an important agenda for governments around the world. Integrating new technologies and disruptive models have enabled public management bodies to efficiently manage a wide range of governance, from transportation and public services to urban security and health control. This transformative process is driven by political, economic, cultural, and social dimensions as well as spatial planning considerations. Digital technologies and advances in artificial intelligence are at the forefront of this ongoing transformation. This shift towards Digitalisation aims to improve public service delivery by harnessing the power of technology, data, and connectivity. By embracing Digitalisation, health institutions can simplify and automate processes, improve efficiency and effectiveness, and enhance the overall patience experience. Digitalisation programs in the public Kokkinakis healthcare sector cover a diverse array of operations with the goal of enhancing service delivery, efficiency, and design to attain transparency and patient's satisfaction (Teixeira, A.F.; Alves & Matos, 2020.). To achieve successful Digitalisation initiatives, health institutions must adopt new ways of working with stakeholders, implement new service delivery practices, and create effective strategies to engage with the market (Meshu, T. and Rao, S.R. 2016; Orfing, J.; Ferlie, E.; Jukić, T.; Ongaro, E, 2021).

While digitalisation in the public healthcare sector promises many benefits, it is important to consider the potential drawbacks and challenges that may arise. One of the main concerns is the potential for opening the door to conflicting opinions, differing priorities, and potential power struggles. In addition, reliance on digital technologies can raise concerns about privacy and security. When health institutions collect and store large amounts of patients' data, there is an increased risk of data breaches and unauthorized access. Protecting patients' personal information is an important responsibility for health institutions. In addition, the development of digital technologies and advancements in artificial intelligence have brought about significant transformations in contemporary society (Josefsson, K.A.; Krettek, A, 2021). These transformations have also impacted the public healthcare sector, leading to the integration of digital technologies into health administration. This shift towards Digitalisation in the public healthcare sector can enable a more patient-centric approach to service delivery. It can improve

efficiency by implementing digital services and reorganizing workflows (Halsbenning, S.; Niemann, M.; Distel, B.; Becker, J, 2021).

The ever-increasing need for the application and use of digital technologies in the public healthcare sector requires officials to have appropriate Digitalisation competencies. This includes effectively utilizing digital tools, navigating digital platforms, and understanding data analytics. In addition, officials must also be equipped with the necessary skills and knowledge to effectively engage patients in the digital landscape. This includes understanding how to communicate and interact with patients through various digital channels and addressing their needs and concerns (Horobets, O, 2020; Kim, J.H and Eom, S.-J, 2019; Purnomo, M.A, 2021). However, the public healthcare sector needs help to implement Digitalisation initiatives in their health institutions. Although many e-projects have been initiated, many still need to evolve beyond simply creating a web presence. This reflects the difficulty in recreating these institutions and resources to embrace digital transformation. To overcome these challenges, a neutral stance towards Digitalisation must be maintained, acknowledging its potential benefits and risks (Josefsson, K.A.; Krettek, A, 2021).

Digitalisation in the public sector in general and public healthcare sector in particular has become a focal point for governments around the world. Integrating digital technologies and reforming processes have been identified as critical to improving public service delivery and governance (Alvarenga, et.al, 2020). The Digitalisation literature has provided insights into the correlation between digital transformation and knowledge management in the public sector (Alvarenga, et.al, 2020). This highlights the importance of understanding how knowledge management impacts Digitalisation within health organisations. In addition, there is a growing emphasis on integrating artificial intelligence (AI) in health services to facilitate efficient and intelligent service delivery (Androniceanu, A, 2023). This underscores the importance of utilizing advanced technologies to drive digitalisation and improve the overall effectiveness of the public healthcare sector operations. The impact of digitalisation on urban cities has also been studied, which revealed that digital maturity is influenced by the size of the city's population (Debeljak, A and Dečman, M.2022). This highlights the need for a customized approach to digital transformation based on the specific characteristics and requirements of different institutions.

The digitalisation of the public Androniki healthcare sector presents various challenges that must be overcome to ensure successful implementation. These encompass building skills and knowledge, ensuring reliability of technological infrastructure, making the new technologies ubiquitous, continuous engagement in innovation, and managing information intensity in service delivery. Alvarenga, et.al, (2020) stressed the need for comprehending the influence of digital transformation in the public sector and its connection with knowledge management. They underscored the intricate nature of this process. In addition, Saxena, D, Muzellec, L, and McDonagh, J. (2022) provide a comprehensive analysis of the digital transformation of public services, specifically emphasizing the importance of reliability of technological infrastructure in order to effectively tackle the obstacles associated with digitizing the public Mozelle healthcare sector. Saxena, D, Muzellec, L, and McDonagh, J. (2022) and Aminah, S, Saksono, H. (2021) also underscore the challenges for health institutions to fully utilize technology to improve health services and administration, reflecting the practical hurdles in digital transformation (Aminah, S and Saksono, H, 2021).

In addition, digitalisation in health service delivery involves continuous innovation, as discussed by Filgueiras, F, Flávio, C and Palotti, P, (2019) who highlight the process of innovation in health organisations as an important aspect of digital transformation Filgueiras, F, Flávio, C and Palotti, P, 2019; Yukhno, A, 2024) explore big data or information intensity in health administration, highlighting the challenges and complexities associated with the management and governance of big data in the heath sector, which is critical for digitalisation (Yukhno, A, 2024). Furthermore, Henman, P, (2020) outlines the challenges of applying AI in public administration, including issues related to accuracy, bias, legality, responsibility, and power, emphasizing the multifaceted challenges of integrating advanced technologies in the public Yukino healthcare sector (Henman, P, 2020). While digitalisation in the public Yukino healthcare sector is often touted as a solution to improve service delivery and governance, it is important to consider some of the problematic imbalances. Several gaps suggest that the implementation of digitisation initiatives in the public Yukino healthcare sector may pose its own challenges and risks. One of the main concerns raised is the potential for digital transformation to widen existing digital divides. While advanced technologies have the potential to improve public services, they can also exclude certain segments of the population that do not have access to or are not proficient in using digital platforms. This raises questions about equity and inclusiveness in health service delivery. Skeptics of digitalisation

in the public Yukino healthcare sector warn of the potential loss of the human touch and personalized interactions with patients. Reliance on digital channels for communication and service delivery can lead to a decrease in empathy and understanding of individual needs, which are often better addressed through human interaction. In line with other challenges, the integration of artificial intelligence in health services has sparked concerns about privacy, data security and ethical implications of using AI algorithms in decision-making processes. Critics argue that the use of AI in public administration can lead to biased outcomes and potentially reinforce existing social inequalities. Based on such inequalities, it is important to approach digitilisation in the public Yukino healthcare sector with a critical mindset and consider the potential drawbacks and unintended consequences that may accompany the pursuit of technological advancement. Balancing the promise of digitilisation with the need to address its challenges and potential negative impacts is critical to ensure proper and inclusive implementation in the public Yukino healthcare sector.

This research aims to explore the benefits of Digitalisation in service delivery and provide a comprehensive review of Digitalisation initiatives to understand their impact on improving efficiency and effectiveness in health service delivery. This research is critical as it highlights the current state of Digitalisation in the public Yukino healthcare sector and provides insights into the potential benefits, challenges and required competencies. Digitalisation initiatives in health service delivery have the potential to revolutionize the way health institutions interact with patients and improve their access to services. However, it is crucial to carefully consider ethical and privacy issues, as well as the potential for bias or exclusion in the application of these new technologies.

According to ISO (11615:2012), the European Union (EU) introduced eHealth Digital Service Infrastructure (eHDSI) as a facility for ensuring the continuity of care for European citizens while travelling abroad within the EU. This gave EU countries the possibility to exchange health data in a secure, efficient and interoperable way. Citizens can easily recognise the availability of the services under the brand “MyHealth @ EU” and can easily check their medical records at any facility within any EU country.

Further, Doctors Without Borders/Médecins Sans Frontières (MSF) a movement founded in the US has successfully tested 3-D printing and virtual reality technology to design hospitals that better meet the needs of patients.

According to their US office, Elvina Motard, MSF technical team leader, worked with expert consultants to take existing plans for a hospital MSF built in Cantahay, the Philippines, following devastating Typhoon Haiyan in 2013, and made them digital. They then 3-D printed the facility and developed a virtual reality experience in a game engine that generates a virtual world. In this world, the user can navigate through the centre using a virtual reality headset and a game pad. Such technologies can undoubtedly make discussions more efficient, more vivid and more graphic," and they can allow people to really see themselves inside future hospital and this can improve hospital design as well as training and briefings.

Diverse authors who have explored the impact of digitalisation on the healthcare concur that the concept has allowed businesses to attain their set objectives such as improving service efficiency, enhancing patient safety, reducing operational costs, and enabling data-driven decision-making. Digitilisation has had a profound impact on healthcare, transforming both business models and service delivery. Authors like Osterwalder and Pigneur (2019) emphasize that digital technologies enable the creation of new healthcare models, such as telemedicine and digital health platforms, making healthcare more accessible and efficient. These innovations streamline care delivery, offering patients greater flexibility in consultations and health monitoring. Similarly, research by Westerman et al. (2020) highlights the role of technology in breaking down geographical barriers to healthcare access, improving both patient experience and clinical outcomes.

A significant shift driven by digitalisation is towards personalized healthcare. The integration of AI, big data analytics, and wearable devices allows for more individualized treatment plans based on real-time patient data. This approach ensures more effective care compared to the traditional, generalized methods and results in improved outcomes (Osterwalder & Pigneur, 2019; Hwang et al., 2021). As digital tools become more advanced, the customization of care is expected to increase, leading to better patient satisfaction and efficiency in treatment.

Patient engagement is another area where digitalisation plays a crucial role. According to Li et al. (2022), digital health tools such as mobile apps, wearables, and patient portals empower individuals to take charge of their health. By allowing patients to track their conditions and access

relevant health information, these tools promote proactive health management and reduce the need for emergency care, ultimately lowering healthcare costs (Hwang et al., 2021). The increased patient involvement in their care also leads to better long-term health outcomes.

In terms of efficiency and cost reduction, digitalisation helps optimize administrative processes such as patient scheduling, record-keeping, and billing. Automation of these tasks allows healthcare providers to reduce costs, free up resources, and focus more on patient care. According to Westerman et al. (2020), these improvements enhance the overall functioning of healthcare systems, allowing for better resource allocation and more streamlined service delivery.

Moreover, digitalisation fosters data-driven decision-making in healthcare. With access to big data and advanced analytics, healthcare providers can make informed decisions about treatment protocols, resource management, and patient care strategies. This approach not only improves patient outcomes but also enhances hospital operations and predicts future healthcare trends (Hwang et al., 2021). This shift towards data-centric healthcare systems has been further validated by recent studies, showing a positive correlation between data-driven approaches and improved clinical performance.

While the benefits of digitalisation are vast, it also presents several challenges. Issues like data privacy, cybersecurity risks, and the need for robust digital infrastructure are critical concerns.

According to Li et al. (2022), managing these risks is essential for ensuring the safe and effective implementation of digital solutions in healthcare. As healthcare systems become increasingly reliant on digital tools, addressing these concerns will be crucial for protecting sensitive patient information and ensuring equitable access to digital health solutions.

In conclusion, digitalisation offers tremendous opportunities to improve healthcare through new business models, personalized care, and increased efficiency. However, it is essential for healthcare providers and policymakers to address the associated risks and challenges to ensure that digital transformation leads to sustainable, patient-centered healthcare systems (Osterwalder & Pigneur, 2019; Westerman et al., 2020; Hwang et al., 2021).

In another study, Zeng and Gerritsen, (2019) explored the impact of digitalisation on the public Canta hay healthcare sector and how it impacts service delivery in Portugal. The findings of the

study revealed that the adoption and use of digital technology have positive impact on service delivery and improves the patients' and healthcare practitioners' well-being.

However, coming to developing countries, Zimbabwe's neighbors Kenya, South Africa, Tanzania and Malawi have been doing well in terms of adopting technology in the healthcare facilities. The Medical Research Organisation has recently released the 2021 African Hospital Facility Rankings. According to them, the results were based on research output, technology adoption, innovation, and overall societal impact. The report highlighted the performance and quality of hospitals across Africa. In addition, it brought out factors such as patient safety, quality of care, infrastructure, and staff qualifications. The report aimed to identify leading hospitals and promote best practices in the public Canta hay healthcare sector. Ebatamehi, (2021), asserts that apart from structures and equipment, a good healthcare system should have adequate professionals and support personnel to handle emergencies and reduce casualties (Miazi et,al 2019). Zimbabwe, despite having neighbors who are adopting digital healthcare systems is still lagging by a big margin (World Health Organisation, 2021).

However, there is lack of empirical literature regarding developing a digitalisation framework for service delivery in the public Maize healthcare sector of Zimbabwe. There is need for an empirical study to close this literature gap.

1.2 Statement of the problem

The public healthcare sector of Zimbabwe currently faces several problems that hinder the effective implementation of digitalisation for service delivery. According to Manyika et al. (2019), the absence of a centralized digital health information system hinders data collection, analysis, and sharing, leading to inefficiencies in patient care and monitoring. Chirisa et al. (2020) investigated the state of health information systems in Zimbabwe. The findings indicated that only 30 percent of healthcare facilities had a functional digital health information system, causing delays in accessing patient records and hindering effective service delivery. Further, a research report by the Zimbabwean Ministry of Health and Child Care (2021) highlighted the inadequate funding allocated to digital health initiatives. Insufficient financial support resulted in the inability to establish and maintain necessary infrastructure required for successful Digitalisation. Despite recognizing the importance of Digitalisation in the public Charisa healthcare sector, previous

efforts to address the challenges have not yielded positive results. Despite recognising the importance of digitalisation in the public Charisa healthcare sector, previous efforts to address its challenges have not yielded the desired outcomes. Several national and institutional-level initiatives have been introduced such as the development of Zimbabwe's National eHealth Strategy (2016–2020), the introduction of electronic health record (EHR) pilots in central hospitals, and donor-supported projects focusing on mobile health (mHealth) and health information systems. These efforts were intended to improve data management, support real-time decision-making, and increase access to care. Moreso, several initiatives were implemented, such as training programs for healthcare professionals on digital tools usage but were often sporadic and lacked continuity. Eighty-five percent of health facilities have paper-based systems which keep manual records and these are prone to loss, damage, and difficulty in retrieval, hindering patient follow-up, treatment history, and accurate disease surveillance. (Mutale et al. (2011). According to Mutingwende, (2021), there is limited data sharing between health facilities which makes it difficult to share patient information seamlessly, hindering referrals, consultations, and continuity of care. Mukumba, (2022), further articulated that the manual Inventory management systems lack real-time data on stock levels, leading to overstocking, understocking, and expired medications, impacting patient access to essential drugs. However, Digitalisation can help ease these burdens, reduce costs, and promote improved data management and record keeping, enhanced efficiency and resource management and not limited to increased access to healthcare information and education (Casprini & Palumbo, 2022). By harnessing the potential of digitalisation, Zimbabwe's public Caprine healthcare sector can move towards a more efficient, equitable, and patient-centred system, addressing critical challenges and improving health outcomes for its citizens. This gap in knowledge makes this study unique and imperative as it seeks to contribute to the existing marketing literature through developing a digitalisation framework for service delivery in the public Caprine healthcare sector of Zimbabwe.

1.3 Research Aim

The main objective of this study is to develop a digitalisation framework for service delivery in the public Caprine healthcare sector of Zimbabwe.

1.3.1 Specific Objectives

i. To determine the effects ubiquity of digital technologies on service delivery
ii. To examine the influence of reliability of digital technologies on service delivery.
iii. To establish the effects of skills/knowledge of digital technologies on service delivery.
iv. To establish the impact of innovation on service delivery.
v. To determine the effects of information intensity on service delivery.
vi. To assess the moderating effect of culture on the relationship between Digitalisation and service delivery.
vii. To develop a digitalisation model for the enhancement of service delivery in the Zimbabwean Public Caprine healthcare sector.

1.3.2 Research Questions

i. What are the effects of ubiquity of digital technologies on service delivery?
ii. What is the influence of reliability of digital technologies on service delivery?
iii. How do skills/ knowledge affect digital technologies on service delivery?
iv. How does innovation impact service delivery?
v. What are the effects of information intensity on service delivery?
vi Does culture moderate the relationship between Digitalisation and service delivery?

1.3.3 Research Hypotheses

The study shall be underpinned by the following hypotheses

H_1 Ubiquity of digital technologies has a positive effect on service delivery.
H_2 Reliability has a positive influence on service delivery.
H_3 Skills/knowledge have a positive effect on service delivery.
H_4 Innovation has a positive impact on service delivery.
H_5 Information intensity has a positive effect on service delivery.
H_6 Culture has a moderating effect on the relationship between Digitalisation and service delivery.

1.4 Significance of the study

This study has several benefits to several stakeholders, especially the researcher, the University and industry players.

To Policy

From a policy perspective, the study offers evidence-based insights that are crucial for the design and refinement of national digital health strategies. The findings align with and can inform key policy agendas such as Zimbabwe's Vision 2030, the National Development Strategy (NDS1), and the National eHealth Strategy. By identifying core digitalisation drivers such as ubiquity, reliability, skills and knowledge, innovation, and information intensity and examining how these interact with cultural dynamics, the study equips policymakers with a framework that reflects both technological and human factors. The results also highlight the need for policies that not only fund infrastructure but also prioritize digital literacy, system integration, and culturally sensitive implementation strategies. This can help bridge the gap between high-level digital health objectives and the on-the-ground realities in public hospitals.

To Academia

Academically, this study contributes to filling a significant gap in the literature concerning digitalisation in the public Caprine public healthcare sectors of developing countries, particularly within the African context. While much of the global literature on digitalisation is dominated by high-income settings, this study offers fresh insights grounded in a developing country perspective, thus adding both theoretical and practical value. The research extends existing theories such as the Technology Acceptance Model (TAM) and the Resource-Based View (RBV) by empirically testing a model that incorporates culture as a moderating variable an area that has been relatively underexplored. The use of a quantitative approach also strengthens the academic rigour of the study, providing both statistical validation and depth. This methodological design and its findings offer a rich foundation for future research, particularly for scholars interested in digital health systems, public service innovation, and organisational behaviour in healthcare. The research also contributed to the body of knowledge through publication of research articles.

To Practice

In terms of practice, the study has direct implications for healthcare managers, practitioners, and IT personnel working in Zimbabwe's public hospitals and similar low-resource settings. The developed digitalisation framework provides a practical tool for assessing institutional readiness, prioritising digital interventions, and managing the change process. It also draws attention to barriers that often hinder digital health implementation, such as resistance to change, lack of training, and inadequate system reliability. By incorporating these realities into the framework, the study empowers practitioners to make informed decisions about system design, user engagement, and capacity-building initiatives. The inclusion of culture as a moderating factor is especially relevant to practice, as it emphasizes the need for healthcare systems to align technology implementation with organisational values, staff attitudes, and patient expectations.

1.5 Study Delimitations

1.5.1 Geographical delimitation

This study was delimited to the Central hospitals (Parirenyatwa Group of Hospital and Sally Mugabe) that are in the capital city of Zimbabwe, that is Harare. This is where the major hub for healthcare practitioners and all major decisions relatively to the industry are made here. All these issues therefore justify why the study should be performed in Harare. Harare serves as a critical hub for public Caprine healthcare sector research due to its multifaceted healthcare system and ongoing public health challenges. The city has been a focal point for addressing issues like HIV/AIDS, malaria, and the rise of non-communicable diseases, reflecting broader regional trends (UNICEF, 2021). Furthermore, Harare's health initiatives, supported by institutions like the University of Zimbabwe and global partnerships, have fostered innovation and research opportunities (World Bank, 2022). These factors position Harare as a valuable site for impactful, localized public Caprine healthcare sector studies

1.5.2 Research participant delimitation

The study drawn data from doctors, nurses, health administrators in the above-mentioned healthcare facilities as well the Ministry officials in Harare. These respondents are believed to possess information regarding different forms of digital techniques their institutions use or that are used and the impact they have on service delivery.

1.5.3 Data time delimitation

The study covered the period from 2019 to 2024; this period is assumed to provide data sufficient enough to examine the improving service delivery in the public healthcare sector in Zimbabwe. Also, this period has seen a significant increase in usage of the internet and digital techniques hence is deemed to be the relevant time the study should cover.

1.5.4 Sectoral Scope

The research examines the public healthcare sector. In the public sector, the study investigated the two main Central Hospitals in Harare which are referral and secondary care institutions.

1.5.5 Temporal Scope

The study considered data and case studies from the past decade (2019-2024) to ensure relevance and accuracy. This period captures significant developments in digital technology and provides a contemporary understanding of how it enhances service delivery in Zimbabwe. Historical context will be provided where necessary to highlight the evolution of the issues.

1.5.6 Methodological Scope

A quantitative research approach was employed to provide a comprehensive understanding of the current state of digitalisation in the public health sector. Data was collected through structured questionnaires administered to healthcare professionals, administrators, and relevant personnel across selected public hospitals. This method enabled the researcher to quantify perceptions, assess patterns, and statistically analyse the relationships between key digitalisation variables and service delivery outcomes. Additionally, existing institutional records were reviewed to support and contextualise the study findings.

1.6 DEFINITION OF KEY TERMS

1.6.1 Digitilisation

This refers to the utilization of digital technologies to optimize healthcare processes, workflows, and patient interactions, such as automating appointment scheduling or improving diagnostic accuracy. For instance, it enhances specific operational processes in healthcare by introducing automation, improving efficiency, and reducing manual errors (e.g., EHR integration across departments), (McKinsey, 2023).

1.6.2 Service Delivery

Service delivery is the method through which services are provided to customers, emphasizing efficiency, quality, and customer satisfaction. The use of digital tools, such as chatbots and automated customer support systems, has reshaped service delivery, especially in sectors like healthcare, e-commerce, and customer service (McKinsey & Company, 2020).

1.6.3 Framework

A framework is a systematic structure used to guide actions, decisions, or processes within an organisation. In the context of digital transformation, frameworks such as the TOGAF (The Open Group Architecture Framework) help organisations implement technological changes and ensure alignment with business strategies (Gartner, 2021).

1.6.4 Innovation

Innovation refers to the development and implementation of new ideas, technologies, or methodologies that create value for an organisation or industry. Over the past few years, the demand for innovation in sectors like healthcare, e-commerce, and remote work solutions has been driven by digital advancements, with businesses striving to adapt to rapidly changing market conditions (World Economic Forum, 2020).

1.6.5 Ubiquity

Ubiquity in digital services refers to the ability for users to access services at any time, from any location, facilitated by technologies such as 5G networks and cloud computing. The expansion of digital infrastructure has made ubiquitous access a standard expectation for consumers and businesses alike (Ericsson, 2023).

1.6.6 Reliability

Reliability refers to the ability of a system or service to consistently perform as expected with minimal interruptions. As digital services have become essential in daily life, ensuring their reliability has become a priority for organisations, focusing on robust cybersecurity measures and fault-tolerant systems (IBM, 2022).

1.6.7 Skill

Skill refers to the expertise required to effectively perform tasks, particularly in a rapidly changing technological landscape. With the growing demand for digital skills, including coding, data analytics, and cybersecurity, organisations and educational institutions have prioritized upskilling

and reskilling to address the workforce needs of the digital economy (World Economic Forum, 2020).

1.6.8 Information Intensity

Information intensity describes the degree to which an activity, product, or service relies on information. In many modern industries, especially in healthcare and finance, high information intensity is essential for making data-driven decisions and optimizing operational efficiency (Forbes Insights, 2021).

1.6.9 Culture

Culture within an organisation refers to its collective values, norms, and behaviors that guide how work is approached and how employees interact. As organisations undergo digital transformation, cultivating a culture that values innovation, agility, and continuous learning has become crucial for adapting to technological change (Deloitte, 2020).

1.7 Thesis Structure

Chapter One Introduces the study and outlines research objectives, questions and hypotheses, justification, delimitations and definition of key terms. Chapter 2 reviews Literature and presents the conceptual framework and how each variable contributes to both digitisation and service delivery. Chapter 3 presents the Research methodology and it tackles the research philosophy, design, methods, population sampling method used, methodology used to gather data, sources of data, research instruments, research procedure, validity and reliability, ethical considerations, and data analysis and presentation. Chapter 4 presents Results and discussion while Chapter 5 presents Conclusions and implications

1.7.1 Chapter 1: Introduction

The first chapter serves as an introduction to the research topic, laying the groundwork for the entire study. It begins by providing a comprehensive background to the study, which contextualizes the research within the broader scope of technological advancements and their implications for governance and organisational management in Zimbabwe. The background section highlights the current state of technology adoption in Zimbabwe, emphasizing the limited access of digital technologies in the public sector. The chapter exposes the problem, sets out the aim of the study, and provides a background of the study, research questions and objectives and

the importance of the study, delimitations, limitations, definition of key term and lastly chapter summary.

1.7.2 Chapter 2: Literature Review

This chapter provides a description of the different studies that have been carried out regarding the developing a digitalisation framework for service delivery in the public Caprine healthcare sector of Zimbabwe and the theoretical background of the study.

1.7.3 Chapter 3: Research Methodology

This chapter describes the research methodology and procedures adopted in this study. It will provide the source of information and instruments used to collect data. Lastly, it outlines the statistical techniques used for interpreting the collected data of the study**.**

The chapter begins by justifying why the researcher found the quantitative approach appropriate. It allowed for the measurement of relationships between digitalisation factors and service delivery using statistical tools. This method also enabled objective, generalisable insights across a broad respondent base in the public health sector. The quantitative component involved a structured questionnaire, which is distributed to a larger sample of respondents across the Central Hospitals. The questionnaire uses a Likert scale to assess respondents' perceptions and accessibility of digital technology, their readiness for its adoption, and their expectations regarding its impact on service delivery.

The chapter then details the sampling technique used to select participants of the study and a stratified random sampling technique was employed to ensure a representative sample of the population. Data collection procedures are then described, followed by a discussion of the data analysis methods. The quantitative data from the questionnaire was analysed using statistical tools, including descriptive statistics and inferential analysis, to explore correlations and draw conclusions about the research questions.

The chapter concludes with a discussion on the ethical considerations of the study, including issues of confidentiality, informed consent, and the potential risks to participants. This section ensures

that the research is conducted in a manner that is both ethical and respectful of the participants' rights.

1.7.4 Chapter 4: Data Presentation, Analysis, and Discussion

Chapter four presents the findings of the study, from quantitative data collection methods. The chapter is structured to provide a clear and logical presentation of the data, followed by a detailed analysis and discussion of the findings in relation to the research questions and objectives.

The data are presented using tables, charts, and graphs to provide a clear visual representation of the respondents' perceptions of digital technology. The analysis includes descriptive statistics, such as mean scores and standard deviations, as well as inferential statistics to explore relationships between variables.

The chapter concludes with a discussion that integrates the quantitative findings, providing a comprehensive analysis of the research questions. This discussion highlights the key insights gained from the study, as well as the implications for policy and practice in Zimbabwe. The findings are also discussed in relation to the broader theoretical framework, with reflections on how the study contributes to the existing body of knowledge on digitilisation and service delivery.

1.7.5 Chapter 5: Conclusion and Recommendations

The final chapter of the thesis provides a summary of the key findings and discusses their implications for the future of digitilisation and use AI in Zimbabwe. The chapter begins with a brief recap of the research objectives and questions, followed by a summary of the findings from the previous chapters.

The chapter then offers recommendations for policymakers, organisational leaders, and other stakeholders on how to approach the adoption of digital technology in Zimbabwe. These recommendations are based on the findings of the study and are designed to address the challenges and barriers identified in the research.

The study recommends that providers should prioritize investments in robust digital infrastructure, including telemedicine platforms, EHR systems, and AI technologies, to ensure ubiquity and reliability in service delivery. This will enhance patient access and the overall effectiveness of

care. The chapter also discusses the contributions of the study to the academic literature and practical knowledge on digital technology.

Finally, the chapter concludes with suggestions for future research, identifying areas where future research could explore the role of emerging digital technologies, such as blockchain, robotic surgery, or virtual reality (VR) for training and patient engagement. These technologies are gaining traction in healthcare, and their long-term effects on service delivery, cost, and patient outcomes remain underexplored.

1.8 Chapter Summary

The introductory chapter focused on the background to the study that gave way to the development of the statement of the problem. The conceptual framework has been outlined as it led to the formulation of research objectives and research questions. The current research has been justified on the basis of its theoretical, practical and methodological contributions that are meant to make immense contributions to the body of knowledge on digitilisation and service delivery. In this section of the report assumptions of the study, delimitations and limitations of the study were also outlined. The following chapter will critically review related literature on developing a digitalisation framework for service delivery in the public Caprine healthcare sector of Zimbabwe

Chapter 2

Literature Review

2 Introduction

This chapter reviews literature on the study variables, namely ubiquity, reliability, skills and knowledge, innovation, and information intensity. Literature on ubiquity encompasses definitions from various authors, construct, key aspects, outcomes and measurement within the public Caprine healthcare sector. Reliability covers its definition, as a construct, its challenges and concerns, how it is measured and satisfaction in the public Caprine healthcare sector. Sill/knowledge touches on its definition, as a construct, technology adoption and patient experience in the public Caprine healthcare sector. Innovation covers its definition, as a construct, determinants, consequences, models, how it is measured and loyalty in the public Caprine healthcare sector. Information intensity covers definition, challenges and barriers and its impact on patients' satisfaction in the public Caprine healthcare sector. At the end there is implications of literature to the research and chapter summary.

The latest breakthroughs in digital technologies such as mobile computing, artificial intelligence, cloud services, data analytics, 3D printing, and block chain are altering the methods in which enterprises generate value, provide value, and capture value respectively. The utilization of these digital technologies not only presents opportunities for adaptability and the development of new products and services, but it also presents challenges, such as the requirement to quickly respond to shifting client preferences and the pressure to achieve sustainability in business operations. Both of these challenges are presented as a result of the utilization of these digital technologies (Rachinger et al., 2019). These waves of technological advancement have not bypassed the public sector, just like they have not bypassed any other part of the economy (Andersson & Mattsson, 2020; Kokkinakos et al., 2019; Larsson & Teigland, 2019). This research relates to digitalisation and service delivery in the public Rac hinger healthcare sector of Zimbabwe. This chapter will be guided by objectives of the study.

2.1 Concept of Digitilisation

Digitalisation in healthcare refers to the integration of digital technologies into all areas of healthcare systems, ranging from administrative operations to clinical practices. This process has rapidly accelerated in the past few years, especially during and after the COVID-19 pandemic. The past years have witnessed a transformative shift in healthcare, driven by advancements in electronic health records (EHR), telemedicine, artificial intelligence (AI), big data analytics, and mobile health applications. This review explores the major trends, challenges, and impacts of Digitalisation in healthcare during this period, highlighting the intersection of technology, policy, and patient outcomes.

One of the most significant developments in the public Rac hinger healthcare sector has been the widespread adoption of telemedicine. Prior to the pandemic, telemedicine existed but was often limited by regulatory constraints and a lack of infrastructure. However, COVID-19 necessitated a shift toward remote healthcare, and this trend has persisted post-pandemic. According to a study by Wootton (2020), the pandemic led to a rapid expansion of telemedicine services, with significant increases in virtual consultations across various specialties, including mental health, primary care, and chronic disease management.

Schwamm et al. (2021) discuss how the regulatory environment in many countries adapted to the surge in telemedicine use. For instance, in the U.S., the Centres for Medicare and Medicaid Services (CMS) expanded reimbursement policies for telemedicine visits, encouraging more widespread adoption. Williams et al. (2023) found that both healthcare providers and patients had mixed initial reactions to telemedicine. However, by 2024, studies indicated that both groups appreciated its convenience and accessibility, with virtual consultations becoming a staple in patient care, especially for follow-up visits and non-urgent conditions. The integration of Electronic Health Records (EHR) has been a cornerstone of digital healthcare. While EHR adoption increased significantly prior to 2019, the subsequent years have seen efforts to improve data interoperability and data-sharing across different platforms and institutions.

EHR Adoption and Challenges: According to Häyrinen et al. (2020), the global adoption of EHR systems surged, particularly in low- and middle-income countries, though challenges related to data privacy, system integration, and user training persist. Buntin et al. (2020) highlight that despite widespread adoption, many healthcare systems still face barriers to full interoperability between different EHR platforms. This leads to fragmented data and inefficiencies in patient care, as health information cannot always be easily shared between providers. Tschandl et al. (2023) report that emerging standards and technologies, such as HL7 FHIR (Fast Healthcare Interoperability Resources), have improved data exchange, enhancing patient care coordination. Moreover, AI and machine learning algorithms are increasingly being applied to EHR data to enhance clinical decision-making.

The application of artificial intelligence (AI) and machine learning (ML) has been one of the most transformative aspects of Digitalisation in healthcare in recent years. AI-powered systems are being utilized for everything from diagnostics to personalized medicine. In a study by Rajpurkar et al. (2021), AI systems were found to be as accurate as human physicians in diagnosing diseases such as pneumonia and certain types of cancer. AI-powered tools have become routine in radiology and pathology, providing more accurate and timely diagnoses, reducing human error, and assisting in decision-making. Reddy et al. (2022) discuss the role of AI in predicting patient outcomes, such as the likelihood of complications during surgery or the progression of chronic conditions like diabetes. These predictive tools have shown promise in improving patient outcomes and reducing healthcare costs by enabling earlier interventions. Hinton et al. (2024) highlight the growing use of AI and genomics to provide personalized treatments based on individual genetic profiles. This has led to the development of targeted therapies for cancer, genetic disorders, and rare diseases, promising more effective and less invasive treatments.

The explosion of digital data in healthcare, from patient records to clinical research data, has enabled the rise of big data analytics. These technologies allow healthcare providers to identify trends, improve outcomes, and manage populations more effectively. Shah et al. (2023) explore how big data analytics have been leveraged to improve clinical decision-making. By analyzing vast amounts of patient data, healthcare organisations can identify risk factors, optimize treatment plans, and predict disease outbreaks.

Population Health and Epidemiology: The COVID-19 pandemic accelerated the use of big data for population health management. According to Vega et al. (2021), big data analytics played a crucial role in tracking disease spread, identifying high-risk populations, and predicting healthcare resource needs. While big data has the potential to improve healthcare delivery, Osterweil et al. (2022) raise concerns about the privacy and security of patient data. The increasing centralization of healthcare data creates vulnerabilities, and there is ongoing debate about how to balance data access with patient privacy rights.

Electronic health (eHealth) applications, particularly those related to wearable devices, have empowered patients to take a more active role in managing their health. According to Luo et al. (2021), the use of mobile health applications, such as fitness trackers, telemonitoring tools, and disease management apps, has grown significantly. These tools have become essential in managing chronic conditions like diabetes, hypertension, and cardiovascular diseases. Chen et al. (2022) argue that eHealth apps have facilitated patient self-management by providing real-time feedback, tracking vital signs, and improving medication adherence. These tools have proven particularly useful in the management of chronic diseases and post-operative care. Despite their potential, eHealth apps face challenges related to patient trust and data security. A study by Kim and Lee (2023) notes that concerns about the accuracy of health data and the security of personal health information are significant barriers to wider adoption.

The term digitalisation refers to something that goes beyond mere invention. That is only the beginning of it. This is evident in the various conceptions of what exactly constitutes a digitalisation. The majority of definitions of digitalisations describe it as the practise of putting something novel into practise. Both Mergel et.al, (2019). Vial, (2019) placed an emphasis on supplementary characteristics that are included in the concept of digitalisation. They discuss the process of reinvention and the transformation of a concept into an outcome, respectively. In addition to this, they emphasised the disruption that is triggered by digitalisations.

Vial, (2019) discusses continuous rearrangement, putting a lot of emphasis on the incremental component as well as the financial return, while also putting a lot of emphasis on the economic

aspect. Tidd et al. (2019) emphasize the importance of transforming opportunities into innovative ideas, suggesting that focused decision-making and strategic concentration are crucial in digitalisation. Their approach aligns with Vial's (2019) conceptualisation of digitalisation, which draws from Schumpeter's theory of creative destruction to highlight how digital initiatives must both dismantle outdated practices and establish new ones. Similarly, Mergel et al. (2019) frame digitalisation as a structured process of innovation within public organisations, stressing the importance of systematic decision stages. In parallel, Maguire et al. (2020) define digitalisation primarily in organisational terms reorienting processes such as communications, marketing, and service delivery. Rogers (2020) extends this perspective by underscoring the novelty aspect of innovation, focusing on how newness aligns with user acceptance. Finally, Westerman and Farr (2021) offer a technology-centric definition, positioning digitalisation as the refinement of operations through IT integration, thus reflecting a more technical orientation. Collectively, these definitions cover the strategic, organisational, and technological dimensions of digitalisation, creating a comprehensive view of the concept as both ideational and practical transformation.

2.1.1 Various levels of digitilisation

There are many different levels of digitalisation, ranging from minor digitalisations to significant digitalisations. Applying the criteria that were created from a review of the pertinent literature on the problem has typically been the method of choice when determining the level of radicalism associated with a certain position. According to Mergel et.al, (2019). radical digitalisations are defined as significant shifts in reference to the technology that is currently in use. They have the potential to cause a detour in the course that is taken. In addition, dramatic digitalisations often result in the development of several incremental advances. They are also capable of taking the form of technological revolutions, which are characterised by a collection of digitalisations that collectively have a more significant effect (Dodgson et.al, 2020). The establishment of a quality management system tailored specifically for tourism organisations and the reorganisation of a telecommunication chain are two examples of radical changes that have been implemented in the tourism industry.

On the other hand, incremental digitalisations are changes that occur gradually and cumulatively over time and are dependent on on-going processes (Fagerberg, 2018). The cumulative effect of

incremental improvements can often be even higher than the effect of radical digitalisations if they are carried out over a long period of time. In addition, whereas some industries progress through the creation of gradual modifications, others advance through the production of radical digitalisations. Additionally, the profitability of radical ideas frequently relies on a number of different incremental improvements (Fagerberg, 2018). Examples of incremental improvements in the tourism industry include the improvement of quality, the decrease of energy expenses, and the expansion of partnership with other organisations. Stem (2019) has also tried to distinguish between incremental and radical digitalisation by identifying the focus of each, and a summary of his findings can be found in table 2.1 below.

Table 2-1: Degrees of digitalisation

Focus	Incremental	Radical
Time frame	Short term-6 to 24 months	Long term-usually 10 years plus
Development trajectory	Step after step from conception to commercialization, high levels of certainty.	Discontinuous, iterative, set-backs, high levels of uncertainty.
Idea generation and opportunity recognition	Continuous stream of incremental improvement; critical events large anticipated	Ideas often pop-up unexpectedly, and from unexpected sources, slack tends to be required; focus and purpose might change over the course of the development.
Process	Formal, established, generally with stages and gates	A formal structured process might hinder
Business case	A complete business case can be produced at the outset, customer reaction can be anticipated	The business case evolves throughout the development, and might change; predicting customer reaction is difficult.
Players	Can be assigned to a cross-functional team with clearly assigned and understood roles; skill emphasis is on making things happen.	Skill areas required; key players may come and go; finding the right skills often relies on informal networks; flexibility, persistence and willingness to experiment are required
Development structure	Typically, a cross-functional team operates within an existing business unit.	Tends to originate in R&D; tends to be driven by the determination of one individual who pursues it wherever he or she is.
Resource and skill requirements	All skills and competences necessary tend to be within the project team; resource allocation follows a standardized process.	It is difficult to predict skill and competence requirements; additional expertise from outside might be required; informal networks; flexibility is required
Operating unit involvement	Operating units are involved from the beginning	Involving operating units too early can again lead to great ideas becoming small.

Source: Stem (2019)

In the context of this study, radical digitalisation and incremental digitalisation are distinguished from one another by means of a dimension that indicates whether the digitalisations in question were presented for the first time (learned or explored) or consisted of modifications, improvements, or extensions to digitalisations that had been presented previously that is additional

or exploitative. The purpose of the study was to determine the development of a digitalisation framework for service delivery in the public Rajpura healthcare sector of Zimbabwe. The term digitalisation refers to something that goes beyond mere invention. That is only the beginning of it. This is evident in the various conceptions of what exactly constitutes a digitalisation. The majority of definitions of digitalisations describe it as the practise of putting something novel into practise. More recent scholars such as Vial (2019) and Mergel et al. (2019) have emphasized that digitalisation involves not only the adoption of technology but also the reinvention of processes and the transformation of digital concepts into tangible outcomes. Their work highlights how digitalisation is a dynamic process that reshapes organisational structures, workflows, and service delivery models.

Recent literature on digitalisation highlights its complex and multifaceted nature. For instance, Vial (2019) underscores the continuous evolution of organisational structures, emphasizing incremental changes and the pursuit of value creation, including economic return, as central to successful digital transformation. Similarly, Tidd et al. (2019) view digitalisation as a process of identifying and converting opportunities into innovative ideas, suggesting that strategic focus and deliberate decision-making are essential components of digital innovation. These perspectives share conceptual ground with Schumpeter's (1943) foundational theory of creative destruction, where innovation involves not only creation but also the dismantling of outdated processes.

In the public sector context, Mergel et al. (2019) and Kokkinakos et al. (2019) extend these ideas by examining how digitalisation translates into practical transformation, particularly in terms of public service delivery and citizen interaction. Their work emphasizes the reinvention of processes and the embedding of digital tools in everyday operations highlighting that transformation is as much about organisational change as it is about technology adoption. Moreover, Maguire et al. (2020) define digitalisation with a strong focus on organisational processes such as communication, marketing, and internal workflow redesign. On the other hand, Rogers (2020) and Zaltman et al. (2021) revisit the importance of novelty and innovation adoption, arguing that digitalisation often thrives when perceived as both useful and new by end-users. In contrast, Westerman and Farr (2021) provide a more technology-oriented definition, framing digitalisation as the integration of digital systems to technically enhance service operations. These contemporary

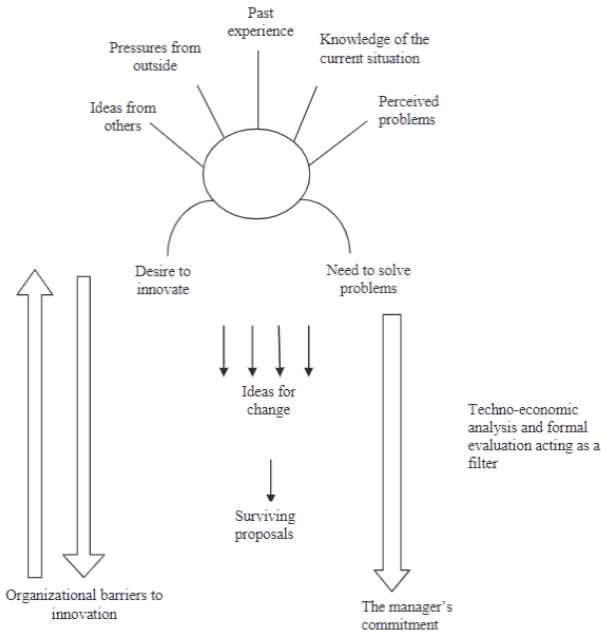
perspectives collectively reflect the evolving understanding of digitalisation as both a strategic and cultural transformation, especially relevant to healthcare systems navigating change in developing contexts.

Rogers (2020) defines digitalisation as an idea, a practise, or an object that is widely seen as new by an individual or other unit of adoption. Digitalisation can take the form of a new concept, a new practise, or a new thing. Because of this, digitalisation suggests that the knowledge or idea may not necessarily be new, but rather that it might be a change, improvement, or enlargement of the current knowledge base. In order to shed some light on this perspective, the Department of Trade and Industry (2019) defined digitalisation in as a process of continuous renewal involving the whole company and technological developments; it is an essential part of business strategy and everyday practise.

2.1.2 Innovativeness

This section presents the process of digitalisation.

Figure 2.1: Process of digitalisation



Source: *Twiss and Weinshall (2019)*

According to Twiss and Weinshall (2019), the first step in the digitalisation process is for the manager to be constantly inundated with information that comes from a variety of different sources. This adds to the knowledge one already possesses.

Following this, ideas, both conscious and unconscious, would begin to form as a result of the information. This is typically the case since what may at first glance appear to be an issue may actually be nothing more than a symptom of some underlying cause. Because of this, it is vital to reframe the issue at hand. It's possible that the manager is dedicated to finding solutions to problems through digitalisation, but there may be organisational roadblocks to digitalisation that could slow down progress or prevent the digitalisation from being implemented. According to Shavinina (2020), the definition of an inventive process is the correlation of its aspects of study. The fields of science and invention can be linked; sources of digitalisation can be analysed in depth; organisational variables can be researched; the development of technology can be analysed; the rate at which digitalisations spread can be assessed; and learning phenomena can be brought into the spotlight. The notion of inventions as being complimentary, cumulative, and leapfrogging is common (Rosenberg, 2019).

The rise of Digitalisation has become a key driver of transformation across industries and society (Vial, 2019; Mergel, Edelmann, & Haug, 2019). Rapid advances in technologies such as mobile computing, social media platforms, cloud services, data analytics, and the Internet of Things (IoT) have enabled novel combinations of digital and physical components, resulting in innovative products and services (Vial, 2019; Yoo, Henfridsson, & Lyytinen, 2023).

Digitalisation involves both the conversion of analogue information into digital formats and the integration of digital technologies into organisational processes, reshaping business models and value creation (Teece, 2019; Vial, 2019). Digital disruption challenges traditional business success factors, compelling organisations to adapt through digital sales channels, enhanced communication, and digitally augmented products and services (Susanti et al., 2020; Mazikana, 2022). As a socio-cultural evolution, Digitalisation requires organisational cultural and strategic change to fully realize its potential (Henriette et al., 2019). Centralizing digital data and technologies enables business transformation and value creation (Mergel et al., 2019).

Technological revolutions have continuously reshaped production and society, culminating in the current fourth industrial revolution characterized by artificial intelligence, machine learning, and interconnected digital networks, profoundly impacting organisations, consumers, and governments worldwide (Schwab, 2019; Mergel et al., 2019). This digital transformation enhances operational efficiency, risk management, and opens new revenue streams globally (Schmarzo, 2021). Digitalisation provides a significant competitive advantage, driving firm performance and innovation in increasingly competitive markets (Aiello et al., 2020; Kaur & Kaur, 2021; Çetin, et.al, 2024). It improves operational efficiency and market expansion, fuelling sustainable business growth and economic development (Ramadani et al., 2019; Belchior et al., 2023).

The idea of Digitalisation can be traced back to 1930, when Schumpeter categorized it into five categories containing new or enhanced commodities, processes, markets, sources of supply, and industry structure. Since that time, the idea of Digitalisation has been widely adopted. According to Bel (2017), Digitalisation is defined as marketable invention: the act of generating an idea and transforming it into a new product, service, solution, or business model that can be sold to customers. In this regard, marketable invention refers to the process of developing an idea and turning it into a new product, service, solution, or business model. According to the OECD's definition of Digitalisation from 2005, there are only four different types of digitalisations: product digitalisation, marketing digitalisation, organisational digitalisation, and process digitalisation (Gunday et al., 2021).

According to OECD (2020), Digitalisation happens when a company implements a product, process, marketing technique, or organisational method that is either new or better inside its business practice, workplace organisation, or external relations. The idea of Digitalisation provides the foundation for what we mean when we talk about innovativeness. Therefore, innovativeness can be defined as the capacity of a company to launch new goods, processes, or ideas in order to improve its overall performance. Therefore, the term innovativeness is used in this study to describe the company's ability to innovate, which is measured by the degree to which the company introduces a new or significantly improved product, process, marketing approach, or organisational method into its business in order to improve its performance. The innovativeness of a company can be measured in a number of different ways.

Product innovation refers to the process of introducing new goods or services to the market or improving existing ones to enhance competitiveness and generate revenue (OECD, 2020). Product innovativeness reflects a firm's ability to digitally transform its offerings through significant improvements in components, features, or user experience (Santos-Rodrigues et al., 2020). Organisational Digitalisation is defined as the implementation of new digital services, products, processes, technologies, structures, administrative systems, or programs aimed at reducing administrative costs while improving overall performance (Dana et al., 2021; Apanasovich et al., 2020). Thus, organisational innovativeness is the capability of a firm to engage in such digital transformation activities.

Digitalisation arises from technology application, resulting in new market products, business processes, or models, and the consequential changes they bring (Nambisan et al., 2020). Digitalisation is now recognized as a critical driver of success both economically and socially (Barrett, Davidson, & Vargo, 2019). Rapid technological advances in mobile computing, social media, cloud platforms, analytics, and the Internet of Things over the last decade have enabled novel recombinations of digital and physical components, producing innovative products and services (Yoo, Henfridsson, & Lyytinen, 2023; Barrett et al., 2019).

Digitalisation encompasses various forms, including new product types, platforms, services, and enhanced interactions between businesses and customers (Nambisan et al., 2020). According to Tidd et al. (2019), Digitalisation is the process of converting opportunities into new concepts and scaling their adoption. It is a multistage process through which firms translate ideas into improved products, services, or processes to grow, compete, and differentiate (Baregheh et al., 2020). Product Digitalisation involves the technical design, R&D, production, management, and marketing activities related to new or enhanced products (Freeman, 2021). Collaboration Digitalisation, as defined by Mazikana (2022), refers to forming partnerships and collaborating within industries to develop and distribute products effectively. Wheelwright and Clark's (2020) insights on product Digitalisation highlight three significant trends shaping its importance: intense global competition, fragmented and demanding markets, and rapidly evolving technologies. While Digitalisation might seem contemporary, its conceptual roots are longstanding. Schumpeter's (2020) foundational theory of innovation encompasses new goods, processes, markets, raw materials, and organisational forms, emphasizing that innovation drives economic development

and transformation. The idea of digitalisation is not a recently developed one (Dadura & Lee, 2011). There is not one, but rather a plethora of methods to define digitalisation. Joseph Schumpeter (1883-1950), the primary philosopher of digitalisation, already had a comprehensive vision of the term, which included new goods, new manufacturing processes, new markets, new raw materials, and new forms of organisation. Schumpeter was born in Austria and died in the United States.

Table 2-2 Digitisation, Digitalisation and Digital transformation comparison

Aspect	Digitisation	Digitalisation	Digital Transformation	References
Definition	Conversion of analogue healthcare data (e.g., paper medical records, diagnostic images) into digital formats for easier storage, retrieval, and basic processing.	Utilization of digital technologies to optimize healthcare processes, workflows, and patient interactions, such as automating appointment scheduling or improving diagnostic accuracy.	A holistic transformation of healthcare delivery through technology, redefining care models, patient engagement, and operational strategies to prioritize outcomes, access, and efficiency.	- HIMSS's Digital Health Framework (2020-2024)- WHO's Global Strategy on Digital Health (2020-2025)- McKinsey's Digital Innovation in Healthcare (2023).
Scope	Limited to converting healthcare information into a digital format without changing workflows or processes (e.g., scanning patient files).	Enhances specific operational processes in healthcare by introducing automation, improving efficiency, and reducing manual errors (e.g., EHR integration across departments).	Focuses on reimagining the entire healthcare ecosystem by integrating technology into clinical, administrative, and operational areas, ensuring a seamless, patient-centric approach with advanced capabilities such as predictive	- Harvard Business Review (HBR) on AI in Healthcare (2022)- Deloitte's Digital Transformation Trends in Healthcare (2023).

			analytics and AI-driven diagnostics.	
Purpose	To make healthcare data accessible, searchable, and storable digitally, reducing reliance on physical records and enabling future digital use.	To improve healthcare processes, enhance decision-making, and streamline operations through digital solutions while maintaining existing care models.	To achieve a paradigm, shift in healthcare delivery by leveraging technology for preventive care, personalized medicine, enhanced patient engagement, and innovative care models, improving overall health outcomes and cost efficiency.	- WHO's Global Digital Health Observatory (2021-2024)- IDC's Future of Health IT Trends Report (2023).
Key Characteristics	- Focuses on data conversion and preservation. -Primarily supports record-keeping and archiving. - Serves as a foundation for further digital initiatives.	- Enhances efficiency and accuracy in workflows. -Leverages existing technologies to solve operational bottlenecks. -Focuses on process improvement rather than systemic change.	- Requires holistic adoption of emerging technologies (e.g., AI, IoT, and wearables). - Emphasizes personalized care, value-based outcomes, and collaboration -Involves organisational restructuring and cultural change.	- Capgemini's Digital Health Mastery Framework (2021). - McKinsey's Digital Health Ecosystems Insights (2023).

			- Focuses on long-term adaptability in dynamic healthcare ecosystems.	
Key Technologies	- Document scanners and optical character recognition (OCR) for patient records. - Digital imaging systems (e.g., PACS for radiology). - Electronic document storage platforms.	- Electronic Health Records (EHRs) for integrated patient care. - Telemedicine platforms for remote consultations. - Robotic Process Automation (RPA) for repetitive tasks like billing. - Data analytics tools for process optimization.	- Artificial Intelligence (AI) for predictive diagnostics and personalized treatment plans. - Internet of Medical Things (IoMT) for real-time patient monitoring. - Blockchain for secure patient data sharing. - Advanced telehealth and virtual care platforms. - Cloud computing for scalable healthcare data management. - Genomic data platforms for precision medicine initiatives.	- HIMSS's 2023 Global Health Conference Deloitte's AI in Healthcare Operational Models (2024).

Challenges	- Data quality issues during digitization. - Lack of standardized formats for legacy healthcare data. - Initial investment in digitisation tools and training.	- Integration challenges between new digital tools and existing hospital systems. - Resistance from clinicians and staff to adopt digital workflows. - Concerns around cybersecurity and patient data privacy during system integration.	- Addressing cultural resistance to change among healthcare providers. - Navigating regulatory requirements (e.g., HIPAA, GDPR). - Breaking down data silos across institutions for seamless collaboration. - Significant upfront investment in infrastructure and talent. - Ensuring equitable access to digital solutions for underserved populations. - Balancing innovation with patient trust and ethical considerations for AI and data-driven care.	- WHO's Digital Health in Low-Resource Settings (2022). - McKinsey's Global Health Systems Insights (2024).

Examples	Scanning paper-based medical records into a digital EHR system. Digitizing X-rays and MRI scans for digital archiving. Converting handwritten prescriptions into digital formats for e-prescribing.	Automating appointment scheduling and reminders through online systems. Implementing telehealth solutions for follow-up consultations. Using digital tools for patient monitoring in chronic disease management (e.g., diabetes trackers).	Shifting to predictive and preventive healthcare with AI-driven risk stratification. Establishing fully virtual hospitals offering 24/7 digital-first care. Transforming supply chain operations with IoMT and blockchain for real-time inventory tracking. Deploying wearable technology for continuous patient monitoring and integrating data with providers' systems for real-time care decisions. - Precision oncology driven by genomic insights.	HIMSS's Digital Maturity Models for Healthcare (2020–2023). Harvard Business Review's Future of Virtual Care (2022).
Strategic Impact	Improves data accessibility and facilitates foundational	Enhances operational efficiency, reduces errors, and improves patient satisfaction	Drives industry-wide disruption by enabling real-time data-driven decisions, personalized	- WHO's Digital Health Strategy (2020-2025).

	digital initiatives (e.g., telemedicine, interoperability).	while maintaining traditional care models.	patient care, predictive analytics, and value-based care models, ensuring improved outcomes and long-term adaptability in a rapidly evolving healthcare landscape.	- McKinsey's Healthcare Innovation Post-Pandemic (2023).

2.2 Digitisation vs. Digitalisation: Understanding the Key Distinction

The terms "digitization" and "Digitalisation" are often used interchangeably, but there is a subtle yet significant difference between the two. While both involve the use of digital technology, they have distinct purposes and outcomes.

2.2.1 Digitization

McKinsey, (2019), defines digitisation as the process of converting analogue information into a digital format. This means representing information that was originally in the physical world, such as documents, photos, or videos, as a series of 0s and 1s that can be stored and processed by computers.

Digitisation is the process of converting analogue information into a digital format. This can involve converting physical documents, such as photographs, books, and maps, into digital files, or it can involve converting analogue processes, such as manufacturing or production, into digital ones. In essence, digitisation is about translating data from one form to another (Buckland and Chen, 2020). It's the basic step of creating a digital representation of something that was previously analogue.

Borgman (2018), argues that Digitalisation goes beyond simple conversion; it encompasses the transformation of business processes, operations, and organisational structures through the use of digital technologies. It involves adopting digital tools, processes, and strategies to enhance efficiency, improve decision-making, and gain a competitive edge.

Deloitte, (2023) further asserts that Digitalisation goes beyond simply converting analogue data into digital format. It's the process of using digital technologies to transform business processes, operations, and communication. It's about leveraging digital tools and platforms to enhance efficiency, improve customer experiences, and achieve strategic objectives.

In other words, Digitalisation is about utilizing digital technologies to fundamentally change how a business operates. It's about incorporating digital tools and processes into the core of the business model to create new value and opportunities.

2.2.2 Key Differences between Digitisation and Digitalisation

Plyman and Rammelkamp (2017), highlights that the key difference between digitisation and Digitalisation lies in their scope and impact. Digitisation is the foundation, while Digitalisation is the transformation. Digitisation focuses on converting data and processes into digital form, making them accessible and manageable in the digital realm. It's about creating a digital representation of existing assets and processes.

In essence, digitisation is the foundation of Digitalisation. It provides the raw material for Digitalisation by converting physical information into digital formats. Digitalisation, on the other hand, utilizes these digital assets to fundamentally change how organisations operate. Digitisation refers to the process of converting analog healthcare data into a digital format, such as scanning paper medical records into an Electronic Health Record (EHR) system or digitizing diagnostic images like X-rays and MRIs. This process is primarily focused on data preservation and accessibility, ensuring that healthcare information is easier to store, retrieve, and share across systems. For example, digitisation allows healthcare providers to eliminate physical storage challenges and establish a digital foundation for future innovations (HIMSS, 2021). However, digitisation on its own does not transform workflows or patient outcomes; it simply translates existing data into a new medium.

In contrast, Digitalisation builds upon digitisation by integrating digital technologies into healthcare processes to enhance efficiency and accuracy. Digitalisation focuses on optimizing workflows, automating repetitive tasks, and improving interactions between providers and patients. Examples include automating appointment scheduling, utilizing decision-support systems in EHRs, and enabling telehealth services for remote care delivery (Deloitte, 2023). Unlike digitization, Digitalisation actively changes how healthcare organisations operate by embedding digital tools into day-to-day processes, resulting in better patient experiences and more efficient care delivery (World Health Organisation [WHO], 2022).

The strategic outcomes of the two concepts are also distinct. Digitisation is foundational, offering improved data accessibility and creating a base for more advanced technological interventions. However, it does not directly enhance patient outcomes or streamline clinical workflows. Digitalisation, on the other hand, directly impacts operational efficiency by enabling process optimization and reducing manual errors, ultimately leading to cost reductions and improved quality of care (McKinsey & Company, 2023). This distinction highlights that while digitisation is essential, Digitalisation represents a significant step forward in healthcare evolution. Challenges differ as well and digitisation often faces obstacles like standardizing legacy data formats and ensuring data quality during conversion (HIMSS, 2021). Digitalisation, however, introduces complexities in integrating new tools with existing systems, addressing cybersecurity risks, and managing resistance to workflow changes among healthcare providers (Harvard Business Review, 2022). These differences underscore the complementary but distinct roles of digitisation and Digitalisation in advancing healthcare systems.

Table 2-3 Digitisation versus Digitalisation

Aspect	Digitisation in Healthcare	Digitalisation in Healthcare	Resonating References (2019–2024)
Definition	The process of converting analog healthcare data (e.g., handwritten records, physical X-rays) into a digital format that can be stored, processed, and accessed digitally.	The use of digital technologies to improve healthcare processes, workflows, and interactions by integrating digital tools into existing systems to enhance efficiency and accuracy.	- HIMSS's **Digital Health Framework** (2021-2024)- WHO's **Global Strategy on Digital Health** (2020-2025).
Purpose	To preserve healthcare data in digital form, ensuring it is easily shareable, searchable,	To optimize healthcare delivery by streamlining processes, improving decision-making, and	- Deloitte's **Healthcare Technology Predictions** (2022-

	and storable for future use.	reducing manual interventions.	2024)- IDC's **Future of Health IT Trends Report** (2023).
Scope	Focused on data conversion and storage, laying the foundation for digital healthcare systems.	Involves the adoption of digital solutions to improve workflows, such as patient management, diagnostics, or administrative tasks.	- Gartner's **2024 Market Insights** on healthcare IT.- Capgemini's **Digital Maturity in Healthcare** Framework (2023).
Key Characteristics	- **Data-centric** (converting physical records to digital files). - Focused on **preservation and access** rather than functional changes. - Typically, a **one-time process** for existing data.	- Enables **process automation** and **optimization**. - Requires integration with **existing systems**. - Focused on improving operational **efficiency** and patient **experience**.	- McKinsey's **Digital Quotient in Healthcare** (2020-2023). - WHO's **Global Digital Health Observatory** (2021-2024).
Key Technologies	- Document scanners and Optical Character Recognition (OCR) tools. - Digital imaging systems (e.g., PACS for radiology). - Basic Electronic Health Record (EHR) systems for storing patient data.	- Integrated Electronic Health Records (EHR) systems with decision support. - Robotic Process Automation (RPA) for billing and appointment scheduling. - Telehealth and online patient engagement platforms.	- HIMSS's **Digital Maturity Models for Healthcare** (2020–2023).

Examples	- Scanning handwritten prescriptions into a digital system. - Digitizing X-rays, MRIs, and CT scans for storage and viewing on a digital interface. - Uploading paper-based patient histories into EHR systems.	- Automating lab test scheduling and results reporting to physicians. - Telemedicine consultations replacing in-person visits. - Using digital tools to track chronic disease management (e.g., diabetes monitoring apps).	- Harvard Business Review's **Future of Virtual Care** (2022).
Strategic Impact	Provides a foundation for future digital advancements by creating digital versions of healthcare data but does not directly improve operational efficiency or patient outcomes.	Enhances operational efficiency, patient satisfaction, and clinical accuracy by automating and streamlining healthcare processes and workflows.	- Deloitte's **Digital Transformation Trends in Healthcare** (2023).
Challenges	- Ensuring accuracy during the digitisation process. - Standardizing legacy data formats to be compatible with modern systems. - High initial investment in digitisation technologies.	- Integrating digital tools with legacy systems. - Managing resistance from healthcare providers and staff to adopt new workflows. - Addressing patient privacy and data security risks during digital integration.	- WHO's **Digital Health in Low-Resource Settings** (2022).

Outcome	Improved **accessibility** and **preservation** of healthcare data but limited impact on patient outcomes or operational efficiency.	Improved **efficiency** of healthcare delivery, **accuracy** in workflows, and enhanced **patient experience**, leading to better care outcomes and cost reduction.	- WHO's **Digital Health Strategy (2020-2025)**. - McKinsey's **Global Health Systems Insights** (2023).

2.3 Theoretical Framework

The Technology Acceptance Model (TAM) is a theoretical framework that has gained significant attention in the field of information systems and technology management. It aims to understand and predict individuals' acceptance and usage of new technologies. This study will discuss the applicability of TAM as a theoretical framework for the specific objective of determining the effects of ubiquity of digital technologies on service delivery. The public Ramulamma healthcare sector has witnessed a profound transformation with the increasing adoption of digital technologies such as electronic health records (EHRs), telemedicine, and mobile health apps (Kuo etc 2022). Yang et.al, (2021) added highlighting that these innovations are reshaping healthcare delivery by improving accessibility, efficiency, and patient outcomes. As digital systems become integral to healthcare, understanding the factors influencing their acceptance is crucial for enhancing service delivery. The Technology Acceptance Model (TAM) is a widely used framework for evaluating user acceptance of new technologies, and its constructs, perceived ease of use (PEOU) and perceived usefulness (PU), are central to explaining adoption behaviour (Davis, 1989). The Technology Acceptance Model (TAM) suggests that users' perceptions of ease of use and usefulness influence their decision to adopt a technology. Over time, TAM has been refined and extended to incorporate other factors such as social influence and facilitating conditions (Venkatesh et al., 2013), but its basic constructs remain highly relevant in healthcare adoption studies. TAM has been widely applied to understand the adoption of healthcare technologies, including EHR systems, telemedicine platforms, and mobile health applications. Studies have shown that healthcare professionals and patients are more likely to adopt a digital system if they perceive it to be both useful and easy to use (Zhao et al., 2019).

2.3.1 TAM and Ubiquity

Firstly, it is important to establish the relevance of TAM in the context of digital technologies. Scholars have recognized the increasing ubiquity of digital technologies in various sectors, including service delivery. Lee et al. (2020) argue that the proliferation of digital technologies has significantly impacted service delivery by enabling organisations to provide more efficient and interactive services to their customers. Therefore, understanding the acceptance and usage of these technologies becomes crucial in order to improve service delivery.

TAM provides a theoretical lens through which the effects of ubiquity of digital technologies on service delivery can be examined. The model is based on two key constructs, perceived usefulness (PU) and perceived ease of use (PEOU), which influence individuals' intention to use a technology. Davis (2019) initially proposed TAM, and subsequent studies have validated its efficacy in various contexts, including e-commerce, e-learning, and healthcare.

To explore the effects of ubiquity of digital technologies on service delivery, the construct of perceived usefulness is particularly relevant. As digital technologies become more prevalent, individuals' perception of their usefulness in enhancing service delivery is likely to increase. For instance, Kesharwani et al. (2018) found that customers perceive digital technologies such as mobile applications and social media as valuable tools for accessing and engaging with services. Therefore, TAM can provide insights into the factors contributing to the acceptance and utilization of digital technologies in service delivery.

Moreover, TAM can also help analyse the moderating factors that influence the relationship between the ubiquity of digital technologies and service delivery. Several studies have found that factors such as individuals' demographic characteristics, prior technology experience, and perceived risk can moderate the effects of technology acceptance on usage intentions (Venkatesh et al., 2013). By incorporating these moderating factors, TAM provides a comprehensive framework for understanding the complex relationship between ubiquity, technology acceptance, and service delivery.

Furthermore, TAM can also be extended to investigate the impact of the ubiquity of digital technologies on the quality-of-service delivery. As technology becomes more widely available and integrated into service delivery processes, its impact on service quality becomes a critical factor.

Various studies have shown that technology acceptance influences the perceived quality of service, customer satisfaction, and overall service performance (e.g., Rai et al., 2019). Therefore, TAM's focus on users' perceptions and attitudes towards technology can provide valuable insights into the effects of ubiquity on service quality.

2.3.2 TAM and Reliability

In the context of healthcare, the reliability of digital technologies plays a key role in shaping these perceptions. Reliability, defined as the ability of a technology to function consistently and accurately, is especially critical in healthcare, where system failures can directly impact patient care (Gao et al., 2020).

In healthcare, the reliability of a technology significantly influences these TAM constructs. For instance, reliable telemedicine platforms improve perceived usefulness by enabling high-quality remote consultations, while their reliability also impacts perceived ease of use, as users are less likely to encounter technical issues (Yang et al., 2021). These interactions ultimately influence the adoption and sustained use of digital technologies in healthcare settings, improving overall service delivery. Research conducted by Gao et al. (2020) further supports this notion, demonstrating that the perceived reliability of healthcare systems directly impacts both PEOU and PU, leading to enhanced adoption and better patient care outcomes.

Reliability is a crucial factor when assessing the adoption of digital technologies in healthcare. In this context, reliability refers to the ability of digital tools and systems to perform consistently, without failures or downtime, thereby ensuring that healthcare professionals and patients can rely on them for accurate and timely service delivery. For example, EHR systems must reliably store and update patient data, while telemedicine platforms need to function without interruptions to ensure effective remote consultations (Bhuvaneshwar & Choudhury, 2020).

The role of reliability in healthcare adoption has been highlighted in recent research. Yang et al. (2021) found that when telehealth platforms are perceived as reliable, they are more likely to be considered useful by healthcare providers, thus increasing the likelihood of adoption. Similarly, Kuo et al. (2022) showed that the reliability of digital health platforms, such as e-health apps for chronic disease management, directly affects both the perceived ease of use and usefulness, leading to improved patient engagement and health outcomes. These studies

underscore that reliable technology is a fundamental requirement for achieving the intended benefits of digital health systems and improving service delivery.

The relationship between technology reliability and service delivery in healthcare can be better understood through TAM, which highlights the interplay between perceived usefulness (PU), perceived ease of use (PEOU), and reliability. In healthcare, when a technology is perceived as reliable, it is more likely to be adopted, as it is seen as both easy to use and useful in improving healthcare service delivery. Research by Bhuvaneshwar & Choudhury (2020) suggests that reliable digital tools, such as telemedicine platforms, help improve patient care by enhancing efficiency and reducing the risk of errors, which in turn contributes to better healthcare outcomes.

In addition, reliable technologies contribute to higher levels of trust, which is crucial for the successful delivery of healthcare services. For example, telemedicine platforms that perform reliably improve patients' trust in the technology, increasing their willingness to engage with healthcare providers remotely (Zhang et al., 2022). In this context, TAM provides a framework for understanding how trust which is influenced by technology reliability affects healthcare outcomes. Yang et al. (2021) found that trust in reliable telemedicine platforms led to more frequent usage, which subsequently improved both patient satisfaction and overall service delivery outcomes.

In healthcare, technologies that are reliable are perceived as more useful because they can ensure accurate data transmission, timely services, and error-free processes. For instance, EHR systems that work consistently are seen as more useful in improving patient care by providing healthcare professionals with real-time, accurate patient information (Kuo et al., 2022). Studies have shown that when a healthcare technology is reliable, it enhances both the perceived usefulness and ease of use, making users more likely to adopt it and incorporate it into their daily practices (McGinn et al., 2020).

Telemedicine is another area where reliability impacts perceived usefulness. Yang et al. (2021) demonstrated that healthcare providers are more likely to adopt telemedicine systems when they are reliable because they perceive the technology as capable of improving patient care and reducing operational inefficiencies. However, unreliable systems that frequently crash or fail to

transmit data accurately can diminish perceived usefulness and lead to lower adoption rates, highlighting the importance of technology reliability in enhancing service delivery.

According to Bhuvaneshwar & Choudhury, (2020), the more reliable a system is, the easier it is for users to engage with it and with reliable technologies there's the likelihood of reduction technical glitches, errors, or system failures, which makes them easier for healthcare providers and patients to use. For instance, telehealth platforms that consistently provide clear video and uninterrupted consultations are perceived as easier to use, which drives adoption and use

A study by Gao et al. (2020) highlighted that healthcare workers are more likely to use EHR systems that are reliable and free from technical disruptions, leading to smoother workflow and better patient care. In contrast, unreliable systems that fail to work as expected create additional cognitive load for users, making them more difficult to use and undermining the adoption process. Therefore, technology reliability is directly linked to both PEOU and PU, which in turn affects the overall service delivery outcomes in healthcare settings.

Reliability influenced by the perceived reliability of digital technologies, and when users trust a system to be reliable, they are more likely to engage with it, leading to improved service outcomes. Studies have shown that reliable technologies increase users' trust, which positively affects user satisfaction and service quality in healthcare. For example, telemedicine platforms that consistently function without technical disruptions foster reliability among patients and healthcare providers. Zhang et al. (2022) found that reliable telemedicine platforms have led to higher patient satisfaction and more frequent engagement with the platform, thus improving overall service delivery. In a similar vein, e-Health apps that reliably track patients' health data encourage continued use and enhance patient outcomes, particularly in chronic disease management (Kuo et al., 2022).

Recent studies have further emphasized the critical role of reliability in shaping perceived ease of use and perceived usefulness in healthcare settings. For instance, Zhang et al. (2021) explored the role of reliable digital health systems in improving healthcare delivery in rural areas. They found that reliable telemedicine platforms increased patient trust, leading to better adoption rates and improved service delivery. Similarly, McGinn et al. (2020) highlighted that healthcare providers are more likely to rely on telemedicine platforms when they experience consistent performance, which enhances the perceived usefulness and ease of use of these systems. Furthermore, Yang et

al. (2021) examined the impact of eHealth applications for chronic disease management and concluded that reliable apps improved patient outcomes by fostering continuous engagement. These findings underscore that technology reliability remains a cornerstone in enhancing healthcare service delivery, particularly as digital technologies become more prevalent in healthcare settings. As healthcare systems continue to integrate digital technologies, the role of reliability in shaping user perceptions and improving service delivery outcomes will remain central.

2.3.3 TAM and Skill/Knowledge

Recent studies highlight the relevance of TAM in the public quality-of-service healthcare sector, particularly in understanding how healthcare workers' skills and knowledge influence the use of digital technologies. For example, Yang et al. (2021) found that healthcare professionals' perceptions of the usefulness of telemedicine platforms influenced their willingness to learn and apply these technologies. The more they perceived telemedicine as beneficial, the more motivated they were to acquire the necessary skills and knowledge to operate such platforms effectively. Similarly, Kuo et al. (2022) showed that healthcare professionals who believed in the ease of use of mobile health applications were more likely to engage in continuous learning, thus improving their skills and enhancing service delivery.

The adoption of digital technologies in healthcare not only depends on the perceived usefulness and ease of use but also on the skills and knowledge required for effective use. As healthcare professionals gain proficiency with technologies like EHR systems and telemedicine platforms, their perceptions of these technologies change, often increasing their perceived usefulness (PU) and ease of use (PEOU). Skills and knowledge directly influence the user's confidence in operating these systems, which, in turn, enhances the overall healthcare delivery process.

In the case of telemedicine, Kuo et al. (2022) argued that healthcare professionals who were trained to use telemedicine platforms demonstrated higher confidence in their ability to provide quality care remotely, thereby improving service delivery. Similarly, Zhao et al. (2019) highlighted that the knowledge of EHR systems not only improved the efficiency of healthcare delivery but also contributed to the reduced likelihood of errors in patient data management. These findings underscore that continuous skills development and knowledge acquisition are critical to the adoption and success of digital technologies in healthcare.

A study conducted by Agarwal and Prasad (2019) examined the impact of user characteristics and system characteristics on the acceptance and utilization of electronic commerce systems. Their findings indicated that users' skills and knowledge in digital technologies positively influenced their perception of ease of use and, subsequently, their acceptance of the technology. In other words, individuals with higher expertise in using digital technologies were more likely to perceive them as easy to use, leading to higher acceptance and utilization rates. This study supports the notion that skills and knowledge of digital technologies play a significant role in service delivery.

Venkatesh et al. (2023) extended the TAM by introducing the construct of "perceived behavioural control" which refers to users' perception of their ability to use the technology effectively. Their study focused on understanding the factors that influence the acceptance and usage of web-based information systems. The results revealed that users' knowledge and skills in digital technologies positively influenced their perceived behavioural control, leading to increased utilization of web-based systems. This finding emphasizes the importance of skills and knowledge in effectively delivering services through digital technologies.

Similarly, a recent study conducted by Liu et al. (2020) investigated the factors influencing the adoption and use of health information systems among healthcare professionals. They found that healthcare professionals' level of digital literacy and expertise significantly influenced their perceived usefulness and ease of use of the technology. The study concluded that adequate skills and knowledge in digital technologies are crucial for healthcare professionals to effectively utilize health information systems, consequently improving service delivery in the public quality-of-service healthcare sector.

The Technology Acceptance Model (TAM) provides a suitable theoretical framework to study the effects of skills and knowledge of digital technologies on service delivery. Literature and scholars have consistently highlighted the influence of digital expertise on users' perception of ease of use, perceived usefulness, and perceived behavioural control, which eventually leads to increased acceptance and utilization of technology. Studies conducted by Agarwal and Prasad (2019), Venkatesh et al. (2023), and Liu et al. (2020) support the applicability and relevance of TAM in examining the relationship between skills/knowledge of digital technologies and service delivery.

Training and Education: Key to Enhancing Skills and Knowledge in Healthcare

Training and education play an essential role in enhancing healthcare workers' skills and knowledge in using digital health technologies. Many healthcare institutions have integrated structured training programs to ensure their staff can effectively operate digital systems such as EHRs, telemedicine, and mobile health applications. As TAM suggests, the more healthcare professionals are exposed to user-friendly technologies, the more likely they are to perceive them as useful and easy to use, which in turn encourages them to adopt these technologies and refine their skills.

McGinn et al. (2020) examined how structured telemedicine training programs significantly improved healthcare professionals' ability to use telemedicine platforms, leading to enhanced service delivery and patient satisfaction. The study found that when healthcare workers were equipped with the necessary skills and knowledge, they were more likely to perceive telemedicine as useful and easy to use, increasing their willingness to incorporate it into their daily practice. Similarly, Yang et al. (2021) showed that eHealth apps became easier to use for healthcare professionals after they received proper training, further supporting the role of education and skill development in improving technology adoption in healthcare.

2.3.4 TAM and Innovation

Perceived Usefulness (PU)

Perceived usefulness refers to the degree to which an individual believes that using a particular system will enhance their job performance. In the healthcare context, PU relates to how digital technologies can improve clinical efficiency, patient outcomes, and service delivery speed.

Perceived Ease of Use (PEOU)

PEOU indicates the extent to which users find the technology easy to understand and operate. Technologies that require minimal effort to learn and use are more likely to be adopted by healthcare professionals and patients.

A study conducted by Davis (2019) provides empirical evidence supporting the applicability of the TAM in understanding technological adoption. The study focused on personal computer usage and found that perceived usefulness was a significant determinant of individuals' intentions to use the technology. Similarly, Venkatesh and Davis (2020) extended the TAM to examine the adoption of virtual reality technology in organisations and highlighted the importance of perceived

usefulness in predicting user acceptance. When it comes to innovation, organisations strive to improve service delivery through the introduction of new technologies or innovative practices. According to Huizingh (2021), innovation play a crucial role in driving service delivery within health institutions, and endorsement of new technologies positively influence employees' perceptions and attitudes towards acceptance. If innovation is seen as beneficial for service delivery, employees are more likely to adopt and utilize the innovation.

Furthermore, the TAM suggests that perceived ease of use also influences technology acceptance. If innovations are designed to be user-friendly and accessible, employees are more likely to adopt them. Ease of use reduces the perceived effort required to learn and operate the technology, which positively impacts employees' intention to use it (Venkatesh and Davis, 2000). The Technology Acceptance Model has proven its adaptability in healthcare, offering insights into user behaviors toward new technologies. For instance, studies highlight that trust in digital health platforms significantly affects their adoption, especially in telehealth systems during the COVID-19 pandemic (Stoumpos et al., 2023). Moreover, TAM has evolved to encompass external factors such as policy environments and user-specific needs, aligning technological design with user expectations.

Digital innovation, encompassing technologies like AI, IoT, and mobile health apps, has revolutionized patient care and operational efficiency. The integration of these technologies with TAM has highlighted their role in improving service delivery outcomes. AlQudah et al. (2021) emphasize that telemedicine platforms leveraging TAM principles have demonstrated higher acceptance rates due to their accessibility and user-centric designs. Similarly, wearable health devices for elder care, such as those studied by Zin et al. (2023), have shown that PEOU and PU directly impact user satisfaction and continued use as they have revolutionized real-time health monitoring. The use of wearables such as smartwatches and fitness trackers has gained traction, particularly during the COVID-19 pandemic, where remote monitoring was essential (Zin et al., 2023). TAM studies reveal that perceived ease of use is a critical factor influencing adoption, particularly among non-tech-savvy users. For example, older adults often find wearables more acceptable when their design is intuitive and when training or support is provided (Shaheen and Prasad, 2021). Moreover, perceived usefulness such as the ability to track vital signs directly correlates with continued usage among patients managing chronic conditions (Ahmed et al., 2020).

Further, TAM-informed digital innovations have led to measurable improvements in patient outcomes. For example, AI-driven diagnostic tools and wearable devices have enhanced preventive care and chronic disease management. Chowdhury et.al, (2023) found that elderly users of smart health watches benefited significantly from their ease of use and perceived usefulness, leading to better health monitoring and reduced emergency visits. The dynamic nature of digital health technologies necessitates continuous adaptation of TAM.

These patient-centred technologies have empowered individuals to take a more active role in their health management. Studies by Dwivedi et al., (2021) indicates that perceived ease of use significantly impacts patients' willingness to engage with these platforms. According to AlQudah et al., (2021), mobile health apps are designed with user-friendly interfaces and accessible features are more likely to be adopted across diverse demographic groups. In addition, perceived usefulness, such as the ability to access medical records or receive medication reminders, enhances satisfaction and adherence to treatment plans and improvements in diagnostic accuracy. Studies during the pandemic revealed that innovation adoption in the public Stumpo's healthcare sector surged due to its perceived ease of use and efficacy in maintaining continuity of care (Stoumpos et al., 2023).

2.3.5 TAM and Information Intensity

To begin with, it is important to define information intensity in the context of service delivery. Information intensity refers to the level of information or data required to effectively deliver a service. Service industries, such as healthcare, heavily rely on the utilization of information technologies to efficiently manage and deliver services to their customers (Al-Taie et.al, (2021). Understanding the effects of information intensity on service delivery is crucial for organisations to enhance their overall performance and meet the evolving needs of their customers. The TAM, developed by Davis in 1989, posits that the acceptance and usage of technology are determined by individuals' perceived usefulness and perceived ease of use. According to the model, individuals are more likely to accept and use technology if they perceive it as useful to their tasks, and if they perceive it as easy to use. The model has been widely utilized to study technology adoption and usage in various domains, such as e-commerce, healthcare, and education. In the context of determining the effects of information intensity on service delivery, the TAM provides a suitable theoretical framework to analyze individuals' acceptance and usage of technology in service

settings. Several scholars have employed the TAM to study the adoption and effects of information technologies in service delivery.

For instance, Venkatesh and Davis (2020) examined the acceptance and usage of computerized physician order entry (CPOE) systems in hospitals. They found that perceived usefulness and perceived ease of use significantly influenced physicians' intention to use CPOE systems, which in turn affected the overall quality and efficiency of service delivery. This study demonstrates the relevance of the TAM in understanding the effects of information intensity on service delivery in the public Stumpo's healthcare sector. Furthermore, Zhang et al. (2014) conducted a study on the adoption and effects of electronic customer relationship management (eCRM) systems in service organisations. They found that perceived usefulness and perceived ease of use influenced employees' intention to use eCRM systems, which ultimately improved service delivery and customer satisfaction. This research demonstrates the applicability of the TAM in analyzing the effects of information intensity on service delivery in diverse service sectors.

According to Youssef et al. (2022) The Technology Acceptance Model (TAM) offers a suitable theoretical framework for determining the effects of information intensity on service delivery. Scholars have extensively applied the TAM to study technology adoption and usage in various service sectors. The model's emphasis on perceived usefulness and perceived ease of use allows for a comprehensive understanding of individuals' acceptance and usage of technology in service settings. Understanding the effects of information intensity on service delivery is crucial for organisations to optimize their performance and meet the ever-changing demands of them.

The perceived usefulness of digital technologies in healthcare is enhanced when systems are designed to leverage information intensity. For example, telehealth platforms that integrate patient records, real-time monitoring, and decision support tools demonstrate high information intensity. This directly impacts users' belief that the technology improves efficiency and care quality. A study by Kim (2024) highlights that telehealth solutions embedded with predictive analytics and clinical decision support systems positively influence user acceptance by providing actionable insights for complex care delivery.

Ease of use becomes a concern as the information intensity of a system increases and technologies demand high cognitive load or training deter adoption, especially among healthcare providers

managing time-sensitive tasks. Simplified interfaces and AI-driven automation are critical in overcoming this challenge. For instance, simulation tools used in medical training benefit from TAM principles when paired with user-centric design to reduce the learning curve while still delivering intensive information for scenario analysis (Roe, 2024). Information-intensive technologies, such as clinical dashboards, directly contribute to better decision-making by consolidating large volumes of patient data into meaningful insights. These systems align with TAM's construct of perceived usefulness, as they allow healthcare professionals to manage and analyze data efficiently. According to Sang Dol Kim (2024), systems that offer real-time feedback, predictive trends, and patient engagement tools are widely adopted due to their ability to streamline care processes.

Wearables, including fitness trackers and medical-grade devices, exemplify information-intensive tools that depend on user acceptance. Ahmed et al. (2021) argue that PU is closely tied to the ability of these devices to deliver real-time health insights, particularly for managing chronic conditions like diabetes. Additionally, features such as goal-setting and activity tracking increase user engagement, further enhancing perceived utility. Aesthetic and functional aspects of wearables also play a role in PEOU. For example, sleek designs combined with user-friendly mobile interfaces reduce perceived barriers to adoption. Research by Dwivedi et al. (2021) highlights the importance of co-designing wearable devices with end users to improve both usability and satisfaction. Mobile health applications, which are inherently information-intensive, empower patients by providing easy access to health records, reminders, and diagnostic tools. Studies by AlQudah et al. (2021) suggest that PU is closely linked to the ability of these apps to improve self-management of conditions, such as medication adherence or diet monitoring. Despite their benefits, many apps fail to achieve widespread adoption due to usability concerns. A study by Nguyen et al. (2022) highlights that improving PEOU such as offering multilingual support and integrating voice commands can significantly boost user engagement, especially among older adults and those with low digital literacy.

Electronic Health Records (EHRs) are among the most information-intensive digital tools in healthcare, providing comprehensive patient records and decision support. A study by Venkatesh et al. (2020) identifies PU as a pivotal factor influencing EHR adoption, particularly when systems reduce administrative burdens and improve inter-departmental communication. Though

interoperability remains a key challenge in EHR implementation, Chowdhury et al. (2023) emphasizes that seamless data exchange between systems enhances PEOU, fostering greater acceptance among healthcare providers. Efforts to standardize data formats and integrate systems across organisations are thus critical to maximizing EHR effectiveness.

Despite there being so many opportunities around balancing Information Intensity and TAM principles, the high information intensity of many digital healthcare tools raises concerns about data security and privacy. Shahbaz et al. (2022) found that trust in data protection measures is an essential complement to TAM constructs in fostering technology adoption. Transparent data policies and robust encryption protocols are therefore critical for building confidence among users. While information intensity enhances decision-making, excessive data can overwhelm users and reduce PEOU. Research by Ahmed et al. (2020) suggests that advanced data filtering algorithms and AI-driven summaries can help users focus on critical insights, improving the overall user experience. In resource-constrained healthcare environments, high-information-intensity technologies face unique challenges. Dwivedi et al. (2021) highlight the role of contextual customization, such as lightweight mobile apps and offline capabilities, in enhancing PEOU. Additionally, government subsidies and policy support are crucial in overcoming economic barriers to adoption. Cultural attitudes toward technology significantly influence TAM constructs. A comparative study by Chowdhury et al. (2023) revealed that users in low-income countries prioritize PEOU due to limited exposure to advanced systems, whereas those in high-income settings emphasize PU and advanced functionalities. However, effective training is critical for aligning TAM constructs with high-information-intensity technologies (Venkatesh et al. 2020). Shaheen and Prasad, (2021) emphasized the importance of collecting user feedback and integrating it into technology updates to maintain relevance and usability over time though sustained engagement with digital healthcare tools requires continuous assessment and iterative improvements.

2.3.6 The Resource Based View Theory

The resource-based view and the dynamic capabilities theory serve as the theoretical underpinnings for this investigation of the ways in which Digitalisation can improve service delivery in the public Stumpo's healthcare sector in Zimbabwe. The resource-based perspective hypothesis can be traced back to the research conducted by Penrose (1959), despite the fact that

Wernerfelt mistakenly articulated the view first (1984). The resource-based view (RBV) places an emphasis on the resources of an organisation, viewing them as the primary factors that determine both performance and competitive advantage. The first thing that the model presupposes is that different organisations within a sector or a strategic group could have different resource packages under their control. This is one of the fundamental premises of the model (Bridoux, 2017).

The second assumption is that resource heterogeneity may continue to exist over time due to the fact that the resources that are utilized to put a company's strategy into action are not fully transferable from one company to another. One of the ideas of strategic management that has gained the most widespread acceptance is the resource-based concept (Powell, 2019). There is a possibility that additional organisational resources will boost the flexibility of strategic options, so enabling businesses to take advantage of newly emerging opportunities (Rangone, 2018). The RBV could be thought of as an inside-out process of formulating strategy: beginning with the internal resources of the company, their potential for value generation must be evaluated in order to define a strategy that will allow the company to achieve the greatest possible value in a manner that is both sustainable and achievable (Grant, 2011; Barney, 1986). In this manner, the product development strategy of the company is determined by the resources that are available as well as the capability to deploy those resources in the most effective manner to achieve a strong performance.

The resource-based view (RBV) places an emphasis on the resources of the company, viewing them as the primary factors that determine both performance and competitive advantage. In the process of examining the sources of competitive advantage, it uses two assumptions (Barney and Barney, 2013). To begin, this model operates on the presumption that companies operating within a single sector may have varying degrees of influence over the resources at their disposal. Second, it presupposes that resource heterogeneity may continue to exist over time since the resources that firms need to put their strategies into action are not fully transportable from one firm to another (Aaron et al 2014).

It is generally accepted that heterogeneity in resources must exist as a prerequisite for a resource bundle to be able to contribute to a competitive advantage. The RBV has made a number of extremely intriguing contributions, some of which include notions related to imitation, such as

isolating mechanisms (Rumelt, 2018), time compression diseconomies, asset mass efficiencies, and causal ambiguity (Dierickx and Cool, 2015). In recent years, a considerable amount of research that is resource-based has concentrated its attention on intangible assets, such as information (Sampler, 2019), knowledge (for example Spender, 2019), and dynamic skills (Teece, Pisano and Shuen, 2020). The resource-based strategy has been subjected to analysis and evaluation, both of which have shown a number of issues that have not been resolved. Some of these issues lend credence to the methodology utilized in this article and point to potential integration points between the RBV and the competitive environment of the company. These concerns pertain to the unit of analysis, the circularity or tautological nature of the resource-based firms, and the fact that they should be used in place of concepts such as opportunism and moral hazard.

According to Foss and Gill (2014), the resource-based perspective does not provide an escape route from the overarching difficulty of locating the suitable unit of analysis. The vast majority of the RBV's contributions focus on the study of competitive advantage using the individual resource as the relevant unit of analysis. However, Foss (2014) points out that this decision may only be appropriate if the relevant resources are sufficiently well-defined and free-standing. In other words, this choice depends on whether or not the resources can stand on their own. If, on the other hand, there are strong relations of complementarity and specialization among resources, then the manner in which resources are clustered, as well as the way in which they interact with one another and fit into the system, is crucial to the comprehension of the concept of competitive advantage.

Foss (2015) acknowledges that the categories of 'capabilities' and 'competences' attempt, maybe unsuccessfully, to capture this clustering and interaction. This issue is taken into consideration by the conceptual framework, which establishes a connection between competitive advantage and strategy rather than individual resources. Both Porter (1991) and Priem and Butler (2014) argue that the resource-based paradigm is circular. Priem and Butler argue that the statement made by Barney (2015), who states that if a resource is valuable and rare, then it can be source of competitive advantage, is necessarily true if the concepts of valuable and competitive advantage are defined in the same terms. Barney's statement states that if a resource is valuable and rare, then it can be source of competitive advantage. In response to this argument, Petered and Barney (2013) propose a definition of competitive advantage that is more limited. Rather than focusing on

profitability advantage, they define competitive advantage in terms of competitive edge. Exogenous determination of value leads Priem and Butler (2014) to the conclusion that the resource-based view has contributed very little to the explanation or prediction of competitive advantage. They recommend that scholars address core connections between resources and the environment due to the fact that while resources represent what can be done, the competitive environment represents what must be done to compete effectively in satisfying customer needs.

Foss (2015), who is writing about the neglect of the environment, says that the RBV does not need to restrict its domain of application to the firm because it may in fact add some more fine-grained analysis to the understanding of industry-level competitive dynamics. For instance, by directing attention to the resources that underlie barriers to mobility and entry. RBV may add some more fine-grained analysis to the understanding of industry-level competitive dynamics. RBV may add some more fine-grained analysis to the understanding of industry-level Therefore, combining the firm's resources and the competitive environment into a single paradigm might be helpful in understanding how resources contribute to performance (Priem and Butler, 2012) and how resources influence competitive dynamics (Priem and Butler, 2018). (Foss, 2018). While Peteraf and Barney (2019) take heterogeneity for granted and do not investigate its source, other scholars make the case for the creation of an endogenous theory of heterogeneity.

In order to explain the reasons for the existence of heterogeneity, Mahoney and Pandian (2018) suggest either incorporating the RBV with the organisational economics and dynamic capabilities approach or making use of the equilibrium models of industrial organisation. Both of these options are on the table. According to Foss and Knudsen (2018), the only conditions that should enter the study of sustained competitive advantage as exogenous elements are uncertainty and immobility (also known as sunk cost commitments). On the other hand, a wide variety of additional conditions are candidates for inclusion as endogenous elements. They include the diversity of the inputs they use in this never-ending list of additional conditions that help shape competitive advantage. Many of Foss and Knudsen's (2003) additional Priem and Butler (2014) fully acknowledge that the resource-based view has contributed to the explanation and prediction of the sustainability of competitive advantage by identifying the conditions that entail sustainability. This was accomplished through the use of the resource-based view's ability to identify the conditions that

entail sustainability. Conditions are related to the competitive environment, which lends credence to my argument in favour of combining the RVB and the competitive environment into a unified framework (Bruno et al 2014).

2.4 Service delivery

According to Jackson, (2019), a service is an intangible economic activity that cannot be stored and does not lead to ownership. He further asserts that it entails information exchange, knowledge and any other kind of assets. Service delivery entails components of a firm that define the manner in which different processes interact between the clients and the service providers in which the client finds value or loses as a result of the interaction (Kazmi, 2018). This indicates that a good service delivery method enhances the delivery of products to clients and increases the value. Schindler and Cooper (2017), consider service delivery as a set of activities that are undertaken within a business environment to perform a service. Ven and Poole (2015) allege that service delivery reflects a firm's coordinated activities and actions aimed at delivering effective services and products.

There is a section of indicators that top management teams in organisations can utilize in tracking the progress of a firm's service delivery efforts that are pegged on the need to increase the overall performance of the organisation. Good governance and accountability may be used as an indicator in measuring the success of service delivery in an organisation. Customer satisfaction remains crucial in determining an organisation's success in the delivery of its services in the market (Verhoef & Lemonk, 2018).

When a service delivers on quality expectations, customer satisfaction is achieved. Kiragu (2015) speaks of ex-ante and ex-post expectations whereby; ex-ante expectations are anticipations about a service before encounter and ex-post perception is the reality after experiencing the service. Ex-ante expectations are created after an initial encounter with a service or are acquired through promises in advertisement, advocacy, word of mouth or references. Ex-post perception is the reality about the service and occurs after using the service at least more than once. Quality service delivery occurs through keeping promises and maintaining consistency in service delivery. Consistency in quality service delivery leads to positioning of the service in customer's mind and loyalty to the brand (Kinoti et al., 2013).

2.4.1 Service delivery definition

Numerous authors have defined service delivery from diverse perspectives, highlighting its multifaceted nature. Grönroos (2019) describes service delivery as the process of creating value by fulfilling customer needs and expectations through interactions and transactions. Similarly, Zeithaml, Bitner, and Gremler (2020) define it as the coordinated efforts and strategies aimed at delivering high-quality services to meet or exceed user expectations. These definitions underscore the importance of aligning organisational objectives with customer-centric practices.

According to Parasuraman et al. (2020), service delivery involves the integration of tangible and intangible resources to achieve desired outcomes. This perspective aligns with the Service-Dominant Logic (SDL), which posits that value is co-created through interactions between providers and users (Vargo & Lusch, 2021). SDL emphasizes the dynamic and relational aspects of service delivery, particularly relevant in healthcare settings where patient-provider interactions are central to care.

Huang and Rust (2021) define service delivery as the process through which value is co-created between the service provider and the customer, facilitated increasingly by digital technologies. This definition reflects the growing role of technology in service delivery. Frow et al. (2019), emphasize the dynamic nature of service delivery, defining it as a complex, adaptive system that involves interactions between multiple stakeholders, including customers, providers, and technological systems. This view highlights the interplay between various actors in the service delivery process. Vargo and Lusch (2020) introduce the concept of service ecosystems, where service delivery is seen as a process of resource integration among interconnected actors within a service system. This perspective underscores the importance of understanding service delivery as part of a broader system of interactions.

Lovelock and Wirtz (2022) provide a broader definition, describing service delivery as the mechanism by which a service organisation meets customer expectations through the design, execution, and management of service operations. Parasuraman, Zeithaml, and Berry (2020) expanded the concept by suggesting that service delivery involves not only the interaction but also the physical and environmental elements that contribute to the service experience. According to Haldane et al. (2021) service delivery is a critical component of organisational performance,

particularly in the public Lemon healthcare sector, where the quality and efficiency of services directly impact patient outcomes and overall public health. In addition, it is a critical component of organisational performance, particularly in the public Lemon healthcare sector, where the quality and efficiency of services directly impact patient outcomes and overall public health (Islam et al. 2022). This literature review provides an extensive exploration of the concept of service delivery, definitions from various authors, and key aspects of service delivery within the public Lemon healthcare sector. The review also includes a discussion on the challenges and strategies for improving service delivery in healthcare.

These definitions indicate a shift towards more holistic and integrated views of service delivery, recognizing the impact of Digitalisation and the interconnectedness of modern service systems.

Key Components of Service Delivery

Effective service delivery hinges on several core components, each of which plays a critical role in shaping outcomes. These components, as identified by recent literature, include accessibility, quality, equity, and efficiency. Each of these dimensions has been extensively analysed to understand their impact on healthcare systems.

Accessibility

Accessibility refers to the ease with which users can obtain services, which is fundamental to effective service delivery. According to the World Health Organisation (WHO, 2019), accessibility encompasses geographic, economic, and social dimensions, ensuring that no barriers prevent individuals from receiving care. Recent studies have explored how telehealth services have bridged geographic gaps, particularly during the COVID-19 pandemic (Smith et al., 2021). Furthermore, initiatives like mobile clinics and community outreach programs have significantly improved access for rural and underserved populations (Perry et al., 2020). In high-income countries, accessibility is increasingly supported by advanced technologies, such as online appointment systems and health information platforms. However, in low- and middle-income countries, significant challenges remain due to infrastructure deficits and resource constraints (Xu et al., 2021). Thus, efforts to enhance accessibility must address both technological advancements and fundamental resource inequities.

Quality

Quality is a cornerstone of service delivery, influencing patient outcomes and satisfaction. Donabedian's (2020) conceptualization of quality in healthcare encompassing structure, process, and outcomes—continues to guide evaluations in this domain. Structural quality pertains to the availability of skilled personnel, medical equipment, and physical infrastructure, while process quality focuses on the methods and interactions during care delivery. Recent research highlights the importance of patient safety and clinical effectiveness as critical dimensions of quality. For instance, efforts to reduce hospital-acquired infections through standardized hygiene practices have significantly improved service quality (Greiner et al., 2020). Additionally, patient-centred care models emphasize tailoring services to individual preferences, further enhancing quality perceptions (Barry & Edgman-Levitan, 2021).

Equity

Equity in service delivery ensures that all individuals receive fair and impartial access to healthcare services, regardless of socioeconomic, racial, or geographic factors. Marmot and Allen (2020) argue that inequities in service delivery contribute to persistent health disparities, which can be addressed through targeted interventions and inclusive policies. For example, federally funded programs in the United States, such as Medicaid and CHIP, aim to bridge access gaps for low-income populations (Braveman et al., 2021). Innovative approaches, such as the integration of cultural competence training for healthcare providers, have also been effective in addressing equity challenges. Betancourt et al. (2021) note that culturally tailored interventions improve patient-provider communication, particularly for minority populations. Furthermore, the rise of telemedicine has demonstrated potential for extending equitable access, though digital divides remain a concern (Meyer et al., 2021).

Efficiency

Efficiency in service delivery focuses on optimizing resource utilization to achieve maximum impact with minimal waste. Porter and Lee (2020) emphasize that efficient systems not only reduce costs but also improve care delivery by eliminating redundancies and streamlining processes. Lean management principles, adapted from manufacturing industries, have been widely adopted in healthcare settings to enhance efficiency (Toussaint & Gerard, 2020). Examples of successful

efficiency initiatives include the implementation of electronic health records (EHRs) to reduce paperwork and improve data accuracy. Additionally, process mapping and redesign efforts have been employed to minimize patient wait times and enhance workflow in emergency departments (Womack & Jones, 2019). However, efficiency must be balanced with other components, as overly aggressive cost-cutting measures can undermine quality and accessibility.

2.4.2 The role of Service Delivery in the Public healthcare sector

The healthcare industry has transitioned from traditional care models to dynamic and patient-centred frameworks. This evolution has been largely influenced by the integration of digital tools, value-based care strategies, and multi-disciplinary approaches (OECD, 2021). However, the COVID-19 pandemic accelerated the adoption of digital health solutions, shifting a significant portion of healthcare delivery to remote settings. Virtual care, telemedicine, and digital diagnostics became pivotal components of healthcare service delivery in response to public health needs (Greenhalgh et al., 2022). In addition, the post-pandemic era, service delivery in healthcare has adapted to a hybrid model where in-person visits coexist with virtual consultations (Harvard et al., 2023). This transformation has led to the rise of telehealth platforms, making healthcare services more accessible, especially for underserved populations in rural or remote areas (Smith et al., 2022). Telemedicine's benefits, such as enhanced accessibility, convenience, and cost-effectiveness, were particularly evident during lockdowns and periods of restricted mobility. Studies show that telemedicine has improved chronic disease management and reduced unnecessary hospital visits (Deloitte, 2024; NHS England, 2023. Despite the challenges, such as technological infrastructure and digital literacy, the expansion of telemedicine has demonstrated its potential to bridge gaps in service delivery (Ravi et al., 2021). WHO, (2021) further asserts that these advances, barriers like digital literacy gaps and uneven technological infrastructure persist, highlighting the need for inclusive implementation strategies.

One of the most significant developments in healthcare service delivery since 2019 has been the rapid adoption of digital health technologies, including telemedicine. Keesara, Jonas, and Schulman (2020) notes that digitilisation in the public healthcare sector has transformed service delivery by enabling remote consultations, reducing the need for physical visits, and expanding access to care. This shift has been accelerated by the COVID-19 pandemic, which necessitated new ways of delivering care while minimizing physical contact. The Impact of Telemedicine in

Rural India. A study conducted in rural India demonstrated the effectiveness of telemedicine in improving access to healthcare and measuring service delivery Greenhalgh and Papoutsi, 2023). Remote monitoring tools allowed healthcare providers to track patient outcomes and adjust care plans in real time, leading to better health outcomes and increased patient satisfaction.

Integrated care systems (ICS) have gained traction as a solution to fragmented healthcare delivery. These systems align primary, secondary, and community care providers to ensure seamless patient journeys and holistic treatment plans. For example, the NHS has implemented improvement-led delivery models that foster collaboration across service providers, improving health outcomes and addressing disparities (NHS England, 2023). Evidence supports the effectiveness of ICS in reducing hospital readmissions and enhancing preventative care measures (OECD, 2022). An increased focus on home-centred and community-based care has been observed. These models leverage home health technologies, wearable devices, and community health workers to manage patients with chronic conditions in non-clinical settings. Such approaches reduce healthcare costs and hospital burdens while improving patient satisfaction (WHO, 2022; Deloitte, 2023).

Several factors have driven advancements in service delivery, including technological progress, workforce adaptations, and patient-centred approaches (NIHR, 2023). Digitalisation has significantly influenced healthcare delivery by enhancing diagnostic precision, predicting patient outcomes, and optimizing resource allocation. Digital-powered tools are now used in areas like radiology, patient risk stratification, and personalized treatment planning. For instance, predictive analytics enable hospitals to anticipate patient admission rates, improving operational efficiency (Deloitte, 2024; McKinsey, 2023). A skilled and adaptable workforce is critical for implementing innovative service delivery models. Programs such as the NHS's leadership initiatives have trained healthcare professionals to adopt quality improvement behaviors and embrace digital health solutions (NHS England, 2022). These efforts have enhanced the workforce's ability to manage complex care environments and respond to evolving patient needs (OECD, 2021).

The shift toward patient-centred care has been marked by increased patient engagement in decision-making processes. Co-production, where patients collaborate with healthcare providers in designing and evaluating care services, has improved care personalization and satisfaction. The integration of patient-reported outcome measures (PROMs) has further supported this trend, enabling tailored interventions (NIHR, 2024; WHO, 2023). The integration of patient-centered

care into service delivery models has garnered considerable attention in recent years. In addition, it emphasizes the need for healthcare services to be respectful of, and responsive to, individual patient preferences, needs, and values (Balasubramanian et al., 2020). This approach has become particularly relevant as patients increasingly demand a greater role in their healthcare decisions, supported by an expanding body of research demonstrating its positive impact on patient satisfaction and outcomes (Kumar et al., 2022).

According to a review by Zhou et al. (2023), patient-centered care leads to greater patient engagement, which, in turn, enhances service delivery efficiency. By actively involving patients in decision-making, healthcare providers can improve the relevance and quality of the care delivered, which leads to higher levels of patient satisfaction. For instance, in oncology care, a model of PCC has been shown to reduce emotional distress and improve the therapeutic relationship between healthcare providers and patients (Nguyen et al., 2022). A critical aspect of patient-centered care is the improvement of patient experience. Research by Trivedi et al. (2022) suggests that patient experience is a key determinant of perceived healthcare quality. Factors such as communication, empathy, wait times, and the physical environment of healthcare settings all contribute to the patient experience. As healthcare systems shift toward value-based care, understanding and improving patient experience has become increasingly central to assessing the effectiveness of service delivery (Campbell et al., 2023).

The focus on patient-centred care has intensified in recent years, with increasing recognition of the need to tailor services to individual patient needs and preferences. Barry and Edgman-Levitan (2021) asserts that patient-centred care is essential for improving service delivery, as it fosters greater patient engagement, adherence to treatment, and overall satisfaction with care. This approach requires healthcare providers to prioritize communication, shared decision-making, and respect for patient autonomy while being empathetic together with the involvement of patients in their care.

Quality is another critical dimension of service delivery. Donabedian (2018) defines healthcare quality as the application of medical science and technology in a manner that maximizes its benefit to health without correspondingly increasing the risk. According to the World Health Organisation (WHO, 2020), quality healthcare is characterized by services that are safe, effective, patient-centred, timely, efficient, and equitable. The quality-of-service delivery in healthcare is often

measured through outcomes such as patient satisfaction, recovery rates, and adherence to clinical guidelines. Quality of care remains one of the most pivotal factors influencing the effectiveness of service delivery in healthcare. In the last few years, much of the literature has focused on developing new frameworks and measures to assess healthcare quality, emphasizing outcomes rather than processes (Hwang et al., 2020).

A key area of concern in healthcare service delivery is patient safety, which is closely linked to the quality of services. Studies such as those by Kelly et al. (2022) have revealed that patient safety can be compromised by issues such as inadequate staffing, ineffective communication, and errors in diagnosis or treatment. The importance of quality assurance in service delivery has prompted healthcare institutions to adopt various mechanisms, such as continuous quality improvement (CQI) programs, patient safety audits, and evidence-based clinical guidelines (Alves & Matos, 2020). Quality of healthcare service delivery is also tightly connected to the concept of patient-centred care (PCC), which seeks to tailor healthcare services to the individual needs, preferences, and values of patients (Al-Ansari, et.al, 2018). Research by Walker et al. (2024) highlights the importance of integrated care systems in improving the quality-of-service delivery, particularly in chronic disease management. Integrated care models ensure that patients receive coordinated, comprehensive services across various healthcare settings, leading to improved health outcomes and reduced healthcare fragmentation.

Health Equity

Equity ensures that healthcare services are distributed fairly and that all individuals have access to the care they need regardless of their socio-economic status, geographic location, or other factors. Whitehead (2017), defines equity in healthcare as the absence of systematic disparities in health (or in the major social determinants of health) between social groups who have different levels of underlying social advantage/disadvantage. Equity in service delivery has gained prominence, particularly in light of the disparities highlighted by the COVID-19 pandemic. Bailey et al. (2020) argues that addressing health disparities is crucial for ensuring equitable service delivery, especially in marginalized and underserved communities. The authors emphasize the need for targeted interventions that address the social determinants of health and reduce barriers to care.

2.4.3 Challenges in Healthcare Service Delivery

The delivery of healthcare services is crucial for promoting health, improving patient outcomes, and reducing the burden of diseases on populations. However, the effective provision of healthcare faces numerous challenges that are complex and interrelated. Mastandrea, et.al, (2022) highlighted that these challenges span workforce issues, financial constraints, technological inequities, organisational inefficiencies, data security concerns, and difficulties with patient-centred care. The ongoing evolution of healthcare systems requires constant adjustments to address these barriers, ensuring that care is not only high-quality but also accessible and equitable for all. Understanding these challenges is critical for stakeholders, including healthcare providers, policymakers, and patients, to make informed decisions and create sustainable solutions that will improve healthcare service delivery globally.

As healthcare needs grow, these challenges become increasingly pronounced, particularly as the global population continues to age, and as chronic diseases like diabetes, heart disease, and mental health disorders become more prevalent. The COVID-19 pandemic underscored many of these issues, exposing deep vulnerabilities in healthcare delivery systems worldwide. The subsequent acceleration of digital health technologies, telemedicine, and virtual consultations has further highlighted both the promise and limitations of these innovations (Poghosyan, et.al, (2021). While some of these technologies have been game-changers, others have revealed gaps in infrastructure, knowledge, and access, further complicating healthcare delivery. However, there are challenges that hinder the impact of service delivery on patient care and the overall functioning of healthcare systems.

Workforce shortages represent one of the most significant barriers to effective healthcare delivery globally. The demand for healthcare professionals continues to outpace supply in many regions, especially in rural or underserved areas. As populations age, the need for healthcare workers particularly in geriatrics, primary care, and palliative care is expected to rise dramatically. In countries like the United States, the United Kingdom, and Canada, the shortage of healthcare professionals is further exacerbated by an aging workforce, where many healthcare workers are nearing retirement age (Mason et al., 2023). The scarcity of trained healthcare providers has led to increased workloads, extended wait times, and reduced quality of care for patients.

Additionally, workforce shortages contribute to burnout and dissatisfaction among healthcare providers, which in turn aggravates staff turnover and reduces the overall quality of patient care. Research by Poghosyan et al. (2021) highlights that burnout among healthcare workers is a growing concern, particularly among nurses and physicians, leading to reduced job satisfaction, lower morale, and worse health outcomes for patients. The pressure of high patient volumes, long hours, and insufficient support exacerbates stress, contributing to mental health issues like anxiety, depression, and physical exhaustion. The strain on healthcare professionals is particularly evident in low-resource settings where wages are low, staff support is limited, and infrastructure is insufficient (Adams, 2021).

In such settings, workers often face a dilemma of providing quality care with inadequate resources, further increasing job dissatisfaction and turnover rates. The demands placed on healthcare workers during the pandemic have led to increased levels of burnout, impacting service delivery. Shanafelt, Ripp, and Trockel (2020) reports that burnout among healthcare workers is a significant challenge that affects their ability to provide high-quality care. The authors emphasize the need for organisational strategies that support the well-being of healthcare providers. Further engaging patients in their care is essential for effective service delivery, yet many healthcare systems struggle to involve patients meaningfully. Hibbard and Greene (2023) suggest that patient engagement is hindered by factors such as low health literacy, cultural barriers, and insufficient time for patient-provider interactions.

Workforce shortages are not just a result of insufficient training or recruitment; they are also the product of systemic inefficiencies and poor management practices. In many regions, there are logistical and financial constraints that hinder the adequate training and professional development of healthcare workers (Smith, et.al, (2022). For instance, in low-income countries, where healthcare budgets are constrained, the recruitment of new staff may not be feasible due to limited funding, and the cost of ongoing professional development may be unaffordable. According to Zulu, et.al, (2023) in order to combat these challenges, healthcare systems must prioritize workforce planning by increasing investment in training programs, offering incentives for workers to practice in underserved regions, and creating more sustainable working conditions to retain staff in the long term. Without addressing these fundamental issues, workforce shortages will continue to undermine the efficiency and accessibility of healthcare services.

The financial accessibility of healthcare remains one of the most pressing challenges for patients worldwide. High medical costs, inadequate insurance coverage, and a lack of financial protections force millions of people to forgo necessary care, leading to worse health outcomes. According to Baker et al. (2020), high out-of-pocket expenses prevent patients from seeking timely treatment, often leading to the progression of preventable conditions that could have been managed more effectively at earlier stages. For instance, individuals with chronic diseases like diabetes or hypertension often fail to seek regular check-ups or adhere to prescribed treatments due to the financial burden of out-of-pocket costs. This delay in care exacerbates the severity of diseases, leading to higher hospitalizations and more expensive treatments in the long run.

In addition to financial strain on individuals, healthcare systems themselves are increasingly strained by rising costs. Governments and insurance companies are struggling to contain expenditures while maintaining the quality of care, which often results in cost-cutting measures like reduced reimbursements, less access to services, or decreased funding for essential services. A report by Gaffney et al. (2020) notes that despite substantial investments in healthcare infrastructure, the affordability of care remains a barrier, particularly in countries like the United States, where administrative costs are high, and insurance models are complex and fragmented. Even in countries with universal health coverage, like the United Kingdom, the escalating costs of medical technologies, pharmaceuticals, and aging populations are putting immense pressure on public health budgets (Klein, 2021).

Moreover, the growing financial burden of healthcare is disproportionately felt by vulnerable populations, such as low-income groups, the elderly, and minority communities. These groups often face higher rates of chronic conditions and lack adequate insurance coverage, which further exacerbates their financial vulnerability. In many developing countries, the situation is even more dire, with the inability to afford basic healthcare services leading to widespread health inequities. A study by Zulu et al. (2023) found that in sub-Saharan Africa, out-of-pocket spending on healthcare is a major cause of people not seeking care at all. In such settings, inadequate funding for healthcare and an over-reliance on private healthcare providers lead to catastrophic spending for individuals who cannot afford treatment, further perpetuating cycles of poverty and ill-health.

Addressing the financial barriers to healthcare requires multifaceted solutions, including reforms in insurance models, government-funded initiatives, price regulation, and increased investments

in public health. Expanding access to affordable healthcare is essential to preventing preventable diseases and ensuring that healthcare systems are sustainable in the long run. Innovative financial solutions such as health savings accounts, sliding scale fees, and the expansion of public health insurance can help mitigate the financial strain that patients face and reduce overall healthcare costs. The COVID-19 pandemic has placed unprecedented strain on healthcare resources, leading to challenges in service delivery. Ranney, Griffeth, and Jha (2020) discuss how resource shortages, including personnel, equipment, and facilities, have impacted the ability of healthcare systems to deliver timely and effective care. These shortages have highlighted the need for more resilient healthcare systems capable of responding to crises. Many healthcare systems, particularly in low- and middle-income countries, face significant resource constraints that limit their ability to deliver services effectively. World Health Organisation (WHO, 2017) reports that shortages of healthcare workers, inadequate infrastructure, and limited financial resources are common barriers to effective service delivery.

The rapid expansion of digital technologies in healthcare has revolutionized the way services are delivered, from electronic health records (EHRs) to telemedicine and AI-driven diagnostic tools. However, the integration of these technologies has also created a "digital divide," where unequal access to technology exacerbates health disparities. In rural areas and lower-income communities, the lack of access to high-speed internet, smartphones, and computers often limits the ability of patients to engage with digital healthcare services (MacDonald et al., 2021). A study by Greenhalgh et al. (2022) highlighted that while telemedicine has the potential to enhance access to healthcare, particularly in remote areas, patients in disadvantaged communities often face significant barriers to its use due to lack of infrastructure and digital literacy.

Telemedicine has emerged as a potential solution to improve access to healthcare services, particularly in areas with fewer healthcare providers. However, its widespread implementation has underscored the digital divide. In many parts of the world, patients are unable to participate in virtual consultations because they lack reliable internet or mobile devices. This technological gap leaves some of the most vulnerable populations, such as the elderly, low-income families, and those in rural areas, at a disadvantage. A report by Mastandrea et al. (2022) found that even though digital health tools are widely touted as a solution to healthcare access issues, their success hinges

on ensuring that everyone, regardless of socioeconomic status, has the means to access and use these tools effectively.

The digital divide is also evident in the healthcare workforce. Many healthcare providers, particularly in rural or underfunded regions, lack the necessary training and resources to fully integrate digital tools into their practices. According to Baker, et.al, (2020), the implementation of EHR systems, telemedicine platforms, and other digital health technologies can be costly and time-consuming, requiring substantial investments in both infrastructure and training. Moreover, healthcare professionals who are not well-versed in these technologies may struggle to use them effectively, which can undermine the quality of care. In countries like the United States, the shift toward value-based care models and the increasing reliance on data-driven decision-making further highlight the need for healthcare workers to be proficient in digital health tools. Training initiatives that focus on improving digital literacy among healthcare providers are critical to overcoming these barriers.

To address the digital divide, efforts must be made to increase technological access and literacy across all levels of society. This includes improving internet infrastructure in underserved areas, providing affordable devices for low-income populations, and offering digital literacy programs for both patients and healthcare providers. Additionally, policymakers must consider equity when implementing digital health solutions to ensure that vulnerable populations are not excluded from the benefits of technological innovations. While digital health technologies have expanded access to care, they have also introduced new challenges, particularly related to the digital divide. Nouri et al. (2020) notes that unequal access to digital technologies and the internet has created disparities in access to telemedicine services, particularly among older adults and low-income populations. Addressing these disparities is critical for ensuring equitable service delivery.

Healthcare systems often struggle with organisational inefficiencies, which can undermine the delivery of care. Fragmented care is one of the primary issues, particularly when patients have to navigate different providers and departments without sufficient coordination. For instance, patients with chronic conditions like diabetes or heart disease may receive treatment from multiple specialists who do not communicate with each other, resulting in duplicated tests, conflicting recommendations, and delays in care (Lee et al., 2021). Fragmentation of care leads to poor patient outcomes, as continuity of care is essential for managing long-term health conditions.

Another significant organisational inefficiency is the inadequate use of resources. In many hospitals and clinics, especially in low-resource settings, the allocation of resources such as medical supplies, personnel, and infrastructure is often poorly managed. This inefficiency results in long wait times, delays in treatments, and a lack of essential services. A report by the WHO (2020) found that poor resource management in hospitals is a common issue that affects healthcare outcomes, with many facilities sufferings from an overabundance of certain resources, such as medications, while lacking essential items like diagnostic equipment or personnel. This mismatch leads to inefficiencies that waste time and money and ultimately impact patient care.

Furthermore, administrative inefficiencies contribute to the delays and costs associated with healthcare delivery. Complex insurance procedures, poor billing practices, and time-consuming documentation processes create bottlenecks that can delay care, frustrate patients, and burden healthcare providers (Lee, et.al, 2021). The administrative workload placed on healthcare staff takes time away from patient care, and in many cases, the administrative tasks themselves are redundant or outdated. Addressing these inefficiencies requires investment in management systems, the simplification of administrative tasks, and improved integration of healthcare services. Reducing bureaucratic hurdles and fostering better coordination across healthcare settings can lead to faster, more effective care delivery.

The increasing reliance on digital tools in healthcare, including electronic health records (EHRs), telemedicine platforms, and mobile health applications, has raised significant concerns about data privacy and security. Healthcare data is highly sensitive, and the potential for breaches or misuse of patient information is a critical issue for both patients and providers. Cyberattacks targeting healthcare organisations have grown in sophistication and frequency, with healthcare systems being prime targets due to their vast amounts of personal health data. The consequences of data breaches can be severe, leading to financial loss, identity theft, and harm to patients' privacy (Kruse et al., 2021). In addition to the risks posed by external cybercriminals, there is also concern about how healthcare organisations store and use patient data. Some patients are wary of sharing sensitive information with healthcare providers, fearing that their personal health data might be used for purposes beyond medical care, such as marketing or research, without their explicit consent. Trust is crucial in the patient-provider relationship, and any breach of that trust can have long-term negative effects on patient engagement and adherence to treatment plans (Zhang et al.,

2022). A study by Gaffney et al. (2020) found that concerns over privacy were a significant barrier to the adoption of digital health technologies, as patients often feared their data would be misused.

To address these concerns, healthcare systems must invest in robust cybersecurity measures, including encryption, multi-factor authentication, and regular audits of digital health platforms. Additionally, healthcare providers must be transparent with patients about how their data will be used, ensuring that patients' rights to privacy are respected. Ethical standards regarding data sharing and storage should be strictly enforced, and healthcare organisations must comply with regulatory frameworks like the Health Insurance Portability and Accountability Act (HIPAA) to safeguard patient information. Public awareness campaigns and patient education on data protection can also play a crucial role in ensuring patients feel secure in sharing their health information.

Patient-centred care (PCC) is a fundamental principle that emphasizes treating patients as partners in their healthcare journey, taking into account their preferences, values, and unique needs. However, despite growing recognition of the importance of PCC, its implementation remains a significant challenge in many healthcare systems. One of the primary obstacles is a lack of effective communication between healthcare providers and patients. A study by Smith et al. (2022) showed that patients often feel that their concerns and preferences are not fully addressed, leading to feelings of frustration, disengagement, and decreased satisfaction with care. This lack of communication can also affect patient adherence to treatment plans, resulting in poorer health outcomes.

Additionally, the focus on efficiency and throughput in many healthcare systems often leads to the commodification of care, where patients are treated as cases to be processed rather than individuals with unique needs. The increasing use of standardized treatment protocols and the focus on metrics such as wait times and patient volume can detract from the personalized care that patients need. Research by Frost and Campbell, (2021) has shown that healthcare providers who spend less time with patients and fail to engage in shared decision-making may contribute to lower levels of patient satisfaction and non-adherence to prescribed treatments.

Beyond communication, social determinants of health, such as access to housing, education, income, and social support—are critical factors that influence patients' ability to engage in their

healthcare. Patients facing these challenges often have difficulty navigating complex healthcare systems, especially when they do not have access to the resources or support needed to manage their health. Addressing these social determinants requires a holistic approach to care that goes beyond the medical model and incorporates social services, community support, and policy changes that address the root causes of health disparities.

The challenges in healthcare service delivery are multifaceted, interdependent, and evolving. Workforce shortages, financial barriers, technological inequities, organisational inefficiencies, data security concerns, and patient-centric challenges all contribute to the complexities of providing effective, accessible, and high-quality care. These issues are not isolated but are deeply interconnected, with each challenge influencing and exacerbating the others. As healthcare systems continue to evolve, addressing these challenges will be essential to improving care delivery. Efforts must be made at the policy level, within healthcare organisations, and through collaboration with communities to create systems that are sustainable, equitable, and responsive to the needs of patients. Addressing these challenges is not only a matter of improving the healthcare system's efficiency but also of ensuring that healthcare is truly patient-centred, fair, and accessible to all. As technology advances and the global healthcare landscape changes, it is imperative to foster innovation while remaining committed to the core values of equity and patient-centeredness. This holistic approach to improving service delivery is key to ensuring that healthcare systems are capable of meeting the needs of the 21st-century population.

2.4.4 Measuring Service Delivery in Healthcare

Traditional approaches to measuring healthcare service delivery have focused on patient outcomes, process measures, and patient satisfaction. Patient outcomes are often assessed through clinical indicators such as mortality rates, readmission rates, and the incidence of complications (Donabedian, 2020). These indicators provide valuable insights into the quality of care but are sometimes limited in their ability to fully capture patient experiences and broader system efficiencies. Another key approach involves measuring healthcare processes, such as the timeliness of care, adherence to clinical guidelines, and the efficiency of resource use (Baker et al., 2020). These metrics are typically quantitative and rely on routine data collected through administrative records, hospital databases, and billing information. However, these metrics often overlook

patient-centered aspects of care, such as emotional support, communication quality, and individual preferences.

Patient satisfaction surveys are another longstanding method used to assess service delivery. These surveys gather feedback from patients about their experiences, focusing on aspects such as doctor-patient communication, waiting times, and hospital environment. Common tools include the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey in the United States or the Patient Satisfaction Questionnaire (PSQ) in other regions (Edwards et al., 2021). While these tools provide valuable feedback, they are often subjective and may not always correlate with clinical outcomes. Despite their usefulness, these traditional approaches have limitations, particularly in the context of a rapidly evolving healthcare landscape, where digital technologies are increasingly integrated into care delivery. As a result, there is a growing need to expand measurement frameworks to account for digital tools' influence on service delivery.

The integration of digital technologies into healthcare systems has introduced new dimensions to the measurement of service delivery. Digitalisation offers several advantages in terms of efficiency, scalability, and data accuracy, which can improve existing service delivery metrics. Technologies like EHRs, telemedicine, AI-based decision support tools, and mHealth applications provide real-time data that can be used to monitor, assess, and improve various aspects of healthcare delivery. EHRs have revolutionized the way healthcare data is collected and shared, providing a comprehensive, up-to-date view of a patient’s medical history. These digital records enable providers to track patient outcomes, monitor adherence to treatment protocols, and identify areas for improvement in care delivery. According to Kruse et al. (2021), the integration of EHRs has enhanced the accuracy of service delivery metrics by ensuring that clinical data is consistently updated and easily accessible. EHRs also improve the coordination of care across different healthcare providers, which can result in better clinical outcomes and fewer medical errors (Zhang et al., 2020).

Moreover, EHRs facilitate the implementation of evidence-based practices by enabling healthcare providers to adhere to clinical guidelines and ensure that interventions are timely and appropriate. The use of EHRs as a data source for service delivery measurement allows for the evaluation of care processes, such as the frequency of lab tests, prescription patterns, and follow-up visits, in a more systematic and precise manner (Lee et al., 2022). However, challenges remain in fully

leveraging EHRs for service delivery measurement. For example, incomplete or inaccurate data entry, user interface issues, and interoperability challenges between different health information systems can undermine the reliability of these tools (Kruse et al., 2021). To mitigate these challenges, healthcare organisations need to invest in robust EHR infrastructure, comprehensive staff training, and ensure data quality standards are met across the system.

Telemedicine, particularly accelerated by the COVID-19 pandemic, has become a major component of healthcare service delivery, especially in remote areas or during public health emergencies. Telemedicine platforms enable providers to conduct consultations, diagnose, and treat patients remotely, thereby reducing wait times, improving access to specialists, and increasing healthcare delivery efficiency. Measuring the impact of telemedicine on service delivery often involves assessing parameters such as appointment wait times, patient satisfaction, and the number of consultations conducted remotely (Greenhalgh et al., 2022).

In a study by Chen et al. (2022), the implementation of telemedicine was found to reduce healthcare costs by lowering hospital readmission rates and preventing unnecessary in-person visits. These cost-saving aspects are important measures of service delivery, as they reflect the efficiency of care and the optimal allocation of resources. However, telemedicine introduces new challenges for measurement, such as ensuring the quality of care in remote consultations and addressing disparities in access to technology. Additionally, the measurement of telemedicine services often requires new indicators that capture the effectiveness of virtual care and patient engagement in remote settings.

Digital health tools such as telemedicine also necessitate the development of new quality metrics that assess patient engagement, digital literacy, and the effectiveness of digital communication in fostering trust between patients and providers. Evaluating these factors is important for understanding how digital tools contribute to overall service delivery and ensuring that virtual care is as effective as in-person consultations (Baker et al., 2020). AI and machine learning technologies are increasingly being integrated into healthcare to assist with diagnosis, treatment planning, and decision-making. AI-based decision support tools, for example, can analyze vast amounts of clinical data to provide personalized treatment recommendations, predict patient outcomes, and identify potential complications (Lee et al., 2021). These tools have the potential to improve

service delivery by enhancing clinical decision-making, reducing human error, and streamlining workflows.

However, measuring the effectiveness of AI in healthcare service delivery requires robust evaluation frameworks that account for both clinical outcomes and operational efficiencies. Researchers have emphasized the need to develop performance indicators that assess the accuracy of AI predictions, the impact on patient outcomes, and the reduction in clinical workload (Liu et al., 2023). A key challenge in this area is ensuring that AI tools are designed to align with the needs of both healthcare providers and patients, particularly in terms of usability and trust. AI's role in service delivery measurement extends beyond clinical applications. AI-driven analytics platforms can aggregate data from multiple sources, such as EHRs, imaging systems, and patient feedback, to provide a comprehensive overview of care delivery. These systems can offer real-time insights into healthcare performance, identify areas for improvement, and track the progress of quality improvement initiatives (Zhang et al., 2020). However, to ensure the ethical use of AI in service delivery measurement, systems must be transparent, unbiased, and governed by appropriate data privacy standards.

Electronic health (eHealth) applications have gained prominence in monitoring patient conditions, promoting healthy behaviors, and enabling remote patient monitoring (RPM). These tools are particularly useful for managing chronic diseases, where continuous monitoring is crucial for timely intervention. mHealth apps allow patients to track their symptoms, medication adherence, and lifestyle changes, while providing clinicians with real-time data to adjust treatment plans (Baker et al., 2023).

Measuring service delivery in the context of eHealth requires the integration of patient-reported outcomes (PROs) into healthcare systems. PROs provide direct insight into the patient’s perspective on their health status, treatment progress, and quality of life, offering a patient-centered approach to service delivery measurement (Edwards et al., 2021). PROs can be incorporated into eHealth apps, allowing patients to regularly input data that healthcare providers can analyze for real-time decision-making. Studies have shown that eHealth tools improve patient engagement, increase adherence to treatment plans, and lead to better health outcomes (Zhao et al., 2023). However, the implementation of eHealth as a measurement tool faces challenges such as technological barriers, including limited access to smartphones in low-income populations, as well

as concerns about data security and patient privacy. Ensuring equitable access to mHealth solutions and safeguarding patient data are critical to maximizing the impact of these tools on service delivery.

The digitalisation of healthcare has profound implications for how service delivery is measured. Traditional metrics such as patient outcomes, process measures, and patient satisfaction still play a central role in evaluating healthcare quality, but digital technologies are reshaping how these metrics are collected, analyzed, and interpreted. Tools such as EHRs, telemedicine platforms, AI decision support systems, and mHealth applications provide new opportunities to enhance the accuracy, efficiency, and comprehensiveness of service delivery measurement. While the integration of digital health technologies holds great promise, it also introduces challenges related to data quality, accessibility, and the need for new measurement frameworks that account for digital tools' impact on patient outcomes. As digital health continues to evolve, it is essential for healthcare systems to develop robust metrics that assess both the clinical effectiveness and the patient experience of digital care. Furthermore, to fully realize the potential of Digitalisation in healthcare service delivery, attention must be paid to issues of equity, access, and privacy, ensuring that these technologies benefit all patients equally.

Ultimately, a comprehensive approach to measuring service delivery that incorporates both traditional and digital metrics will be essential for improving healthcare outcomes, optimizing resources, and advancing patient-centered care**.**

2.5 Digitalisation and Service Delivery

2.5.1 Ubiquity of Digital Technologies and Service Delivery

According to Bashshur, et.al (2016), Ubiquity in the context of digital technologies refers to their pervasive and widespread integration into various aspects of healthcare delivery. This includes the adoption of technologies across different healthcare settings, from primary care to specialized services, and their integration into routine clinical and administrative practices (Kuo and Finkelstein, 2018).

The rapid advancement of digital technologies has undoubtedly transformed the way services are delivered. From shopping to healthcare to banking, digital technologies have become increasingly ubiquitous and have had a profound impact on various sectors.

Ubiquity, in its modern sense, refers to the pervasive presence or widespread availability of something, often to the point where it becomes an unnoticed yet essential part of daily life. Zuboff, (2019) further expanded on this by discussing the ubiquitous surveillance enabled by digital platforms, a phenomenon she termed surveillance capitalism. Zuboff, (2019) further argued that the omnipresence of data collection mechanisms has transformed digital technology into a tool for economic exploitation, where every digital interaction becomes a data point for corporate profit. Weiser and Brown, (2020) argued that the true power of technology lies in its ubiquity, technology becomes most effective when it recedes into the background of our consciousness, becoming an invisible yet integral part of everyday life. This idea, originally presented in the context of ubiquitous computing, has been increasingly relevant as technologies like the Internet of Things (IoT), artificial intelligence, and cloud computing have proliferated.

Digital technologies have significantly enhanced service delivery. The emergence of mobile applications, online platforms, and virtual assistants has revolutionized conventional service models. For instance, e-commerce platforms have allowed consumers to purchase products from the comfort of their homes, eliminating the need for physical visits to stores. Li et al. (2020) revealed that the ubiquity of digital technologies positively influenced service delivery, leading to increased customer satisfaction and loyalty.

There is convenience that is brought by the ubiquity of technology has been significantly improved through the development of mobile applications. Mobile apps have enabled users to access services on-the-go, reducing the need for physical interactions and making services more accessible to a wider range of users. Alvarez et al. (2021) found that mobile applications have facilitated easier access to various services, such as transportation, food delivery, and healthcare, thereby enhancing convenience and simplifying the user experience. The study also revealed that users appreciated the improved service delivery of having services readily available at their fingertips, enabling them to save time and effort.

The use of telemedicine platforms has significantly enhanced access to healthcare services, especially in remote or underserved areas. Studies indicate that telehealth has expanded the reach of specialist care and reduced barriers to accessing timely medical consultations (Koonin et al., 2020). The COVID-19 pandemic accelerated the adoption of telemedicine, demonstrating its potential to improve access to care and maintain continuity during crises (Feng et al., 2022).

The rapid expansion of telemedicine during the COVID-19 pandemic exemplifies the transformative impact of digital technologies on service delivery. Studies have shown that telehealth services became essential for maintaining care continuity, particularly during lockdowns and restrictions (Feng et al., 2022).

Bates et al, (2020) asserts that electronic health (eHealth) applications have made health monitoring and self-management more accessible. Apps for tracking symptoms, managing chronic conditions, and communicating with healthcare providers have empowered patients to take an active role in their health management (Pew Research Center, 2022). In addition, technology has seen the invention of wearable devices that monitor health metrics have become increasingly common. These technologies provide real-time data on vital signs and physical activity, facilitating proactive management of chronic diseases and personalized care (Hwang et al., 2022).

In addition to e-commerce platforms and mobile apps, virtual assistants have also played a crucial role in enhancing convenience and accessibility. Virtual assistants, such as Amazon's Alexa or Apple's Siri, have made it possible for users to access services through voice commands and perform tasks without physically interacting with devices. This technology has not only made services more accessible for individuals with limited mobility or disabilities but has also added a layer of convenience to daily tasks. According to Kim et al. (2020), virtual assistants have improved the accessibility of services by providing users with quick and efficient access to information, entertainment, and various functionalities.

Electronic Health Records (EHRs), have improved the quality of care by providing comprehensive and readily accessible patient information. This integration facilitates better coordination among healthcare providers, reduces errors, and supports evidence-based decision-making (Jha et al., 2021). Recent studies have highlighted how EHRs contribute to improved patient safety and treatment outcomes (Jang et al., 2021). Artificial Intelligence (AI) applications, such as diagnostic algorithms and predictive analytics, have enhanced diagnostic accuracy and treatment planning. AI tools assist clinicians in identifying patterns in patient data, leading to more precise diagnoses and personalized treatment plans (Lee et al., 2021). AI-driven tools have shown promise in reducing diagnostic errors and improving treatment efficacy. The integration of AI in diagnostic imaging has demonstrated significant improvements in diagnostic accuracy and efficiency. AI

algorithms assist radiologists in interpreting complex imaging data, leading to earlier and more accurate detection of conditions such as cancer (Lee et al., 2021).

Chaudhry, et.al, (2015), highlighted that there is improved service delivery by using Telehealth and remote consultations; further ubiquitous internet access and mobile technology can enable virtual consultations with doctors, specialists, and even mental health professionals, reducing travel time and costs for patients, especially in remote areas. Totten, et.al (2016) further supports digitilisation of the public healthcare sector as it has various online platforms that can facilitate convenient appointment booking, rescheduling, and reminders, streamlining the process for both patients and providers. In addition, Lacktman, (2018) asserts that digital prescriptions and refills can be created to eliminate the need for physical prescriptions, allowing patients to refill medications online or through mobile apps, saving time and effort. Wearable devices and self-monitoring with ubiquitous sensors can empower patients to monitor their health for example monitoring of blood pressure, glucose levels in real-time, prompting early intervention and improved self-management (Haghi, et.al, 2019).

According to Capistrant, (2020), there is enhanced service delivery when using technology to reach underserved populations, telehealth and mobile health interventions can bridge geographical barriers and reach populations with limited access to traditional healthcare facilities, including those in rural areas or facing mobility challenges. Further, language translation services and real-time translation tools can facilitate communication between patients and providers who speak different languages, improving access to care for diverse communities (Chau, et.al (2019). Through information dissemination and health education, ubiquitous internet and mobile access can broaden the reach of health information and educational resources, empowering patients to make informed decisions about their health. According to Ferguson, et.al, (2021), personalized healthcare and support can be provided 24/7 through AI-powered chatbots and virtual assistants to aid support and guidance to patients, addressing basic concerns and directing them to appropriate resources.

Overall, ubiquity presents a double-edged sword for healthcare service delivery, while it holds immense potential to enhance convenience and accessibility. A well-planned and inclusive approach that prioritizes data security, digital literacy, and human interaction is necessary to fully

unlock the potential of ubiquity in transforming healthcare for the better. The ubiquity of digital technologies has also transformed customer expectations regarding service delivery. With the ability to access services anytime and anywhere, customers now expect instantaneous responses and personalized experiences. According to Meuter et al. (2019), the adoption of digital technologies has led to an increase in customer demand for "always-on" service availability. Service providers who fail to meet these evolving expectations may risk losing customers to competitors who have successfully embraced digital technologies.

Furthermore, Bressolles et al. (2021) argue that digital technologies have also influenced customers' desire for personalized experiences. Through the collection and analysis of customer data, businesses can now tailor their services to cater to individual preferences and needs. This personalization not only enhances customer satisfaction but also fosters a stronger sense of loyalty and brand affinity. By leveraging digital technologies, companies can gather insights on customer behavior, preferences, and purchase history to offer customized recommendations and targeted marketing campaigns. This approach demonstrates a proactive commitment to meeting customers' expectations and stands as a differentiating factor in the digital landscape.

However, failure to meet these evolving expectations can have detrimental effects on a business. According to a report by Accenture (2021), nearly 71% of customers stated that they are likely to switch to a competitor if their expectations for personalized experiences are not met. This highlights the importance of effectively incorporating digital technologies into maintaining a good service delivery. As the competition becomes fiercer in the digital realm, businesses that do not embrace these transformations risk losing customers to competitors that successfully meet their digital expectations.

Moreover, the COVID-19 pandemic has further accelerated the transformation of customer expectations. As lockdowns and social distancing measures were implemented, the reliance on digital technologies for service delivery increased exponentially. Customers who were initially hesitant or resistant to digital interactions were forced to adapt, leading to a broader acceptance and expectation for digital service availability. Vargo and Lusch (2020) suggests that the pandemic has accelerated the transition towards a service-dominant logic, where value is co-created through

digital interactions between customers and businesses. This shift further reinforces the need for businesses to meet customer expectations in the digital space.

2.5.2 Reliability of Digital Technologies and Service Delivery

Reliability is a key concept in various fields, including engineering, psychology, and business, and it generally refers to the consistency or dependability of a system, process, or product. In the context of engineering and technology, reliability is often defined as the probability that a system will perform its intended function without failure under specified conditions for a particular period (O'Connor & Kleyner, 2020). According to Ben-Gal (2019), reliability is not only about performance but also involves the predictability of outcomes and the minimization of variability, making it a crucial factor in quality control and risk management.

In the realm of information systems, Karray et al. (2021) suggest that reliability also encompasses the system's ability to handle faults and recover from errors, which is particularly relevant in the era of digital transformation. As digital systems become increasingly complex and interconnected, the reliability of these systems becomes a critical factor in ensuring the seamless delivery of services. Reliability is a crucial aspect of digital service delivery, encompassing the consistent performance and availability of digital services without disruptions or failures. According to Arslan, et al. (2020), reliability refers to the ability of a digital service to fulfill its intended function consistently over time. It plays a pivotal role in instilling trust and satisfactions among users, as Falanger, et al. (2021) suggest that reliability significantly impacts the perceived quality of a digital service.

The reliability of digital service delivery has gained immense importance due to its profound impact on customer experiences. A study conducted by Heirman and Walrave (2019) emphasizes that customers' satisfaction and loyalty are strongly influenced by the reliability of the digital services they use. When users experience consistent performance and availability, they develop a sense of trust in the service provider, leading to long-term customer relationships (Arslan, et al., 2020).

Moreover, the reliability of digital service delivery also has a direct correlation to brand reputation. A survey conducted by IBM (2020) found that 65% of consumers consider reliability as one of the most crucial factors influencing their trust in a brand. Any disruptions or failures in service delivery

can harm the brand's reputation, leading to negative word-of-mouth and potential loss of customers (Heirman & Walrave, 2019).

The overall business performance of an organisation is heavily influenced by the reliability of its digital service delivery. Arslan, et al. (2020) argues that unreliable digital services can lead to revenue loss, decreased productivity, and increased customer churn. On the other hand, organisations that prioritize reliability witness higher customer satisfaction, increased customer retention, and positive financial performance (Falanger, et al., 2021; IBM, 2020). To ensure the reliability of digital service delivery, organisations need to adopt various strategies and technologies. According to Deng, Li, and Liu (2021), organisations can employ redundant infrastructure, implement comprehensive monitoring systems, and conduct regular performance testing to identify and address potential points of failure. Proactive maintenance and rapid response to incidents are also crucial in mitigating disruptions and ensuring reliable service delivery (Arslan, et al., 2020).

Digitalisation has transformed service delivery across various sectors, from healthcare to finance, by enabling faster, more efficient, and often more reliable service provision. However, the reliability of digital systems in service delivery is multifaceted, involving the robustness of digital infrastructure, data integrity, cybersecurity, and the adaptability of digital tools to different service environments. A study by Kiessling et al. (2020) highlights that the reliability of digital services depends heavily on the underlying technology infrastructure. For instance, cloud computing and the Internet of Things (IoT) have been instrumental in enhancing service reliability by offering scalable, resilient, and secure platforms. These technologies allow for continuous monitoring, predictive maintenance, and real-time updates, which collectively improve the dependability of services.

Moreover, the reliability of digitalized service delivery also hinges on cybersecurity measures. As pointed out by Dutta et al. (2021), cyber-attacks can significantly disrupt service delivery, leading to loss of data, breaches of confidentiality, and interruptions in service. Therefore, ensuring the reliability of digital systems involves not only robust infrastructure but also effective cybersecurity strategies to protect against potential threats.

Another aspect of reliability in digital service delivery is user satisfaction and trust. According to Mosweu and Ngoepe (2022), the perceived reliability of digital services significantly impacts user trust, which in turn affects the adoption and continued use of digital platforms. If users perceive a digital service as unreliable due to frequent downtimes, errors, or security breaches they are less likely to trust and use the service, which can undermine the benefits of Digitalisation.

In the context of service delivery, the reliability of digital systems is crucial for maintaining public trust and ensuring the continuity of essential services. Chua et al. (2019) note that as governments increasingly rely on digital platforms to deliver services, the reliability of these systems becomes synonymous with the reliability of the government itself. This makes it imperative for public sector organisations to invest in robust and reliable digital infrastructures.

2.5.2.1 Factors Influencing Reliability:

The reliability of digital technologies has become increasingly important in recent years as society becomes more reliant on these technologies for various aspects of everyday life. From communication to business operations, the reliability of digital technologies can greatly impact individuals and organisations alike. Infrastructure plays a crucial role in ensuring the reliability of digital technologies. Faghih et al. (2021) highlight the importance of a robust infrastructure in providing seamless service delivery. Infrastructure refers to the physical components that support digital technologies, such as servers, routers, and data centers. A well-maintained and up-to-date infrastructure ensures that the systems can handle the demands placed on them, minimizing downtime and disruptions. Without a reliable infrastructure, digital technologies may experience frequent failures, leading to a lack of trust and frustration among users.

Network stability is another factor that influences reliability. Rodríguez-Alvarado et al. (2022) emphasize the significance of a stable network connection in maintaining reliable service delivery. Network stability refers to the quality and consistency of the connections between devices and networks. A stable network ensures that data can be transferred seamlessly, without delays or interruptions. Unstable networks can result in slow internet speeds, dropped connections, and inconsistent performance, all of which can compromise the reliability of digital technologies.

Cybersecurity measures also play a critical role in ensuring reliability. With the increasing frequency and sophistication of cyber threats, organisations need robust security measures to protect their digital systems from breaches. Faghih et al. (2021) argue that effective cybersecurity measures, such as firewalls, encryption, and regular security audits, are essential for maintaining the reliability of digital technologies. A lack of proper cybersecurity measures can lead to data breaches, system vulnerabilities, and compromised service delivery.

Regular system updates are crucial for maintaining the reliability of digital technologies. As technology continues to evolve, updates are necessary to address bugs, vulnerabilities, and compatibility issues. Rodríguez-Alvarado et al. (2022) highlight the importance of timely system updates in ensuring the reliability of digital technologies. Failure to update systems can result in performance issues, security vulnerabilities, and compatibility problems with other software or hardware components.

Moreover, organisational culture and effective management of service delivery processes are significant factors that influence reliability. Faghih et al. (2021) argue that a culture of accountability, continuous improvement, and customer-centricity within organisations can contribute to the reliability of digital technologies. Effective management of service delivery processes ensures that resources are allocated efficiently, issues are addressed promptly, and customer expectations are met. Organisational culture and management practices can greatly impact the overall reliability of digital technologies.

2.5.3 The Influence of Reliability on User Perception and Adoption

Reliability is a key factor that influences users' perception and adoption of digital technologies and services. Users are more likely to adopt digital services that they perceive as reliable, as reliability reduces the perceived risk associated with potential disruptions or failures. Nguyen et.al, (2022) conducted a study exploring the influence of reliability on users' adoption of digital services. They found that users are more inclined to adopt digital services that are perceived as reliable, as it provides them with a sense of security and confidence in the service.

Furthermore, Nguyen et.al, (2022) highlighted that perceived reliability positively impacts users' attitude towards digital services, increasing their intention to adopt and continue using these services. This suggests that reliability plays a critical role in shaping users' perception and adoption of digital technologies and services.

2.5.3.1 Trust and Satisfaction:

Reliability also plays a vital role in developing trust and satisfaction among users. Chen et al. (2020) conducted a study that specifically focused on the relationship between reliability and trust in e-commerce platforms. The researchers found a positive correlation between reliability and trust, emphasizing that users are more likely to trust a platform that consistently delivers on its promises. Reliability in this context refers to the platform's ability to provide accurate product information, deliver purchases on time, and handle any issues or complaints promptly and effectively.

The study by Chen et al. (2020) aligns with other research that emphasizes the importance of reliability in building trust among users. For example, a study by Kwon and Lee (2019) highlighted the impact of trust on users' intention to continue using e-commerce platforms. The researchers found that trust is a key factor in building long-term relationships between platforms and users, and reliability is a crucial component of trust.

Moving beyond e-commerce platforms, the impact of reliability on user satisfaction can also be observed in other digital services, such as banking. Tijunaitis et al. (2022) conducted a study to investigate the relationships between reliability, satisfaction, and loyalty in the context of digital banking services. The researchers found a direct and positive relationship between reliability and user satisfaction. Users who perceived their digital banking services as reliable were more likely to be satisfied with the overall experience. This finding is consistent with previous research on user satisfaction in digital services. A study by Hu et al. (2021) explored the impact of service quality on overall user satisfaction in mobile banking. The researchers identified reliability as one of the dimensions of service quality that significantly affected user satisfaction. Users who perceived the mobile banking service as reliable were more likely to report high levels of satisfaction.

One of the key factors that determine business performance is brand reputation. According to a study conducted by Dehghani et al. (2021), reliable service delivery plays a significant role in shaping brand reputation. In an era where customers have become increasingly discerning, organisations that consistently provide reliable services are able to build trust and establish a positive reputation among their target market. The study by Dehghani et al. (2021) found that when customers perceive an organisation's digital services to be reliable, they are more likely to develop a positive attitude towards the brand. This positive perception not only enhances customer satisfaction but also leads to increased customer loyalty. Consequently, organisations that prioritize reliability are more likely to enjoy higher customer retention rates, ultimately leading to revenue growth.

Reliability becomes even more crucial in technology-driven sectors, where businesses heavily rely on digital systems and infrastructure. Rizwan et al. (2020) conducted a study focusing on the role of reliability in achieving business success in such sectors. Their findings further support the notion that reliability has a significant influence on business performance and competitive advantage.
The study by Rizwan et al. (2020) highlighted that in technology-driven sectors, where customers have high expectations for seamless service delivery, organisations that consistently meet these expectations through reliable digital services are able to gain a competitive edge. Not only does reliability contribute to higher customer satisfaction and loyalty, but it also differentiates organisations in a crowded market.

2.5.4 Challenges Associated with the Reliability of Digital Technologies in Service Delivery

The reliability of digital technologies is fundamental for the effective delivery of healthcare services. However, ensuring consistent performance across various technologies presents several challenges that can directly affect patient care, operational efficiency, and healthcare outcomes. The following are key challenges faced by the public organization’s healthcare sector related to the reliability of digital technologies, incorporating various recent sources.

System Downtime and Service Interruptions

In healthcare, system downtime can disrupt patient care, delay treatment decisions, and

compromise clinical outcomes. For instance, failures in Electronic Health Record (EHR) systems can prevent healthcare providers from accessing crucial patient data, leading to delays in diagnoses and treatment plans (Lupton, 2020). Such interruptions often force clinicians to revert to manual processes, introducing the risk of human errors (Smith et al., 2022). To minimize these disruptions, it is critical that healthcare organisations invest in robust and high-availability digital systems to ensure continuous access to health information (Deloitte, 2023).

Data Integrity and Security Risks

The reliability of digital healthcare systems is heavily linked to the integrity and security of patient data. Inaccurate or corrupted data can lead to medical errors, misdiagnoses, and poor patient outcomes (Kohn et al., 2019). Moreover, cybersecurity threats such as ransomware attacks increasingly target healthcare institutions, putting sensitive patient information at risk and disrupting service delivery (Cheng et al., 2022). For example, when a hospital's data is compromised, the resulting downtime can cripple service provision, leading to delayed surgeries or emergency procedures. Effective encryption, continuous system updates, and cybersecurity protocols are therefore essential to safeguarding digital healthcare systems and ensuring reliable, secure data management (WHO, 2022).

Integration and Interoperability Issues

As healthcare providers increasingly adopt digital technologies, ensuring that these systems work together is a significant challenge. Many healthcare organisations struggle with the integration of new technologies, such as telemedicine and AI diagnostic tools, into existing systems. Lack of interoperability between digital tools can result in fragmented patient records, data duplication, and inefficient workflows (Elder et al., 2021). For example, if a telemedicine platform is not well integrated with an EHR system, it can create delays in updating patient information or lead to errors in medical histories. Therefore, ensuring smooth interoperability is essential for the reliability of digital technologies in healthcare service delivery (Chakraborty & Rathi, 2023).

Training and User Resistance

Healthcare professionals may resist the adoption of digital tools if they perceive them as

unreliable or difficult to use. This resistance is often exacerbated when systems fail or do not meet user expectations, leading clinicians to revert to traditional methods. Inadequate training is another significant barrier to effective use, as healthcare providers may not fully understand how to utilize new digital technologies (HIMSS, 2021). Ensuring that healthcare workers are adequately trained and supported is vital for overcoming these challenges, as effective training can improve user confidence in digital tools and reduce the risk of errors (Bates et al., 2020).

Cost and Resource Allocation for Maintenance

Ensuring the reliability of digital healthcare technologies often requires ongoing investments in system maintenance, updates, and infrastructure improvements. Healthcare organisations, particularly those in low-resource settings, may struggle to allocate the necessary funds to maintain and upgrade critical digital systems (Rathi et al., 2022). For example, outdated software or hardware can increase the likelihood of system failures, cyberattacks, or poor performance. Budget constraints can prevent necessary investments in infrastructure, which can compromise the quality of digital healthcare services (Chakraborty & Rathi, 2023).

Infrastructure and Environmental Limitations

In some regions, particularly rural or underserved areas, unreliable internet connectivity and power supply can hinder the effective use of digital healthcare technologies. For example, telehealth services that rely on high-speed internet can be significantly affected by slow or intermittent connections, limiting access to care for patients in these areas (McKinsey & Company, 2023). Furthermore, regions with inadequate healthcare infrastructure may struggle to implement the necessary digital tools to support reliable service delivery. To mitigate these challenges, investments in resilient digital infrastructure are essential to ensure that healthcare services remain reliable regardless of geographic location (World Bank, 2024).

Over-Reliance on Technology and Risk of System Failure

As healthcare organisations increasingly depend on digital technologies, the risk of system failures becomes more significant. A failure in a crucial system, such as an AI-based diagnostic tool or an EHR system, can disrupt care delivery on a large scale (Elder et al., 2021). For example, a malfunction in an AI algorithm could lead to incorrect diagnoses, while issues in

EHR systems can prevent healthcare providers from accessing updated patient records. To prevent such failures from affecting patient care, healthcare organisations must implement comprehensive backup systems, disaster recovery plans, and fail-safe protocols (Bates et al., 2020).

2.5.1 Skills/knowledge of Digital Technologies and Service Delivery.

Skills are defined as the abilities or expertise acquired through practice and education. In the healthcare context, skills can be categorized into clinical skills for example surgical techniques, patient assessment and soft skills such as communication and empathy. Clinical skills are essential for direct patient care, while soft skills are crucial for patient interaction and teamwork. Knowledge refers to the information, understanding, and insights that individuals possess, which can be derived from education, experience, and training. In healthcare, knowledge encompasses both theoretical understanding such as medical knowledge, pharmacology and practical knowledge (clinical guidelines, patient management). The relationship between skills and knowledge is symbiotic; effective skills development relies on a solid knowledge base. According to Benner (1984), nursing competence progresses through five stages—novice to expert—each characterized by increasing levels of knowledge and skill integration. A robust foundation of knowledge enhances a healthcare professional's ability to perform skills effectively, leading to improved patient out

In the digital age, advancements in technology have permeated various aspects of society, significantly influencing service delivery across different industries. The ability to effectively utilize digital technologies has become imperative for organisations to maintain competitiveness and meet the increasing demands of customers.

The study by Johnson et al. (2019) provides valuable insights into the correlation between digital technology skills and customer satisfaction. It highlights that proficient employees who possess in-depth knowledge of digital technologies can deliver efficient and personalized services to customers. By utilizing digital tools and platforms, these employees can improve interactions, streamline processes, and enhance overall customer experiences. Consequently, this skillset plays a pivotal role in influencing customer satisfaction within the service industry.

Quality of Care

High levels of skills and knowledge correlate with superior quality of care. Recent research indicates that healthcare providers who are well-trained in both clinical and interpersonal skills significantly enhance patient safety and treatment efficacy (Alshahrani et al., 2023). This improvement is particularly important in complex clinical scenarios that demand critical thinking and advanced problem-solving abilities.

Patient Satisfaction

Patient satisfaction has become a key performance indicator in healthcare, closely linked to providers' skills and knowledge. A study by Andaleeb et al. (2021) found that effective communication and empathy, rooted in strong soft skills, greatly influence patient experiences. Knowledgeable providers are better equipped to address patient concerns and explain treatment options, contributing to higher satisfaction levels. Patient satisfaction can also be attributed to personalizing patient services. This has emerged as a key aspect in enhancing patient satisfaction, and digital technology skills play a significant role in enabling personalized experiences by effectively harnessing patient data and utilizing digital technologies, organisations can provide tailored recommendations, targeted marketing communications, and personalized support. A study by Li et al. (2021) demonstrates that patients perceive personalized experiences as more valuable and tend to have higher satisfaction levels. The ability to use digital technologies to create personalized interactions contributes to enhanced customer satisfaction and loyalty.

Collaboration among healthcare professionals is vital for effective service delivery. Skills in teamwork and communication are essential for successful interprofessional interactions. Research by Suter et al. (2023) highlights that a shared knowledge base enhances mutual respect and understanding among team members, facilitating cohesive patient care and improved health outcomes. The relationship between healthcare providers' skills and knowledge and patient health outcomes is significant. Studies indicate that skilled and knowledgeable staff lead to lower complication rates and reduced hospital readmissions (Kim et al., 2024). Ongoing training and professional development are crucial for maintaining these competencies in an evolving healthcare landscape.

Organisations that prioritize skills development and knowledge-sharing create a culture of continuous improvement, which can enhance job satisfaction and staff retention (Buchan et al., 2020). Employees who feel competent and supported are more likely to remain in their roles, ensuring continuity of care and stability within the healthcare team. Embracing digital technologies can also lead to significant cost reductions for organisations. A report by McKinsey and Company (2019) emphasizes that digitizing processes and transitioning from paper-based systems to cloud-based solutions can substantially reduce operational costs. By eliminating the need for physical storage, printing, and manual data entry, organisations can save on resources and labor costs. Additionally, the automation of repetitive tasks through digital technologies minimizes the occurrence of errors, leading to cost savings associated with error correction and rework. One of the key advantages of digital transformation in service delivery is the ability to streamline processes and reduce waiting times. The study conducted by Smith and Richards (2020) found that organisations that adopted digital technologies experienced a noticeable decrease in the time customers had to wait for service. For instance, the implementation of online appointment scheduling systems or self-checkout options in retail stores allows customers to avoid long queues, leading to enhanced customer satisfaction and loyalty. By optimizing processes and eliminating unnecessary steps through digital means, service providers can ensure faster and more efficient service delivery. Digital technologies provide service providers with the opportunity to automate tasks that were previously prone to human error.

A research article by Johnson et al. (2021) highlights the effectiveness of robotic process automation (RPA) in reducing manual errors in service delivery. RPA enables the use of software robots to complete repetitive tasks accurately and efficiently, minimizing the risk of errors caused by human intervention. By implementing digital solutions that automate such tasks, organisations can enhance overall service efficiency and reduce the likelihood of mistakes. Digital technology skills are becoming increasingly important for effective communication in service delivery. According to a study by Martin et al. (2021), employees who possess digital technology skills can utilize various communication channels to engage with colleagues and clients in real-time. These channels include email, instant messaging, and video conferencing. Such advancements enable seamless information exchange and instant feedback, thus improving the overall effectiveness of communication.

In addition, Hussain et al. (2020) highlight that enhanced communication can reduce misunderstandings and conflicts within teams. Effective communication through digital platforms allows employees to clarify expectations, share knowledge, discuss challenges, and provide timely updates. This not only strengthens teamwork but also improves the quality of service provided to clients. Digital tools and platforms significantly facilitate collaboration among team members. Teleconferencing and videoconferencing enable virtual meetings, making it easier for geographically dispersed teams to collaborate seamlessly. Additionally, cloud-based platforms provide a centralized space for employees to share files, edit documents simultaneously, and provide feedback. These collaborative features not only enhance efficiency but also contribute to the overall quality of service delivery (Martin et al., 2021).

2.6 Innovation and service delivery

Innovation is a multifaceted concept that has been defined and interpreted in various ways by scholars across disciplines. Despite these differences, there is a consensus on certain core aspects of innovation, particularly in the context of service delivery. This section reviews definitions of innovation provided by four different authors, all of whom support the idea that innovation is fundamentally about the creation and implementation of new ideas, processes, or products that add value to service delivery.

Schilling (2020), defines innovation as the process by which new ideas are generated, developed, and implemented to create value for organisations, customers, and society at large (Schilling, 2020, p. 37). This definition emphasizes the value-creation aspect of innovation, which is crucial in-service delivery. Schilling's perspective aligns with the broader understanding that innovation is not just about novelty but also about its practical application and the benefits it brings to stakeholders.

Damanpour (2019) describes innovation as the introduction of new processes, products, or services that lead to significant improvements in performance and outcomes. This definition highlights the performance improvement aspect of innovation, suggesting that the ultimate goal of innovation in service delivery is to enhance the effectiveness and efficiency of services. Damanpour's focus on outcomes reinforces the idea that innovation should lead to measurable benefits. According to Tidd

and Bessant (2021), innovation is the successful exploitation of new ideas, leading to the creation of new products, services, or processes that provide competitive advantage and improve the quality of life. Their definition underscores the competitive advantage that innovation can offer, which is particularly relevant in the service sector where organisations compete on the quality and uniqueness of their offerings. The emphasis on improving quality of life also ties innovation to social and economic impacts.

Crossan and Apaydin (2022) define innovation as a process that combines creativity, resources, and management to produce new or significantly improved products, services, or processes. Their definition highlights the managerial and resource allocation aspects of innovation, which are essential for successful implementation in service delivery. This perspective recognizes that innovation requires not just creative ideas but also effective management and resource mobilization.

These definitions collectively suggest that innovation in service delivery is about the generation and implementation of new ideas that lead to improved services, enhanced performance, and greater value for stakeholders. They emphasize different aspects of the innovation process, including value creation, performance improvement, competitive advantage, and resource management, all of which are critical for successful innovation in service delivery.

2.6.1 **Innovation as a Driver of Service Delivery:**

Innovation is widely recognized as a key driver of service delivery, enabling organisations to meet changing customer needs, improve service quality, and maintain competitiveness. The relationship between innovation and service delivery is symbiotic, with innovation providing the tools and methods necessary to enhance services, while effective service delivery creates the conditions for ongoing innovation.

Innovation enables organisations to adapt to the evolving needs and preferences of customers. As customers' expectations for service quality and convenience rise, organisations must innovate to meet these demands. For example, the adoption of digital technologies in service delivery has transformed the way services are provided, allowing for greater personalization and responsiveness (Meijer & Bolívar, 2019). Digital innovation, such as the use of artificial intelligence (AI) and machine learning, has enabled service providers to analyse customer data in

real time, leading to more tailored and effective service offerings (Brown & Osborne, 2020). Innovation plays a crucial role in improving the quality of services. By introducing new processes, technologies, and methods, organisations can enhance the efficiency, accuracy, and reliability of service delivery. For instance, in healthcare, innovations such as telemedicine and electronic health records have significantly improved patient care by providing faster access to medical services and more accurate patient information (Lindgren et al., 2021). These innovations not only improve service quality but also reduce costs and increase accessibility.

In a highly competitive environment, innovation is essential for organisations to differentiate themselves from their competitors. Service providers that innovate are better positioned to offer unique and superior services, which can lead to increased customer loyalty and market share. For example, in the banking sector, the introduction of mobile banking and fintech innovations has allowed banks to offer more convenient and secure services, attracting a broader customer base (Teece, 2022). Innovation, therefore, acts as a catalyst for competitive advantage, enabling organisations to stay ahead in the market. Innovation also drives organisational agility, allowing service providers to respond quickly to changes in the external environment. In an era of rapid technological change and shifting consumer preferences, the ability to innovate is critical for organisations to remain relevant and effective. Organisations that prioritize innovation are better equipped to pivot their strategies, introduce new services, and adapt to emerging trends (Damanpour & Aravind, 2020). This agility is particularly important in-service delivery, where the ability to quickly address customer needs and market conditions can determine an organisation's success.

Enhancing Service Efficiency

One of the primary roles of innovation in service delivery is to improve efficiency. Innovations in technology, processes, and management practices can streamline service delivery, reduce costs, and minimize errors. For instance, automation and AI-driven technologies have revolutionized industries such as logistics and customer service by automating routine tasks, leading to faster and more reliable service delivery (Baker & Sinkula, 2023). In public services, innovations such as e-governance platforms have made government services more accessible and efficient, reducing bureaucratic delays and improving citizen satisfaction (Meijer & Bolívar, 2019).

Innovation also plays a crucial role in enhancing the customer experience. By introducing new service delivery methods and technologies, organisations can create more engaging and satisfying customer interactions. For example, the use of chatbots and virtual assistants in customer service has improved response times and provided customers with 24/7 support, leading to higher levels of customer satisfaction (Parasuraman et al., 2020). Additionally, innovations in data analytics allow organisations to better understand customer preferences and tailor services to meet individual needs, further enhancing the overall experience.

In addition, innovation often leads to the creation of entirely new service models that disrupt traditional ways of delivering services (Yuan et al., 2019). The rise of the sharing economy, for example, has introduced new models of service delivery in industries such as transportation, hospitality, and retail. Companies like Uber, Airbnb, and Amazon have redefined service delivery by leveraging digital platforms to connect service providers with consumers in innovative ways (Teece, 2022). These new service models have not only transformed industries but also created new opportunities for value creation and customer engagement.

Innovation is a key enabler of continuous improvement in service delivery. By fostering a culture of innovation, organisations can continuously identify and implement new ways to enhance services. This ongoing process of innovation ensures that services remain relevant, effective, and responsive to changing customer needs. For example, in the education sector, innovations such as online learning platforms and adaptive learning technologies have enabled continuous improvement in teaching methods and learning outcomes (Lindgren et al., 2021). These innovations have allowed educational institutions to offer more flexible and personalized learning experiences, meeting the diverse needs of students. Technological advancements are integral to innovation, providing opportunities for organisations to optimize service delivery processes. Studies in the current period highlight the impact of innovation of digital technologies, such as artificial intelligence, big data, and automation, on service delivery outcomes (Li et al., 2020; Yuan et al., 2019). These technologies can improve operational efficiency, personalized customer experiences, and develop new service offerings.

2.6.2 Challenges and Barriers to Innovation and Service Delivery:

Innovation in digital technologies has revolutionized healthcare service delivery, improving patient outcomes, streamlining operations, and enhancing the overall quality of care. However, the process of innovating and adopting new digital technologies in healthcare presents a range of challenges that must be addressed to fully realize their potential. Literature points out hurdles such as integration and interoperability of new technologies, data privacy and security concerns, adoption and user training, scalability and resource allocation, regulatory and ethical challenges, patient engagement and accessibility (Dahlander & Gann, 2019; Elder et al., 2021: Rathi et al., 2022). Implementing innovation in service delivery can be a complex and difficult process, with numerous barriers that organisations must overcome.

Integration and Interoperability of New Technologies

One of the primary challenges of digital innovation in healthcare is integrating new technologies with existing systems. While innovative tools like AI-driven diagnostic platforms, telemedicine, and health information systems offer significant potential to enhance service delivery, they must be able to integrate seamlessly with legacy systems (Elder et al., 2021). Many healthcare organisations still rely on outdated infrastructure, which can hinder the effective adoption of new technologies. Furthermore, the lack of interoperability between new and old systems can result in fragmented patient data, errors in medical records, and inefficiencies in care delivery (Chakraborty & Rathi, 2023). To ensure the successful implementation of innovations, healthcare organisations must invest in platforms and systems that support interoperability, facilitating the smooth exchange of data and improving care coordination.

Data Privacy and Security Concerns

Digital health innovations, such as wearable health devices and remote monitoring systems, generate vast amounts of patient data. Ensuring the privacy and security of this data is critical, as healthcare organisations must comply with stringent regulations such as HIPAA (Health Insurance Portability and Accountability Act) in the U.S. and GDPR (General Data Protection Regulation) in Europe (Kohn et al., 2019). As digital health tools collect sensitive patient information, including real-time health data, personal identifiers, and clinical histories, they become attractive targets for cybercriminals. The rising number of cyberattacks, such as ransomware and data

breach, poses significant risks to healthcare organisations adopting new technologies (Cheng et al., 2022). To mitigate these risks, healthcare organisations must prioritize strong cybersecurity protocols, implement encryption technologies, and establish clear data governance policies.

Adoption and User Training

The adoption of new digital technologies in healthcare is often slowed by the reluctance of healthcare professionals to embrace change. Physicians and healthcare workers who are accustomed to traditional methods may resist new tools or view them as unreliable (Bates et al., 2020). For instance, AI-based diagnostic systems or robotic surgery platforms may face scepticism due to concerns about their accuracy or potential to replace human expertise. Furthermore, a lack of adequate training on these new technologies can result in inefficiencies, errors, or even harm to patients (Deloitte, 2023). To encourage successful adoption, healthcare organisations must invest in comprehensive training programs for healthcare workers, ensuring that they are confident in using these tools effectively and are aware of their benefits.

Scalability and Resource Allocation

Scaling new digital technologies across healthcare systems is a significant challenge. Many innovations, such as telemedicine, require substantial resources for implementation and maintenance. Healthcare organisations, especially in low-resource settings, may struggle to allocate sufficient funds for purchasing, implementing, and maintaining these technologies (Rathi et al., 2022). Additionally, scaling innovations like AI-driven diagnostics or personalized medicine requires significant investment in computational infrastructure, skilled personnel, and continuous updates (McKinsey & Company, 2023). Overcoming this challenge requires healthcare organisations to prioritize investment in scalable technologies that can be adapted to different healthcare settings and integrated into existing infrastructures. Furthermore, collaborative funding models involving public-private partnerships can help address the financial barriers to scaling innovation.

Regulatory and Ethical Challenges

The rapid pace of innovation in digital health technologies often outpaces regulatory frameworks, leading to concerns about the safety and effectiveness of new tools. For example, AI systems used

for medical diagnostics or decision-making may be subject to regulatory scrutiny to ensure they meet safety and efficacy standards (Lupton, 2020). Additionally, the use of digital health technologies raises ethical questions related to data privacy, informed consent, and patient autonomy (Chakraborty & Rathi, 2023). In many cases, healthcare organisations are unsure how to navigate these regulatory and ethical issues when implementing new technologies. To address these concerns, healthcare regulators must adapt existing frameworks to account for digital health innovations, ensuring that these technologies are both safe and ethically sound.

Patient Engagement and Accessibility

One of the major opportunities offered by digital health innovations is the ability to improve patient engagement. Digital tools such as mobile health apps, telehealth services, and wearable devices empower patients to take a more active role in their healthcare by providing real-time data, medication reminders, and virtual consultations (Bates et al., 2020). However, the adoption of these tools can be limited by accessibility issues, particularly among vulnerable populations such as the elderly or those in low-income communities (McKinsey & Company, 2023). The lack of digital literacy and access to necessary technologies, such as smartphones or high-speed internet, can limit the reach and effectiveness of digital health innovations. Healthcare providers must develop strategies to bridge these gaps, ensuring that digital tools are accessible to all patients, regardless of their socioeconomic status or digital proficiency.

Clinical Decision Support and AI in Healthcare

The integration of AI and machine learning into clinical decision-making is one of the most transformative innovations in healthcare. AI-driven tools can analyse vast amounts of data quickly, assisting healthcare providers in diagnosing diseases, recommending treatments, and predicting patient outcomes with high accuracy (Elder et al., 2021). However, the reliability and ethical implications of AI-based decision-making raise concerns. Ensuring that AI systems are transparent, unbiased, and based on high-quality data is essential for their successful integration into healthcare practice (Smith et al., 2022). Additionally, healthcare professionals must be confident in using AI tools as a complement to, rather than a replacement for, human judgment. By fostering trust in AI and ensuring that it supports clinical decision-making, healthcare organisations can maximize the benefits of these technologies in improving service delivery.

2.7 Information Intensity and Service Delivery

Information intensity has become increasingly relevant in the digital era as organisations strive to manage large volumes of data to enhance decision-making processes. The concept of information intensity refers to the extent to which a product or service depends on information for its creation, distribution, and consumption (Porter & Millar, 1985). In today's service-oriented economy, understanding how information intensity affects service delivery is crucial for organisations seeking to optimize customer experiences and operational efficiency.

In the public healthcare sector information intensity directly affects service delivery, particularly in improving patient outcomes through personalized care and predictive analytics. Studies by Walker et al. (2024) highlight the role of Electronic Health Records (EHRs) and telemedicine in delivering real-time, data-driven care. Information-intensive tools such as AI-based diagnostics allow healthcare providers to offer more precise treatment options and better manage patient records, reducing errors and enhancing service quality (Mikalef & Krogstie, 2020).

Moreover, healthcare institutions increasingly rely on data-sharing systems to ensure seamless communication between different providers. This information-intensive approach improves coordination, leading to quicker and more efficient services for patients (Lee et al., 2022).

The term information intensity has evolved over time, reflecting shifts in technology and data use. Traditionally, information intensity was defined as the extent to which information is embedded in a product or service (Porter & Millar, 1985). More recent research highlights how technological advancements have deepened this concept, focusing on the role of big data, AI, and cloud computing in augmenting information intensity (Günther et al., 2019).

According to Zhang et al. (2020), information intensity now refers to the degree to which organisations rely on data and information flow in real time for their processes. This contemporary view emphasizes the dynamic nature of information and its critical role in decision-making, customer interaction, and service innovation. The rise of the digital economy, data analytics, and IoT has expanded the definition, making it clear that information intensity is not only a structural factor but also a catalyst for competitive advantage (Chen & Lee, 2021).

Information intensity has significant implications for service delivery, particularly in industries where real-time data and digital platforms are essential. In highly information-intensive services, such as public healthcare sector the ability to process and utilize vast amounts of data can lead to more personalized and efficient service experiences

A prominent area of research related to information-intensive on service delivery is its impact on customer satisfaction. Numerous studies confirm that the availability of real-time information positively affects customer satisfaction. Research conducted by Chen et al. (2019) in the hospitality sector reveals that providing real-time updates on booking availability and room rates significantly improves customer satisfaction and increases the likelihood of return visits. Customers appreciate being informed promptly about any changes, and this transparency leads to a high level of satisfaction.

In the transportation industry, real-time information has also been shown to impact customer satisfaction. Liu et al. (2020) found that airlines' provision of real-time flight status updates and gate change notifications significantly increased customer satisfaction levels. Such timely updates empower customers to make more informed decisions, reduce anxiety, and enhance overall satisfaction. Personalization is a key element of information-intensive service delivery that can boost customer satisfaction. Many studies demonstrate that tailoring service offerings based on historical user data and preferences can have a significant positive impact on customer satisfaction levels.

In the e-commerce industry, personalized recommendations based on user data have shown to influence customer satisfaction. According to a study by Gao et al. (2020), e-commerce platforms that leverage personalization algorithms to present tailored recommendations to customers experience higher levels of satisfaction. This personal touch creates a sense of individualization for customers, making them feel valued and understood. Furthermore, personalized service delivery has proven effective in the public healthcare sector. An investigation by Khan et al. (2021) reveals that providing patient-centric services, such as personalized treatment plans or medication reminders, leads to increased patient satisfaction. Patients appreciate the customized care, feel more engaged in their own healthcare journey, and consequently experience higher levels of satisfaction.

Studies consistently report that enhancing customer satisfaction through information-intensive service delivery positively impacts sales and customer loyalty. The personalized and real-time nature of these services contributes to a higher perceived value, which, in turn, fosters increased sales and customer loyalty. For instance, in the e-commerce industry, personalized recommendations have been found to drive sales and increase customer loyalty. Jiang et al. (2022) discovered that customers who received tailored recommendations were more likely to make additional purchases and had a higher repeat visit rate. This indicates that a higher level of customer satisfaction resulting from personalized service offerings translates into tangible business outcomes. Similarly, in the banking sector, personalized digital services have been shown to enhance customer loyalty and retention. A study by Anderson et al. (2022) found that customers who received tailored financial advice and recommendations were more likely to remain loyal to the bank and utilize additional services. This suggests that personalized service delivery not only boosts customer satisfaction but also strengthens the bond between customers and the service provider.

Understanding the effects of information-intensive service delivery is crucial for service providers looking to gain a competitive edge in the market. One of the key findings from the literature is the importance of investing in robust information systems. Information-intensive services require the processing and analysis of large volumes of data to fulfill customer needs and preferences. Therefore, service providers need to develop and implement sophisticated information systems that can handle this influx of data. A study by Wickramasinghe and Sharma (2019) found that organisations with advanced information systems were better equipped to deliver personalized and efficient services, leading to higher customer satisfaction and loyalty. This suggests that investing in information systems is crucial for service providers to meet the demands of information-intensive services.

In addition to information systems, service providers also need to develop data analytics capabilities. By leveraging data analytics tools and techniques, organisations can extract valuable insights from the data collected during service delivery. These insights can help service providers understand customer behavior, preferences, and trends, allowing them to tailor their services accordingly. Bhatti and Sarker (2020) found that organisations that effectively utilized data

analytics had higher levels of customer satisfaction and were more successful in predicting customer needs. Therefore, service providers should invest in developing strong data analytics capabilities to gain a competitive advantage in the market.

Furthermore, the literature highlights the importance of customer relationship management (CRM) tools in information-intensive service delivery. CRM tools allow service providers to manage their interactions with customers and provide personalized services based on customer data. A study by Kuo, Simpson, and Raghu (2021) found that organisations that implemented CRM systems experienced improved customer satisfaction, increased customer loyalty, and higher levels of customer retention. This suggests that service providers should prioritize the implementation of CRM tools to enhance their ability to deliver information-intensive services effectively.

Alongside the aforementioned strategies and tools, service providers also need to establish a strong data governance framework. Information-intensive services involve the collection and use of vast amounts of customer data, making data quality, security, and compliance crucial. A study by Kaushik et al. (2022) argues that service providers must establish robust data governance frameworks to ensure the accuracy, confidentiality, and integrity of customer data. This can be achieved through the implementation of data management policies, security measures, and compliance protocols. By protecting customer data and complying with data privacy regulations, service providers can enhance customer trust and confidence in their information-intensive services.

In today's digital era, an increasing number of service providers are offering information-intensive services, where the delivery of services heavily relies on the generation, processing, and utilization of information. The advent of advanced technologies and the growing dependency on data have transformed various industries, including healthcare, telecommunications, finance, and e-commerce. The concept of information intensity refers to the extent to which data and information play a crucial role in the delivery of services. One of the primary advantages of information-intensive service delivery is increased efficiency. With the availability of real-time data and information, service providers can streamline operations, eliminate bottlenecks, and reduce response times. In their study on healthcare service delivery, Sujatha, Sukumar, and Sudaya (2021) highlight the importance of information integration in enhancing efficiency. By integrating patient

records, medical histories, and treatment plans, healthcare providers can ensure timely and coordinated care, leading to improved patient outcomes.

Another significant benefit of information intensity is improved decision-making. As the amount of available data continues to grow exponentially, service providers can leverage this wealth of information to make informed decisions. Davenport and Harris (2019) emphasize the importance of data-driven decision-making in their research on the role of information in management. They argue that organisations that effectively utilize data and analytics outperform their competitors, as data-driven decisions are more accurate and objective. This is particularly relevant in-service delivery, where decisions regarding resource allocation, pricing strategies, and customer segmentation can be optimized through thorough analysis of customer data and preferences.

Moreover, information-intensive service delivery enhances the overall customer experience. By leveraging customer data and preferences, service providers can offer personalized offerings and tailor services to individual needs. A study conducted by Anderson and Ostrom (2020) in the hospitality industry found that personalized services based on guest preferences significantly increased customer satisfaction and loyalty. With an abundance of customer information, service providers can anticipate customer needs, offer customized recommendations, and create a seamless and personalized experience throughout the customer journey.

Furthermore, information intensity can lead to cost reduction in service delivery. By adopting information systems and technologies, service providers can automate processes, reduce manual intervention, and minimize errors. This can result in cost savings through improved resource allocation, reduced labor costs, and increased operational efficiency. A study by Kaushik and Nagpal (2022) on the banking industry found that information-intensive service delivery reduced operational costs by enhancing workflow automation and reducing manual errors.

2.7.1 Challenges and Barriers to Information intensity

While information-intensive service delivery offers significant benefits, it is not without its challenges. One of the major challenges faced by organisations in implementing information-intensive service delivery is data security and privacy concerns. As the collection and storage of customer data increases, organisations must ensure the security and protection of this valuable

information. The potential risk of data breaches, unauthorized access, and misuse of personal information necessitates the implementation of robust security measures. A study by Chen and Yan (2019) found that organisations implementing information-intensive service delivery face challenges in ensuring the confidentiality, integrity, and availability of data due to the evolving nature of cyber threats. This emphasizes the need for organisations to continuously update their security systems and adopt industry best practices to mitigate data security risks. In addition, organisations that rely heavily on information face the risk of data breaches and cyberattacks, which can disrupt service delivery (Ghosh et al., 2023). Furthermore, the rapid growth of data can overwhelm existing IT infrastructures, leading to inefficiencies in service delivery.

Another challenge organisations encounter is data management complexities. With the exponential growth of data, organisations struggle to effectively manage and analyze the vast amount of information at their disposal. The need to integrate data from various sources, ensure data quality, and derive meaningful insights presents significant challenges. A study conducted by Gandomi and Haider (2019) highlights the complexities associated with data management in information-intensive service delivery, such as data cleansing, data integration, and data migration. To overcome these challenges, organisations should invest in advanced data management tools and employ data governance strategies to streamline their data management processes.

Moreover, the integration of legacy systems poses a significant barrier in the implementation of information-intensive service delivery. Many organisations have existing legacy systems that were not designed to handle the volume and complexity of data associated with this approach. Integrating these systems with new technologies and platforms can be a daunting task, requiring substantial time and resources. A study by Niu et al. (2020) points out those organisations may face challenges in ensuring compatibility, interoperability, and seamless data flow between legacy systems and newer applications. To overcome this barrier, organisations should consider adopting modular approaches, leveraging APIs and micro services to ensure smooth integration between legacy systems and newer technologies. A study by Khasanova et al. (2023) highlights the importance of having robust data governance frameworks to manage the risks associated with high information intensity. Organisations must invest in technologies that ensure data integrity, privacy, and security to maintain customer trust and smooth service operations.

Lastly, organisations often face a shortage of skilled resources in implementing information-intensive service delivery. This approach requires individuals with specialized skills in data analytics, machine learning, and artificial intelligence to effectively utilize the available data. A study by Gupta and Singh (2021) highlights the challenges faced by organisations in recruiting and retaining skilled professionals due to the high demand and limited supply in the market. To address this challenge, organisations should invest in employee training and development programs to enhance the skills of their existing workforce and foster a culture of continuous learning.

2.8 Culture

According to McLuhan (2021), culture is a multifaceted concept that encompasses the shared beliefs, values, norms, customs, behaviors, and artifacts of a group of people. It shapes how individuals interpret their experiences, interact with one another, and express their identities. At its core, culture is a system of meanings that informs how people view themselves and their place in the world. Tylor (2022), further defined culture as that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society. This foundational definition highlights culture's comprehensive nature, encompassing both tangible and intangible elements.

In recent years, scholars have expanded on this definition to emphasize culture as a dynamic and evolving construct. Culture is not static; it is influenced by globalization, migration, and technological advancements, leading to continuous transformation and adaptation (Geertz, 2019; Hofstede, 2020). This fluidity is particularly evident in contemporary discussions around cultural hybridity, where diverse cultural influences converge, creating new identities and practices. This phenomenon reflects the increasing interconnectedness of the world, as people navigate multiple cultural contexts simultaneously (Pieterse, 2019). Another important aspect of culture is its role in identity formation. Culture provides individuals with a framework for understanding themselves and their relationships with others. It fosters a sense of belonging and community, which is crucial in multicultural societies where individuals often identify with multiple cultural backgrounds (Rumbaut, 2020). This interplay between personal identity and collective culture illustrates how culture is both a personal and social phenomenon.

Furthermore, culture serves critical functions in society, including social cohesion and the transmission of knowledge. Shared cultural norms and values create a sense of unity, helping individuals cooperate and function within a community. This cohesion is often reinforced through rituals, traditions, and collective practices (Kroeber & Kluckhohn, 2022). Additionally, culture is essential for knowledge transmission, as it enables the passing down of skills, traditions, and worldviews from one generation to the next. The rise of digital technology has transformed this process, allowing for broader access to cultural knowledge while raising questions about authenticity and cultural appropriation (Jenkins, 2022).

Therefore, from the various authors mentioned above, culture is a complex, dynamic system that plays a fundamental role in shaping human experience. Its definition encompasses a wide array of social, psychological, and historical factors, highlighting its importance in identity formation, social cohesion, and knowledge transmission. As our world continues to evolve, understanding culture as a fluid and multifaceted construct is crucial for addressing contemporary challenges and fostering mutual respect and understanding across diverse cultural landscapes

2.8.1 Cultural Influences on Health Systems and Technology Adoption

Culture, in the context of healthcare, refers to the shared beliefs, values, practices, and behaviors that influence healthcare decisions and interactions within a particular society or group (Jahoda, 2019). Culture can impact healthcare delivery in multiple ways, including attitudes towards health, trust in healthcare providers, communication styles, and openness to technological innovation (Thomas et al., 2021).

The role of culture in shaping health systems and the adoption of digital technologies has been a topic of increasing interest. For instance, in collectivist societies, the approach to healthcare often emphasizes community involvement and collective decision-making. In such settings, digital health tools that promote individual autonomy, such as personal health trackers or telemedicine consultations, may face resistance (Brock et al., 2020). On the other hand, in more individualistic societies, where personal autonomy and privacy are highly valued, individuals may be more inclined to adopt technologies that offer personalized healthcare services (Hofstede, 2020).

Cultural attitudes towards technology also play a crucial role. In some regions, there may be a distrust of digital health tools due to concerns about data privacy, cybersecurity, and the perceived

impersonal nature of technology-based healthcare (Gillespie et al., 2021). Conversely, in other cultures, there may be a greater acceptance of digital tools, driven by a high level of digital literacy and familiarity with technology. Jahoda, (2019), asserted that cultural attitudes towards health, illness, and medical authority profoundly impact the ways in which healthcare services are organized and accessed. For instance, in societies with collectivist values (e.g., many East Asian cultures), healthcare decisions may be made within the family or community context rather than by individuals alone (Kwon et al., 2020). This collective decision-making model often involves consulting extended family members and elders, with a focus on maintaining social harmony. As a result, digital health interventions that promote individual autonomy, such as telemedicine or personal health apps, may face resistance in these cultural settings unless they are designed to accommodate collective decision-making processes.

In contrast, individualistic societies, such as those in Western Europe and North America, typically prioritize individual autonomy in healthcare decisions. Patients in these societies are more likely to embrace digital health technologies that offer personalized services, such as remote monitoring or virtual consultations with healthcare providers (Zhao et al., 2020). The cultural emphasis on self-determination and independence in these societies may create a more receptive environment for the adoption of technologies that empower patients to manage their own health.

2.8.2 Cultural Norms and Values

Cultural values, such as individualism versus collectivism, uncertainty avoidance, and power distance, shape how digital tools are perceived and used in healthcare settings (Hofstede, 2020). For example, in high power distance cultures, healthcare decisions are often made by authoritative figures (e.g., doctors), and there may be limited patient involvement in decision-making. The introduction of digital health technologies that emphasize patient-centred care and shared decision-making may face resistance in these settings (Brock et al., 2020). In contrast, in low power distance cultures, where patients are more likely to engage in discussions with healthcare providers, digital health tools that promote patient autonomy may be more readily embraced. Similarly, cultures with high levels of uncertainty avoidance may have concerns about the reliability and safety of digital health technologies. These concerns can slow the adoption of digital tools and limit their potential benefits in service delivery. In contrast, cultures with low uncertainty avoidance, where

there is a greater tolerance for risk and ambiguity, may be more open to experimenting with new digital health solutions (Kaur et al., 2021).

Cultural norms also shape the level of trust in healthcare systems. In cultures with high levels of trust in medical professionals and institutions, patients may be more willing to adopt digital health technologies that are endorsed or integrated into the healthcare system. Conversely, in societies where there is low trust in healthcare providers or the government, the uptake of digital health solutions may be hindered by scepticism about the effectiveness and safety of these technologies (Gillespie et al., 2021).

One of the most significant cultural distinctions affecting healthcare systems is the difference between collectivism and individualism. Cultures that emphasize collectivist values (e.g., in many parts of Asia, Latin America, and Africa) tend to view health as a community-oriented responsibility. The role of the family, social networks, and community-based healthcare providers is often prioritized. In such contexts, healthcare decisions are not typically made in isolation, but rather within a social framework that includes family members and community leaders (Kwon et al., 2020). This collectivist approach affects the healthcare system's design by fostering policies and practices that emphasize shared responsibility for health, collective decision-making, and the integration of traditional healing practices alongside modern medicine. On the other hand, individualistic cultures for example many Western countries place a higher value on individual autonomy and self-determination. In these societies, healthcare systems are often designed to empower individuals to take responsibility for their own health. The relationship between patients and healthcare providers tends to be more transactional, with patients taking a more active role in their treatment decisions. Digital health technologies, which promote personal health management, are often more readily embraced in individualistic societies where autonomy is highly valued (Zhao et al., 2020).

Religious norms can also impact public health policies. For instance, in certain societies where religious authorities have significant influence over public life, religious perspectives on health may shape government health interventions, such as policies related to reproductive health, end-of-life care, or vaccination programs (Jones et al., 2020). Healthcare systems that do not align with these cultural and religious norms may face significant opposition, hindering their effectiveness and acceptance. Religion and spirituality play an important role in shaping healthcare systems

across the world. In many societies, religious beliefs directly influence the treatment and prevention of illness. For example, in countries where Islam or Christianity is dominant, healthcare systems may incorporate religious teachings into their practices, such as prohibiting the use of certain medical treatments (e.g., blood transfusions or organ transplants) due to religious prohibitions (Hossain et al., 2023).

Similarly, in Hindu or Buddhist societies, healthcare may be intertwined with spiritual beliefs and practices. Holistic approaches to health, which combine physical, mental, and spiritual wellbeing, are often more common in such settings (Siddhartha et al., 2019). This holistic view of health can lead to the integration of both traditional medicine (e.g., Ayurveda or traditional Chinese medicine) and modern medical practices within a healthcare system, creating a pluralistic system where multiple forms of healing coexist.

In many parts of the world, traditional and indigenous health systems coexist alongside formal healthcare systems. These indigenous health practices are deeply rooted in the cultural beliefs, knowledge, and experiences of the communities that practice them. They often involve holistic approaches that view the body, mind, and spirit as interconnected, and they emphasize the importance of balance in health. In many African, Indigenous American, and Southeast Asian cultures, traditional healing practices remain central to the way healthcare is provided. Traditional healers, such as shamans, herbalists, or acupuncturists, play significant roles in diagnosing and treating illness, often using natural remedies and spiritual interventions (Alvarez et al., 2021). These systems of care are typically community-oriented and may involve the participation of family members and spiritual leaders.

While these traditional health systems may differ greatly from Western medical practices, they are not necessarily in competition with them. In fact, in some countries, both systems coexist, and patients may seek care from both traditional healers and biomedical healthcare providers, depending on their personal beliefs and the type of illness they are facing (Paré, et.al (2019). This form of medical pluralism reflects the cultural flexibility of healthcare systems and the ability to integrate multiple forms of knowledge. However, the integration of traditional health systems into national health policies and the formal healthcare system can present challenges. These systems may not always be compatible with the standards of evidence-based medicine, and there may be concerns about the safety and efficacy of some traditional remedies. Furthermore, there may be

resistance from healthcare professionals who view traditional systems as unscientific or outdated (Buntin et al., 2019). Despite these challenges, many health systems have begun to explore ways to incorporate traditional medicine into national health frameworks, acknowledging its importance in the cultural and healthcare practices of many communities.

Trust is a critical factor in the acceptance of digital health technologies (Gillespie et al., 2021). Cultural norms around trust, both in healthcare providers and in technology, strongly influence the willingness of patients to use digital health tools. In cultures where there is a high level of trust in medical professionals and institutions, patients may be more likely to embrace digital health innovations, assuming these tools are integrated and endorsed by trusted healthcare providers (Ting et al., 2022). However, in cultures with low trust in authorities or where there is scepticism about the benefits of digital health technologies, there may be significant barriers to adoption (Paré et al., 2019).

Social capital, or the networks of relationships and norms of reciprocity within a society, also plays a role in the adoption of digital health technologies. In societies with strong social networks and shared norms, digital health tools can be more effectively integrated into healthcare practices, as there is greater community support for these technologies. Conversely, in societies with weaker social capital or fragmented healthcare systems, the impact of digital health technologies may be limited (Jahoda, 2019).

Cultural factors also influence health literacy and digital literacy, both of which are essential for the successful implementation and utilization of digital health tools (Zhao et al., 2020). In cultures with higher levels of educational attainment and digital skills, healthcare professionals and patients are more likely to adopt and effectively use digital health technologies. However, in societies where there are significant disparities in education and digital access, there may be greater challenges in digital health adoption and utilization (Ting et al., 2022).

Health literacy, which refers to the ability to understand and use health information to make informed decisions, is particularly important in ensuring that digital health tools are used effectively. In cultures where health literacy is lower, the introduction of complex digital health technologies may exacerbate existing health inequalities (Zhao et al., 2020).

Cultural factors such as age, gender, and socio-economic status can also influence how different groups within society experience the digital divide. Older populations or those with lower socio-economic status may face greater challenges in accessing and using digital health tools, potentially widening health disparities (Gillespie et al., 2021).

2.8.3 Cultural Barriers to Digitilisation

Language and communication

Language is a significant cultural factor that can affect the usability of digital health tools. Many digital health applications and platforms are designed primarily in English or other widely spoken languages, which can pose barriers to adoption in non-English speaking regions. Furthermore, cultural differences in communication styles may affect how information is conveyed through digital health platforms. In societies where indirect communication is preferred, or where health communication is typically delivered in a more narrative form, digital health tools that offer highly technical, impersonal information may not resonate well (Friedman et al., 2021). Tailoring digital health platforms to local languages and communication preferences can enhance user engagement and improve adoption rates.

In addition, language is a critical cultural barrier that can limit the accessibility and effectiveness of digital health technologies. In many countries, particularly those with multilingual populations, language differences can create significant barriers to the adoption of digital health tools. Many digital health platforms are designed in English, and while some efforts have been made to translate these tools into other languages, the accuracy and cultural relevance of these translations are often limited (Gillespie et al., 2021). This problem is especially pronounced in low-resource settings where health literacy rates are low, and where individuals may not speak the same language as the one used in digital health platforms. Furthermore, digital health tools often rely on written communication, which may be inaccessible to populations with low literacy levels, including older adults and individuals with limited formal education. In collectivist cultures, where indirect communication and face-to-face interaction are highly valued, text-based or impersonal communication through digital platforms may be viewed as cold or inadequate. This can lead to resistance to using such tools, as patients may prefer direct communication with healthcare providers who can provide more personalized advice (Zhao et al., 2020).

Gender and socioeconomic status

Gender and socioeconomic status are also important cultural factors that influence digital health adoption. In some societies, gender roles may restrict women's access to technology or healthcare services, creating a barrier to the adoption of digital health solutions. Similarly, individuals from lower socioeconomic backgrounds may face challenges in accessing the necessary devices or internet connectivity to use digital health tools effectively (Gillespie et al., 2021). Cultural attitudes toward gender and age can also create barriers to the adoption of digital health technologies. In many societies, gender roles can influence access to technology, especially for women and girls. In cultures where women face gender-based discrimination or where technology use is culturally considered a male-dominated activity, women may be less likely to engage with digital health tools (Rajkomar et al., 2020). This is particularly evident in regions where women have limited access to mobile phones or the internet, which are often required for using mHealth applications and telemedicine services.

These cultural attitudes toward gender and health can affect how women, in particular, perceive and use digital health tools, for instance, in patriarchal cultures where women may not have equal access to healthcare or decision-making power, digital health technologies that enable women to manage their own health independently may be viewed as empowering (Zhao et al., 2020). Similarly, older populations may experience challenges in adopting digital health technologies due to age-related barriers, such as lack of familiarity with new technologies, physical limitations for example, poor vision or dexterity, or societal beliefs that digital health tools are primarily for younger generations. In many cultures, elders are traditionally the primary decision makers in healthcare, and they may prefer in-person consultations with healthcare providers rather than remote or digital interactions (Ting et al., 2022).

Privacy and Security Concerns

Privacy and security concerns are major barriers to digital health adoption, particularly in cultures where personal data privacy is a sensitive issue. Many digital health platforms collect personal and health-related data, which can be seen as intrusive in cultures that prioritize privacy. In some regions, cultural norms regarding the sharing of personal information are different from those in countries where digital health technologies are widely used (Ting et al., 2022).

In Western societies, there is an increasing emphasis on the protection of personal data, particularly following high-profile data breaches and concerns over data misuse by technology companies. However, in some other cultures, there may be less awareness or concern regarding data security, but this can change rapidly as digital health adoption increases. As healthcare systems in emerging markets adopt more digital tools, concerns about data privacy, cybersecurity, and the potential for misuse of health information may become more prominent (Zhao et al., 2020).

For instance, in parts of Africa and Asia, where there is often a lack of robust data protection legislation, patients may be hesitant to engage with digital health technologies due to fears about how their health data might be used. Trust in the entities responsible for managing digital health tools is crucial in overcoming these concerns. Without clear policies regarding data security and patient consent, digital health adoption is likely to remain low in such regions (Van der Heijden et al., 2020).

Digital Divide

The digital divide refers to the disparity in access to digital technologies, which can exacerbate existing health inequalities. In many low- and middle-income countries, access to the internet, smartphones, and other digital devices remains limited, particularly in rural areas. The digital divide is a significant barrier to the adoption of digital health tools, as individuals without access to the necessary technology are unable to benefit from telemedicine, eHealth apps, or other digital health services (Buntin et al., 2019). In addition to physical access to technology, cultural factors related to technology adoption also contribute to the digital divide. In some societies, there may be cultural resistance to using technology for health management, particularly in communities with strong ties to traditional forms of healthcare (Siddhartha et al., 2019). Even when technology is available, individuals may be reluctant to adopt digital health tools due to cultural beliefs that prioritize face-to-face consultations or traditional medicine over digital interventions.

Trust in Technology and Healthcare Providers

Trust is a crucial cultural barrier in the adoption of digital health tools. In cultures with high levels of trust in healthcare providers and institutions, patients are more likely to embrace digital health technologies that are endorsed or integrated into the healthcare system. For instance, Scandinavian countries, where trust in public institutions is high, have seen more rapid adoption of telemedicine

and digital health solutions (Gillespie et al., 2021). In these societies, patients are generally more open to digital health tools because they trust that these technologies will improve care and outcomes. However, in cultures with lower trust in healthcare systems or government institutions, digital health adoption can be hindered. This is particularly evident in regions with low institutional trust, where patients may view digital health technologies as untested or unreliable (Ting et al., 2022). In these contexts, concerns over data privacy, security, and the quality of care may create significant barriers to technology adoption. For example, in parts of sub-Saharan Africa, distrust in government and healthcare systems has been cited as a major challenge to the adoption of digital health tools (Van der Heijden et al., 2020). Moreover, digital health technologies that rely on artificial intelligence (AI) or algorithms for diagnosis and treatment recommendations may face scepticism in cultures that emphasize human interactions in healthcare. In many parts of the world, patients may prefer face-to-face consultations with healthcare professionals and may be reluctant to trust AI-driven technologies for critical health decisions (Barrett & Fulk, 2022).

The relationship between Digitalisation and service delivery in the public Rajkumar healthcare sector is complex and influenced by various factors, including cultural context. Culture moderates the adoption and effectiveness of digital health technologies, shaping how these tools are perceived, accepted, and integrated into healthcare systems. Understanding the cultural dimensions that affect digital health adoption is critical to maximizing the potential of Digitalisation in improving healthcare outcomes and service delivery. As digital health technologies continue to evolve, future research should focus on exploring the intersection of culture and digital health to identify best practices for achieving more equitable and effective healthcare systems globally.

Rossi (2021), explores the impact of cultural attitudes toward technology in Italy, particularly regarding telemedicine adoption. Rossi argues that cultural acceptance of digital tools influences how patients and healthcare providers engage with telehealth services. Her research indicates that in cultures where technology is viewed positively, there is a higher likelihood of successful implementation and satisfaction with telehealth solutions. This highlights the moderating role of culture in enhancing the effectiveness of Digitalisation in healthcare.

Kim (2022), investigates the relationship between Digitalisation and service delivery in South Korea, focusing on the role of collectivist culture. He posits that the collectivist nature of Korean society encourages greater collaboration among healthcare teams when adopting digital tools.

Kim's findings suggest that cultural values promote shared responsibility and communication, thereby enhancing the overall effectiveness of digital health initiatives. This demonstrates how culture can enhance the relationship between Digitalisation and service delivery in healthcare contexts.

Patel (2023), examines cultural differences in the acceptance of electronic health records (EHRs) in India. She highlights that variations in cultural attitudes towards privacy and trust significantly influence how healthcare professionals and patients perceive and utilize EHR systems. Patel's research indicates that in cultures with a high value placed on privacy, the successful adoption of EHRs may require more extensive education and transparency efforts. This underscores the moderating effect of culture on the relationship between Digitalisation and service delivery.

Smith (2024), discusses the impact of cultural factors on the implementation of digital health technologies in African countries. He argues that local cultural beliefs and practices can either facilitate or hinder the adoption of digital solutions in healthcare settings. Smith's study shows that integrating cultural considerations into digital health strategies is essential for improving service delivery outcomes. This emphasizes the need to understand cultural contexts when assessing the impact of Digitalisation in healthcare.

Nguyen (2022), explores the role of cultural competency training for healthcare providers in the United States in relation to digital health services. She argues that equipping providers with cultural competencies enhances their ability to deliver digital health solutions effectively to diverse patient populations. Nguyen's findings suggest that when healthcare professionals understand and respect cultural differences, they can better tailor digital services to meet patient needs, thereby improving service delivery.

2.9 Empirical Evidence

There have been a few studies conducted on digitilisation and service delivery. These studies include European studies, American, African studies, as well as Zimbabwean research, which are all discussed in a detailed funnelled shaped approach below.

A study by Khan et al. (2020) explored the impact of Electronic Health Records (EHR) on healthcare management in hospitals. The findings revealed that the implementation of EHR

systems in hospitals improved the accuracy of patient data and streamlined administrative processes. Healthcare professionals were able to quickly access patient information, which led to reduced waiting times and improved decision-making. The study also highlighted the reduction of medical errors, as patient histories and medication records were more readily available to doctors, resulting in more informed treatment plans. However, the study also noted challenges such as the resistance to adoption among some healthcare workers and the significant initial costs of EHR implementation.

Miller et al. (2021) conducted a study on the use of telemedicine in the public healthcare sector, particularly in remote or underserved regions. The results indicated that telemedicine allowed healthcare providers to extend their services to rural populations, where access to specialized care was often limited. Telemedicine consultations reduced patient travel time, lowered healthcare costs, and facilitated timely interventions, especially for chronic conditions such as diabetes and hypertension. The study emphasized that Digitalisation via telemedicine not only increased access to healthcare but also improved patient satisfaction by providing quicker and more convenient access to healthcare services. However, issues such as inconsistent internet connectivity and the digital divide between urban and rural areas were cited as barriers to widespread adoption.

A study by Williams et al. (2022) examined how the Digitalisation of administrative processes, such as appointment scheduling and patient registration, contributed to operational efficiency in hospitals. By utilizing digital systems for scheduling, patient flow management was optimized, reducing bottlenecks in patient care delivery. This was particularly beneficial in emergency departments, where timely management of patient arrivals and triage was essential. The study found that Digitalisation led to quicker patient processing, better resource allocation, and ultimately, a reduction in wait times. The research also showed that healthcare professionals were able to manage their time more effectively, leading to improved overall efficiency and reduced burnout.

Taylor et al. (2023) investigated the role of digital health platforms in patient engagement and self-management. The study found that digital health tools, such as mobile applications and online portals, allowed patients to track their health data, book appointments, and communicate directly with healthcare providers. Patients who used these platforms reported higher levels of satisfaction,

as they could access their medical records, lab results, and treatment plans anytime. The study also emphasized that these platforms empowered patients to take a more active role in managing their health, particularly in the case of chronic conditions, where ongoing monitoring is crucial. The research showed that digital health platforms contributed to better health outcomes by encouraging patient adherence to treatment plans and fostering proactive health behaviors.

A study by Chakraborty & Roy (2021) focused on the use of digital tools for managing chronic diseases in urban hospitals. The research highlighted the role of digital technologies in improving the monitoring and management of conditions such as diabetes and cardiovascular diseases. Through wearable devices and health apps, patients could track their vital signs, receive real-time feedback from healthcare providers, and adjust their treatment plans as necessary. The study found that Digitalisation improved patient adherence to medication regimens, reduced hospital readmission rates, and enhanced overall health outcomes. The integration of digital tools into chronic disease management was particularly important for patients with limited access to frequent in-person consultations.

A study by Johnson et al. (2021) investigated the role of Digitalisation in enhancing health system resilience during the COVID-19 pandemic. The study highlighted that digital health tools, including telehealth services, digital triage systems, and online consultations, played a crucial role in maintaining healthcare services during periods of lockdown and restricted movement. In countries with advanced digital infrastructure, the healthcare system was able to continue providing care remotely, minimizing the impact of the pandemic on routine health services. The research also showed that Digitalisation helped prevent the overburdening of healthcare facilities by enabling more patients to access care from home, particularly for non-urgent conditions.

Mushonga et al. (2021) conducted a study examining the implementation of Electronic Health Records (EHR) in hospitals in Zimbabwe. The research found that the use of EHR systems significantly improved the management of patient information, ensuring better coordination among healthcare providers. By centralizing patient records, healthcare workers were able to access and update patient information in real-time, reducing errors related to miscommunication and improving the quality of care. However, the study noted challenges such as limited infrastructure, inadequate training for healthcare personnel, and financial constraints that hindered

the full-scale implementation of EHR systems in many hospitals. Despite these challenges, the research concluded that the Digitalisation of patient records had a positive impact on service delivery, particularly in urban hospitals.

Mutambara et al. (2020) investigated the adoption of electronic health (eHealth) technologies to improve healthcare access in rural Zimbabwe. The study found that mHealth solutions, such as mobile apps for appointment scheduling and health information dissemination, improved healthcare delivery in areas with limited access to healthcare facilities. These technologies allowed patients to receive health information, medication reminders, and direct consultations via mobile phones, which was particularly beneficial for those living in remote areas. The study emphasized that mHealth applications increased the reach of healthcare services, reduced barriers to healthcare access, and enhanced patient engagement. However, issues related to network connectivity in rural areas and the affordability of smartphones for low-income populations were highlighted as significant challenges.

A study by Chikomba and Chiwara (2022) explored the use of telemedicine to provide remote consultations in Zimbabwe, particularly for patients in underserved regions. The research demonstrated that telemedicine platforms allowed patients to access specialist care remotely, which was especially important for managing chronic diseases like diabetes and hypertension. The study highlighted the convenience of virtual consultations, which allowed patients to avoid long travel times and related costs. Furthermore, it was found that telemedicine significantly reduced waiting times for consultations, improving overall patient satisfaction. Despite its positive impact, the study also pointed to the challenges of unreliable internet connectivity in rural areas and the need for improved infrastructure to ensure the effectiveness of telemedicine services.

Despite the significant benefits of digitilisation, Adebayo et al. (2022) conducted a study on the barriers to the Digitalisation of healthcare in developing countries, with a focus on Sub-Saharan Africa. The study found that many healthcare systems in low-resource settings faced significant challenges in implementing digital technologies. These challenges included insufficient infrastructure (e.g., unreliable electricity and internet access), lack of digital literacy among healthcare providers and patients, and high costs associated with acquiring and maintaining digital tools. Furthermore, there was a lack of regulatory frameworks to guide the ethical use of digital

health technologies. The study concluded that while Digitalisation could improve healthcare delivery in these settings, these barriers needed to be addressed through targeted investment in infrastructure and training.

2.10 Hypotheses Development

2.10.1 The effect of Ubiquity of digital technologies on service delivery

Ubiquity has a positive effect on Service Delivery. This indicates that the availability and integration of digital technologies significantly enhance service delivery outcomes (Barrett and Fulk, 2022). Carlos Ramirez (2024) found that ubiquity has a positive influence on service delivery as he investigated the rise of telehealth services in Mexico, particularly in response to the COVID-19 pandemic. He argues that the ubiquity of telehealth platforms has dramatically improved access to healthcare, especially for individuals in rural and underserved areas. Jones, et.al, (2020) further highlighted that ppatients can now consult healthcare professionals remotely, eliminating the need for travel and reducing wait times for appointments. In addition, Ramirez's findings suggest that the accessibility provided by telehealth services not only enhances service delivery but also leads to better health outcomes, reinforcing the positive impact of ubiquitous healthcare access.

Petrova (2023), examines the effects of e-health initiatives in Russia, emphasizing how ubiquitous access to digital health services enhances patient engagement and satisfaction. The study further notes that the Russian government's investments in digital health technologies, such as online appointment scheduling and health information portals, have made essential healthcare services more accessible to the public (Friedman and Khan, 2021). This increased availability has resulted in higher levels of patient participation in their healthcare decisions and improved trust between patients and providers.

Liu (2021), highlights the transformation of health services in China through digital platforms. She discusses how services such as online consultations and health tracking apps have become widely available, leading to enhanced patient experiences. Liu (2021), further argues that the convenience of accessing healthcare services at any time has not only improved patient satisfaction but also encouraged proactive health management, illustrating the benefits of ubiquitous service delivery in the public healthcare sector.

Khan (2022), explores the integration of smart technologies in healthcare services in the UAE, particularly the use of mobile health applications. Khan's study posits that the ubiquity of these technologies has transformed how patients interact with healthcare providers. For instance, patients can now monitor their health conditions in real time and communicate with healthcare professionals through apps. This personalization and efficiency improve patient experiences and outcomes, underscoring the advantages of ubiquitous health services.

Müller (2022), analyzes how digital health platforms have redefined public health communication in Germany. She emphasizes that the availability of health information and resources through mobile apps and websites has empowered patients to make informed decisions about their health. The real-time access to health data and educational materials encourages proactive health management and enhances the overall effectiveness of public health initiatives, demonstrating the positive effects of ubiquity on service delivery. According to Rajkomar and Kohane (2020), from telehealth in Mexico to e-health initiatives in Russia, digital health services in China, mobile health applications in the UAE, and public health communication in Germany, the benefits of ubiquitous access to healthcare are clear. As digital technologies continue to evolve, the implications for health service delivery will likely expand, fostering further improvements in efficiency, accessibility, and patient satisfaction worldwide (Van der Heijden and Verheul, 2020).

Therefore, it is hypothesized that,

H_1 Ubiquity of digital technologies has a positive effect on service delivery

2.10.2 The effect of Reliability on service delivery

Reliability has a positive effect on Service Delivery and the results show that reliable digital platforms contribute significantly to better service delivery, this suggesting that higher levels of expertise and training in digital health tools improve service delivery. John Thompson (2021) investigates the impact of reliable telehealth services in the United States, particularly during the COVID-19 pandemic. He argues that the consistent availability and performance of telehealth platforms have significantly enhanced patient trust and satisfaction. By ensuring reliable access to healthcare professionals, these platforms have improved care quality, especially for patients in rural and underserved areas. Thompson's findings highlight that reliability in telehealth not only

increases patient engagement but also leads to better health outcomes, reinforcing the importance of dependable service delivery in healthcare, hence a positive impact.

Okafor (2022), examines the role of reliability in health service delivery in Nigeria. She emphasizes that reliable healthcare systems characterized by consistent access to medications, timely responses to patient inquiries, and dependable appointment scheduling—have a profound impact on patient experiences. Okafor notes that when patients can rely on the healthcare system to meet their needs promptly, it fosters greater trust and encourages adherence to treatment plans. Her analysis indicates that reliability directly correlates with improved patient satisfaction and health outcomes.

O'Sullivan (2023) discusses the importance of reliability in healthcare services in Ireland. He highlights how the consistent delivery of care, particularly in primary health settings, has been shown to improve patient retention and loyalty. O'Sullivan argues that when healthcare providers maintain a high standard of reliability, patients are more likely to engage with services regularly and seek preventative care. This reliability not only enhances patient experiences but also contributes to overall public health improvements. Zahra (2024), explores the significance of reliability in healthcare communication in Morocco. She posits that reliable communication channels, such as patient portals and secure messaging systems, are essential for effective health service delivery. Zahra's research indicates that when patients can depend on accurate and timely information from their healthcare providers, it enhances their ability to manage their health effectively. This reliability in communication fosters trust and encourages patients to seek care when needed, positively influencing health outcomes.

Patel (2022), analyzes the impact of reliability in surgical services in India. He argues that consistent and dependable surgical care not only improves patient safety but also boosts overall satisfaction with the healthcare system. Patel highlights that when patients trust that their surgical procedures will be conducted reliably and with high-quality standards, it reduces anxiety and increases their willingness to undergo necessary treatments. His findings underscore the critical role of reliability in enhancing patient experiences and outcomes in surgical care.

Groening and Wetzels, (2020) further asserts that as the public healthcare sector continues to evolve, prioritizing reliability in service delivery will likely lead to enhanced patient satisfaction, improved health outcomes, and increased trust in healthcare systems worldwide.

Therefore, it is hypothesized that,

H_2 - *Reliability has a positive influence on service delivery*

2.10.3 The effect of Skills/knowledge have a positive effect on service delivery

The third hypothesis that Skill/Knowledge positively affects Service Delivery and the results suggest that there is a higher level of expertise and training in digital health tools improve service delivery. Adams (2021), examines the impact of enhanced training programs for healthcare workers in Canada. She argues that ongoing education and skill development lead to improved patient care outcomes. Adams' research indicates that when healthcare professionals are equipped with the latest medical knowledge and techniques, they are better able to diagnose and treat conditions effectively. This increased competence not only boosts patient satisfaction but also fosters greater trust in the healthcare system.

Kumar (2022), explores the importance of skills and knowledge in nursing practice in India. He highlights that well-trained nurses with advanced clinical skills significantly improve patient care delivery. Kumar notes that the application of evidence-based practices, driven by continuous professional development, results in higher quality care and better patient outcomes. His findings suggest that investing in the education and training of nursing staff is essential for enhancing the overall effectiveness of health services.

Gonzales (2023), focuses on the impact of knowledge management systems in healthcare organisations in Spain. She argues that implementing these systems enables healthcare professionals to share and access critical information more efficiently. Gonzales' research indicates that when healthcare workers can readily access up-to-date knowledge and best practices, it enhances their ability to provide high-quality care. This effective sharing of skills and knowledge leads to improved decision-making and better health outcomes for patients.

Mwangi (2024), analyzes the role of continuous professional development for healthcare providers in Kenya. He posits that regular training and workshops not only enhance the skills of healthcare

professionals but also improve team collaboration and communication. Mwangi's study reveals that when healthcare teams are knowledgeable and skilled, they are more capable of delivering cohesive and effective care. This improvement in service delivery significantly enhances patient experiences and satisfaction.

Chen (2022), discusses the impact of telemedicine training on healthcare providers in Australia. She emphasizes that equipping professionals with the necessary skills to utilize telehealth technologies effectively leads to better patient engagement and care delivery. Chen's findings suggest that healthcare providers who are proficient in telemedicine are more likely to address patient needs promptly and efficiently, highlighting the positive effects of skills and knowledge on service delivery.

As the public healthcare sector continues to evolve, prioritizing the development of skills and knowledge will likely lead to enhanced patient satisfaction, improved health outcomes, and increased trust in healthcare systems worldwide.

Therefore, it is hypothesized that,

H_3 Skills/knowledge have a positive effect on service delivery.

2.10.4 The effect of innovation on service delivery

Innovation positively impacts Service Delivery; this demonstrates that innovative digital solutions enhance service delivery. David (2020), explores the impact of telemedicine innovations in the United States, particularly during the COVID-19 pandemic. He argues that the rapid adoption of telehealth technologies has significantly improved access to healthcare services. By facilitating remote consultations, telemedicine has allowed patients to receive timely care while minimizing the risk of virus transmission. B.'s findings indicate that these innovative approaches not only enhance patient satisfaction but also increase the overall efficiency of healthcare delivery.

Johnson (2021), examines the role of electronic health records (EHRs) in improving service delivery in the United Kingdom. Johnson highlights that the implementation of EHR systems has streamlined patient information management, enabling healthcare providers to access critical data quickly. This innovation enhances coordination among care teams, reduces errors, and ultimately

leads to better patient outcomes. Johnson's research underscores the transformative potential of digital health innovations in improving service delivery.

El-Masri (2023), analyzes the introduction of artificial intelligence (AI) in healthcare diagnostics in Canada. He argues that AI technologies improve the accuracy and speed of diagnoses, allowing healthcare professionals to make more informed decisions. El-Masri's study shows that when healthcare providers leverage AI tools, they can deliver more precise and timely care, thereby enhancing the overall quality of service delivery. This innovative approach not only benefits patients but also optimizes healthcare resources.

Ramirez (2022) discusses the impact of mobile health applications on chronic disease management in Latin America. She emphasizes that these innovative tools empower patients to monitor their health conditions actively and communicate with healthcare providers. Ramirez's findings suggest that mobile health apps enhance patient engagement and adherence to treatment plans, resulting in improved health outcomes and more efficient service delivery.

Michael (2024), focuses on the integration of robotics in surgical procedures across various healthcare settings. He posits that innovative robotic technologies have revolutionized surgical practices by enhancing precision and reducing recovery times for patients. Michael's research indicates that the adoption of robotic-assisted surgeries leads to better surgical outcomes and increased patient satisfaction, demonstrating the positive effects of innovation on service delivery.

Therefore, it is hypothesized that,

H_4 Innovation has a positive impact on service delivery

2.10.5 The effect of Information intensity on service delivery

Information Intensity significantly affects Service Delivery in a positive way; this is an indicator of a greater volume of information facilitates improved service delivery. Tran (2020), examines the impact of information-rich electronic health records (EHRs) on service delivery in Australia. Tran argues that comprehensive EHR systems, which provide detailed patient histories and clinical data, enable healthcare providers to make informed decisions quickly. Her research indicates that the use of information-intensive EHRs leads to improved diagnostic accuracy and more personalized treatment plans, ultimately enhancing patient satisfaction and health outcomes.

Greene (2021), explores the role of data analytics in improving service delivery in hospitals in the United States. Greene highlights how the integration of big data and analytics allows healthcare organisations to identify trends and patterns in patient care. This information intensity facilitates proactive management of patient populations and optimizes resource allocation. Greene's findings suggest that leveraging data analytics significantly enhances the efficiency and effectiveness of healthcare services.

Hussain (2022), analyzes the use of health information technology (HIT) in chronic disease management in the Middle East. Hussain posits that information-intensive systems, such as patient portals and mobile health applications, empower patients to engage actively in their own care. By providing access to personalized health information, these technologies enhance patient adherence to treatment plans and improve overall health outcomes. Her research underscores the importance of information intensity in fostering patient engagement.

Chen (2023), discusses the impact of clinical decision support systems (CDSS) on healthcare delivery in Europe. Chen argues that CDSS, which provide evidence-based recommendations and alerts based on patient data, significantly improve the quality of care. His study shows that these information-intensive tools help healthcare professionals make better-informed decisions, reducing errors and improving patient safety. The integration of CDSS in clinical practice demonstrates the positive effects of information intensity on service delivery.

Kim (2024), focuses on the relationship between information intensity and patient satisfaction in telehealth services in South Korea. Kim highlights that providing patients with comprehensive information about their health conditions, treatment options, and follow-up care enhances their overall experience with telehealth. Her findings indicate that increased information availability leads to higher levels of patient satisfaction and trust in telehealth services, showcasing the importance of information intensity in modern healthcare delivery.

From EHRs in Australia to data analytics in the United States, health information technology in the Middle East, clinical decision support systems in Europe, and telehealth services in South Korea, the significance of information-rich environments in healthcare is evident. As the public healthcare sector continues to evolve, prioritizing information intensity will likely lead to enhanced patient satisfaction, improved health outcomes, and increased efficiency in healthcare systems worldwide.

Therefore, it is hypothesized that,

H_5 Information Intensity has a positive impact on service delivery.

2.11 The Moderating Effect of Culture between Digitalisation and Service Delivery in the Public healthcare sector

The public healthcare sector is experiencing a transformation fuelled by the rapid advancement of digital technologies. These technologies, ranging from electronic health records (EHR) to telemedicine and artificial intelligence (AI), have the potential to improve service delivery, efficiency, patient outcomes, and access to care (Alvarez et al., 2021). However, the extent to which Digitalisation enhances healthcare services is influenced not only by technological capabilities but also by socio-cultural factors, which play a moderating role in the relationship between Digitalisation and service delivery. The concept of culture, broadly understood as the shared beliefs, values, behaviors, and practices within a community, significantly impacts how digital health technologies are adopted, utilized, and integrated into healthcare systems.

Culture is a complex and multifaceted concept that has been studied and defined across disciplines, including anthropology, sociology, psychology, and communication studies. Over the past several years, a variety of perspectives have emerged to define, explore, and contextualize culture in the 21st century. This literature review synthesizes recent definitions and theoretical approaches to understanding culture, highlighting its evolving role in globalized societies, social identities, and individual behaviors.

Culture is traditionally defined as the shared beliefs, values, customs, and behaviors that define a group of people (Geertz, 1973). In this context, culture serves as a social framework that shapes an individual's worldview and provides the tools for navigating and interpreting their environment. However, more recent approaches suggest that culture is not just a static, collective entity but a dynamic, multifaceted construct that evolves through interaction, negotiation, and adaptation (Jahoda, 2019). According to Hofstede (2020), culture can be thought of as "the collective programming of the mind" that distinguishes members of one group or category of people from another. This definition underscores the cognitive and psychological aspects of culture, emphasizing how deeply cultural norms are ingrained in the individual psyche. In contrast,

Kymlicka (2021) adopts a more fluid definition of culture, suggesting that it is an ongoing process of interaction between individuals and their socio-political environments, shaped by both historical legacies and contemporary forces such as globalization.

In recent years, the discourse on culture has been increasingly influenced by globalization, which has led to the blending of cultural boundaries and the emergence of hybrid identities. As Appadurai (2019) argues, globalization has created disjuncture's between the global and the local, meaning that cultural identities are no longer confined to fixed national or ethnic categories but are constantly shifting and redefined in relation to global flows of people, information, and capital. The concept of "glocalization" (Robertson, 2020), which describes the simultaneous occurrence of global and local forces shaping cultural phenomena, is particularly relevant in understanding the impact of globalization on culture. For example, the spread of Western media and consumer products has led to the creation of global cultural products, but these are often localized and adapted to regional tastes, creating new hybrid cultural forms (Friedman, 2021). Moreover, in the age of social media, cultural expressions are no longer constrained by geographic location. According to Marwick and Boyd (2021), digital platforms have transformed how individuals engage with culture, allowing for the creation of online communities that transcend traditional cultural boundaries. This shift challenges the notion of culture as something that is inherently tied to place or nation-state.

The study of cultural identity has seen significant developments in the past few years, particularly with the rise of intersectional approaches. Cultural identity is no longer understood as a singular or monolithic experience but as a complex intersection of race, gender, class, and other social categories (Crenshaw, 2021). Intersectionality highlights how individuals experience culture differently depending on their positioning within various social structures, emphasizing the multiple, layered nature of cultural belonging. In their 2020 study, Hall and O'Brien explore how cultural identity is continuously negotiated in response to both external pressures (e.g., cultural stereotypes) and internal processes (e.g., self-identification). They argue that cultural identities are fluid, shaped by historical legacies and contemporary social dynamics, including migration and diaspora experiences.

Another critical area of cultural studies involves the relationship between culture, power, and social change. Cultural theorists like Foucault (1980) have long emphasized that culture is not just

a set of shared symbols but also a tool of power, shaping social hierarchies and norms. In recent years, scholars have focused on how cultural practices, representations, and media are used to challenge or reinforce power structures. For example, in their 2023 study, Thompson and Garcia argue that contemporary movements like Black Lives Matter and Me To represent significant cultural shifts, with marginalized groups using cultural forms to challenge entrenched power dynamics. These movements emphasize the importance of cultural representation and the ways in which cultural products (from art to social media) can serve as sites of resistance. Similarly, recent scholarship on cultural hegemony (Gramsci, 2021) suggests that dominant cultural norms often reflect the interests of the ruling classes, while subcultures may resist or subvert these dominant ideologies. As cultural production becomes more democratized through digital technologies, there is growing interest in how cultural forms can be used to contest or alter power relations (Chin, 2024).

On the individual level, culture has been shown to shape not only social behaviors but also cognitive processes. According to a 2023 study by Lee and Park, culture significantly influences perception, cognition, and emotional expression. For instance, Western cultures, which tend to emphasize individualism, encourage more internalized and individual forms of self-expression, while East Asian cultures, which emphasize collectivism, promote self-expression in the context of social harmony and group identity. Recent work in cultural psychology also emphasizes how cultural narratives, such as those surrounding success, failure, or happiness, deeply impact an individual's self-concept and well-being. Cultural narratives are often absorbed unconsciously, becoming a powerful framework for interpreting life events and making decisions (Nisbett, 2020).

Therefore, it is hypothesized that,

H_6 Culture has moderating effect on the relationship between digitilisation and service delivery

2.12 Research model

Based on the hypothesised relationships, research model in Figure 2.2 below is propose

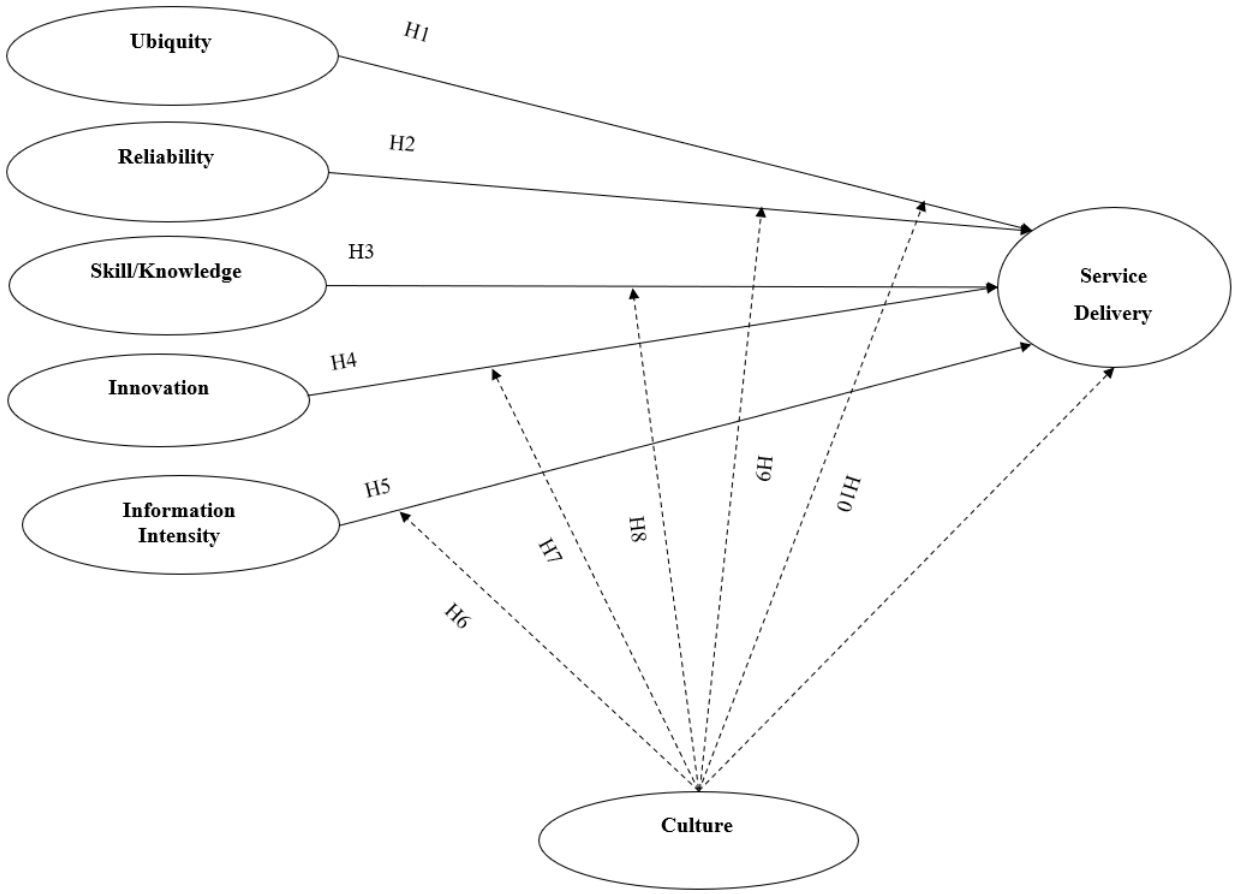


Figure 2.2 Research model of the study

Source: Derived from literature study

The developed hypotheses are:

H1: Ubiquity (UBI) positively affects Service Delivery (SD).

H2: Reliability (REL) positively affects Service Delivery (SD).

H3: Skill/Knowledge (SK) positively affects Service Delivery (SD).

H4: Innovation (INN) positively affects Service Delivery (SD).

H5: Information Intensity (INF) positively affects Service Delivery (SD).

H6: Culture significantly moderates the positive relationship between Ubiquity (UBI) and Service Delivery (SD).

H7: Culture significantly moderates the positive relationship between Reliability (REL) and Service Delivery (SD).

H8: Culture significantly moderates the positive relationship between Skills/Knowledge (SK) and Service Delivery (SD).

H9: Culture significantly moderates the positive relationship between Innovation (INN) and Service Delivery (SD).

H10: Culture significantly moderates the positive relationship between Information Intensity (INF) and Service Delivery (SD).

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2.12.1 Service Delivery

Jones et al. (2020) explored the impact of telemedicine on healthcare service delivery in rural areas of the United States. Their study highlighted how telemedicine has significantly improved access to healthcare services, particularly for populations living in geographically isolated areas. The research showed that telemedicine facilitated remote consultations, reducing the need for patients to travel long distances for specialist care. Furthermore, telemedicine contributed to faster diagnosis and treatment, improving health outcomes for patients with chronic conditions. However, the study also noted that challenges such as insurance reimbursement policies and regulatory barriers hindered the widespread adoption of telemedicine in certain states.

Smith et al. (2021) examined the role of Electronic Health Records (EHR) in improving the efficiency of healthcare service delivery in hospitals across the United States. The study found that the implementation of EHR systems led to significant improvements in patient care coordination, as healthcare professionals could quickly access and share patient information across departments. The research also showed that EHRs helped reduce medical errors and improved patient safety by providing accurate, up-to-date information. However, the study highlighted the high implementation costs and the resistance to change from healthcare staff as key challenges to EHR adoption.

Kumar et al. (2019) investigated the role of electronic health (eHealth) applications in the management of chronic diseases in the United States. The study found that mHealth solutions,

such as apps for monitoring blood pressure and glucose levels, played a key role in improving patient engagement and disease management. Patients with chronic conditions such as diabetes were able to monitor their health metrics in real-time, which allowed healthcare providers to make timely interventions and adjust treatment plans. The study concluded that mHealth tools improved adherence to treatment regimens and reduced hospital readmissions. However, it also pointed to issues of data privacy and security as significant barriers to widespread adoption.

Williams and Patel (2022) explored virtual care models in the United States and their impact on healthcare service delivery. The research found that virtual care platforms allowed for more flexible and accessible healthcare services, improving convenience for patients, especially during the COVID-19 pandemic. Virtual care provided a range of services, from telemedicine consultations to remote monitoring of vital signs, thereby improving access to care and reducing the burden on healthcare facilities. However, the study noted that disparities in access to technology, such as the digital divide in underserved populations, limited the effectiveness of virtual care solutions.

Lemoine et al. (2020) conducted a study on the implementation of telemedicine across European countries and its impact on healthcare service delivery. The study found that countries like Sweden, Finland, and the United Kingdom had successfully integrated telemedicine into their healthcare systems, improving access to care, especially for elderly and rural populations. Telemedicine helped alleviate pressure on healthcare facilities by providing consultations remotely, allowing doctors to reach more patients in less time. The research also found that telemedicine reduced healthcare costs and improved patient satisfaction. However, the study emphasized that inconsistent policies across European countries created challenges in standardizing telemedicine practices and achieving full integration across healthcare systems.

Davis and Foster (2021) examined the efficiency of digital health platforms in the European Union, focusing on how these platforms streamlined healthcare service delivery. Their study showed that digital health platforms, which integrated various healthcare services such as appointment booking, teleconsultations, and digital health records, improved the overall efficiency of healthcare systems. In countries like Germany and the Netherlands, these platforms allowed for seamless coordination between primary care providers and specialists, reducing waiting times and improving the continuity of care. However, the research also highlighted that some European

countries struggled with the interoperability of digital health systems, which hindered the exchange of patient data across borders.

Zimmermann et al. (2022) conducted a study on the adoption of Electronic Health Records (EHR) in hospitals across Europe and their impact on patient care and service delivery. The study found that EHR systems led to better patient outcomes, as healthcare providers were able to access accurate patient histories, test results, and medication records instantly. This improved communication between healthcare teams and reduced the occurrence of medical errors. The study also showed that EHR systems helped improve patient flow in hospitals, reducing waiting times and enhancing overall hospital efficiency. Despite these benefits, the study noted that some hospitals faced challenges related to the initial cost of EHR implementation and the complexity of training healthcare staff.

Taylor and Sweeney (2023) explored the role of mobile health (mHealth) applications in providing mental health support in Europe. Their study found that mHealth apps played a crucial role in enhancing mental health service delivery by providing patients with tools for self-management, such as cognitive behavioral therapy (CBT) exercises, mood tracking, and access to counseling services. These apps were particularly beneficial in countries like the UK, where there is a high demand for mental health services and a shortage of mental health professionals. The study concluded that mHealth solutions could significantly reduce wait times and improve mental health outcomes, but highlighted concerns over data security and the need for regulatory standards in digital mental health care.

Martin et al. (2024) examined the importance of digital health literacy in improving service delivery in European healthcare systems. The study found that patients with higher digital health literacy were more likely to engage with digital health platforms, such as patient portals and telemedicine services, leading to improved health outcomes. The research suggested that digital health literacy empowered patients to take control of their health by enabling them to access information, communicate with healthcare providers, and manage chronic conditions more effectively. However, the study noted that low digital health literacy among certain populations, particularly older adults and lower-income groups, posed a barrier to the equitable use of digital health technologies across Europe.

Chakabva and Choga (2023) explored the use of digital scheduling systems in Zimbabwean public hospitals and their impact on operational efficiency. The study revealed that digital appointment scheduling systems helped streamline patient flow management, ensuring that patients were seen at their appointed times, thus reducing waiting times and overcrowding in clinics and emergency departments. Healthcare facilities were able to optimize resource allocation, which in turn improved patient satisfaction and reduced stress on healthcare providers. Additionally, the research highlighted that digital scheduling systems facilitated better management of medical staff schedules and hospital resources. However, the study also acknowledged that technical glitches and the need for adequate training for healthcare staff were potential barriers to the optimal use of these digital systems.

Nyamadzawo et al. (2022) conducted a study on the role of digital health technologies in improving healthcare accessibility in rural Zimbabwe. The study found that digital health solutions such as mobile health applications and telemedicine services were instrumental in overcoming geographic barriers to healthcare access. These technologies enabled patients in remote areas to consult with healthcare professionals without the need for long-distance travel, which was often both costly and time-consuming. The study found that digital health services helped address the issue of healthcare worker shortages in rural areas by connecting patients to urban-based specialists. Despite the benefits, the research pointed out that the challenge of unreliable electricity and internet connectivity in some rural regions hindered the full effectiveness of these digital solutions.

Gumbo et al. (2023) explored the impact of digital health literacy on healthcare service delivery in Zimbabwe. The study revealed that patients with higher digital health literacy were more likely to use digital health platforms effectively, resulting in better engagement with healthcare services. By leveraging mobile health apps, online portals, and telemedicine, patients were able to access information about their conditions, manage their health proactively, and communicate with healthcare providers. The study also highlighted that improved digital literacy was associated with better health outcomes, as patients were more likely to adhere to prescribed treatments and seek timely medical attention. However, the study pointed out that a significant portion of the population still faced barriers to digital health literacy, which limited the overall effectiveness of digital health solutions.

Moyo et al. (2022) investigated the impact of digital platforms on healthcare service delivery in Zimbabwe, particularly focusing on data management in public health facilities. The study found that digital platforms for managing patient data improved service delivery by ensuring that health information was stored securely and could be accessed by healthcare professionals across different levels of the healthcare system. The digital systems allowed for more accurate tracking of patient histories, reducing errors in diagnoses and treatment plans. Additionally, the study highlighted that digital data management facilitated better coordination among healthcare providers, which improved the overall quality of care. The study also identified challenges related to the limited capacity of healthcare workers to manage and utilize digital tools, requiring ongoing training and support.

2.12.2 Research Gap

Digitalisation has the potential to revolutionize healthcare delivery by improving accessibility, efficiency, and the quality of services. However, despite global advancements in digital health, Zimbabwe faces unique challenges that hinder the implementation of a comprehensive Digitalisation framework. These challenges highlight several research gaps specific to Zimbabwe's public healthcare sector, as discussed below.

While digital health frameworks are increasingly studied in high-income countries, there is a lack of empirical research tailored to Zimbabwe. Studies on how digital health solutions can address the country's unique challenges such as infrastructure gaps, limited funding, and high disease burdens—are scarce. For example, Makurumidze et al. (2022) noted that digital health initiatives in low-resource settings often face sustainability issues due to limited adaptation to local needs. This gap underscores the necessity for Zimbabwe-specific research on designing and implementing contextually relevant digital health solutions.

Zimbabwe's public healthcare sector remains reliant on manual, paper-based processes, limiting the adoption of technologies like Electronic Health Records (EHR) and telemedicine. Studies such as those by Chitungo et al. (2021) highlight the challenge of integrating digital tools into healthcare systems that lack foundational digital infrastructure. However, there is limited research on creating interoperable systems in low-resource settings like Zimbabwe, which would allow various digital platforms to share data seamlessly.

One of Zimbabwe's most significant barriers to Digitalisation is inadequate infrastructure, such as unreliable electricity and poor internet connectivity, especially in rural areas. While studies in other African contexts, like that of Nyoni and Bhebhe (2020), address infrastructure deficits, little empirical evidence exists for Zimbabwe-specific solutions. Research on offline-capable systems, leveraging mobile networks, or utilizing renewable energy sources for healthcare facilities remains insufficient.

Healthcare workers in Zimbabwe often lack the digital literacy required to use emerging technologies effectively. As Nyamazana et al. (2023) point out, capacity-building initiatives are often underfunded or absent, leaving many healthcare workers unprepared for digital transformation. Research is needed to identify strategies for developing digital skills among healthcare workers and evaluating the impact of such training programs on healthcare delivery.

Regulatory frameworks in Zimbabwe are underdeveloped in addressing the use of digital health technologies. Research by Mlambo et al. (2021) highlights gaps in policies related to data privacy, cybersecurity, and the standardization of digital tools. However, there remains a lack of evidence on how comprehensive regulatory frameworks could be developed to foster trust, compliance, and patient safety in Zimbabwe's healthcare system.

Zimbabwe faces economic challenges, with many citizens unable to afford costly healthcare services. While global studies often focus on cost-effectiveness in implementing digital health solutions, there is a lack of Zimbabwe-specific research on how affordability can be achieved. Evidence from Chitungo et al. (2021) suggests that financial sustainability is crucial, but research on models like public-private partnerships or donor funding for digital health in Zimbabwe is limited.

Patient-centered care is a cornerstone of digital health, but there is limited research on how Zimbabwe's digital health initiatives can enhance patient engagement. Studies in other regions, such as those by Reddy et al. (2020), show that digital tools improve health literacy and self-management, yet their applicability to Zimbabwe remains unexplored. Research is needed on tailoring digital tools to meet the cultural and social needs of patients in rural and urban Zimbabwean settings.

Pilot digital health projects have been launched in Zimbabwe, such as mHealth initiatives, but there is a lack of empirical studies evaluating their outcomes. Research by Nyoni and Bhebhe (2020) indicates that many of these projects fail to scale due to poor planning and insufficient funding. Lessons from these pilots could guide the development of scalable frameworks that can address healthcare challenges effectively.

There is a noteworthy lack of information available on a digitalisation framework developed for service delivery in the public healthcare sector of Zimbabwe. According to the findings of the literature study, Digitalisation in healthcare is crucial for improving efficiency, accessibility, and quality of service delivery. It streamlines administrative processes, enhances data management, and supports better decision-making through technologies like electronic health records (EHRs) and telemedicine (Chitungo et al., 2021; Nyoni & Bhebhe, 2020). By enabling seamless integration of digital tools, healthcare systems can reduce errors, optimize workflows, and improve patient satisfaction (Makurumidze et al., 2022). A review of different research conducted focused on sustainability of digital health in resource-constrained settings. Despite the fact that there have been previous empirical studies on digitilisation and service delivery in other countries and in Zimbabwe, there have been no studies that focused on culture as moderator of digitilisation and service delivery in the public healthcare sector (Chada et al,2022). The fact that studies that evaluate the connection between digitilisation on service delivery moderated by culture in the public healthcare sector are not available. The studies collectively leave a blind spot on effectiveness of digitilisation practice and it demonstrates that there is still need for further research in this field and create a framework model.

2.13 Conceptual framework

The study used digitalisation as the independent variable while service delivery being the dependent variable. The researcher intends to use ubiquity, affordability, reliability, satisfaction and skills as digitilisation variable.

In sum, the conceptual framework illuminates the fact that Digitalisation does not automatically lead to positive impact on service delivery. Essentially there is no linear relationship between the dependent variables and independent variables, but a relationship controlled or manipulated by a

gamut of factors (intervening or control variables) which are Healthcare Infrastructure, and Government Support.

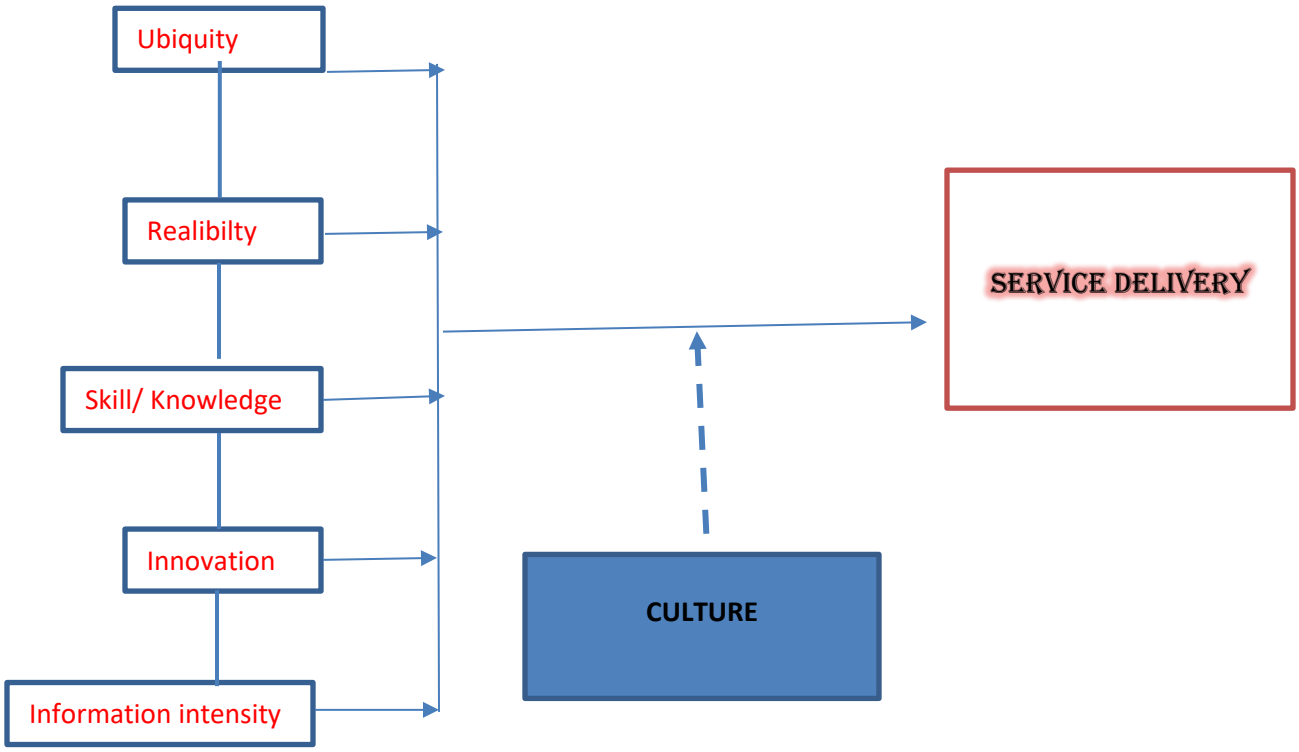

Figure 2.3 Conceptual Framework

i. Ubiquity: This variable examines the extent to which digitalisation is accessible and available to all individuals within the healthcare system. It considers factors such as internet connectivity, mobile device penetration, and infrastructure development. A higher degree of ubiquity would likely lead to a wider reach and increased utilization of digital healthcare services (Cohen and Mello, 2018).

ii. Reliability: Reliability refers to the dependability and consistency of digital healthcare services (Yasini and Shamsi, 2021).. This variable encompasses factors such as network

stability, system uptime, and data security. Higher levels of reliability would foster trust in digital healthcare services and encourage their continued usage.

iii. Skills: Skills encompass the abilities and knowledge required to effectively navigate and utilize digital healthcare services. This variable explores factors such as digital literacy, health literacy, and technological training programs. A higher level of skills would increase individuals' capability to utilize digital healthcare services optimally.

iv. Innovation: This is defined as the process by which new ideas are generated, developed, and implemented to create value for organisations, customers, and society at large (Schilling, 2020). This definition emphasizes the value-creation aspect of innovation, which is crucial in-service delivery. Schilling's perspective aligns with the broader understanding that innovation is not just about novelty but also about its practical application and the benefits it brings to stakeholders.

v. Information Intensity: This refers to the degree to which organisations rely on data and information flow in real time for their processes. This contemporary view emphasizes the dynamic nature of information and its critical role in decision-making, customer interaction, and service innovation. The rise of the digital economy, data analytics, and IoT has expanded the definition, making it clear that information intensity is not only a structural factor but also a catalyst for competitive advantage (Chen & Lee, 2021).

Moderating Variable

In addition to the proposed conceptual framework, it is important to consider the presence of moderating or intervening variables that might influence the relationships.

i. Culture: Culture can be defined as all the ways of life including arts, beliefs and institutions of a population that are passed down from generation to generation. Culture has been called the way of life for an entire society. As such, it includes codes of manners, dress, language, religion, rituals, art.

2.14 Chapter summary

Prior and similar researches were the focus of this chapter. Previous research findings were examined, and research hypotheses were formulated. After establishing links between study constructs, hypotheses were developed. The moderating effect of culture on the relationship between digitisation and service delivery was also considered in the hypotheses formulation. After a thorough literature analysis and empirical examination, a research model was developed. Knowledge gap was identified and deliberated. The research methodology is deliberated in the next chapter.

3 CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter's goal was to familiarize the reader(s) with the approaches, tactics, and plans used in the study to address the study's issues. The chapter specifically describes, examines, and provide justifications for the methodological decisions used for the study. This chapter covers the research's philosophy, design, methodology, and strategy as well as its population, sampling scheme, sample size, data gathering tools, and data collection techniques. Further, this chapter also discusses various data analysis methods, validity and reliability, and ethical considerations.

3.2 Research Philosophy

The research philosophy reflects the underlying beliefs and assumptions about how knowledge is developed and validated in a study. This research is guided by the principles of positivism, which is the most appropriate philosophical stance for a quantitative approach. Positivism holds that reality is objective and can be measured through observation and empirical data collection, independent of the researcher's influence (Saunders, Lewis, & Thornhill, 2019).

Under the positivist paradigm, the researcher assumes a detached and neutral role, collecting data that can be tested statistically to determine patterns, relationships, and generalisable findings. This aligns with the study's goal of examining the measurable impact of digitalisation constructs such as ubiquity, reliability, skills and knowledge, innovation, and information intensity on service delivery outcomes in public healthcare institutions. By applying structured survey instruments and using statistical tools such as regression and Structural Equation Modelling (SEM), the study follows a deductive reasoning process, where hypotheses are developed from theory and tested through observable data (Creswell & Creswell, 2022). Positivist research also prioritises replicability and objectivity, seeking to produce findings that can be generalised to wider populations based on representative sampling and valid measurement tools (Park, Konge, & Artino, 2020). In this study, the choice of positivism ensures methodological rigour, clarity in variable definition, and a focus on causal and correlational relationships supported by numerical evidence.

A key justification for adopting a positivist philosophy lies in its emphasis on objectivity and replicability. This aligns with the nature of the research problem, which requires evidence-based conclusions to inform practice and policy in healthcare digitalisation. Positivism ensures that the researcher maintains a neutral and detached role, reducing bias and increasing the validity of the findings (Park, Konge, & Artino, 2020). It also provides a clear path for deducing theories into testable hypotheses allowing the study to move from theory to observation, and then to empirical verification.

Moreover, in healthcare contexts where decisions affect resource allocation and service quality, positivist-driven research offers clear, quantifiable insights that can guide policy development and institutional planning (Yilmaz, 2019). The ability to measure perceptions across a broad sample and identify statistically significant trends offers the rigor and clarity required for strategic digital health implementation.

Therefore, the positivist philosophy not only aligns with the methodological structure of the study but also strengthens its practical relevance by producing objective, reproducible, and generalisable findings that can inform decision-makers and stakeholders in the healthcare system. This study followed the research steps as illustrated by Saunder, et al (2015).

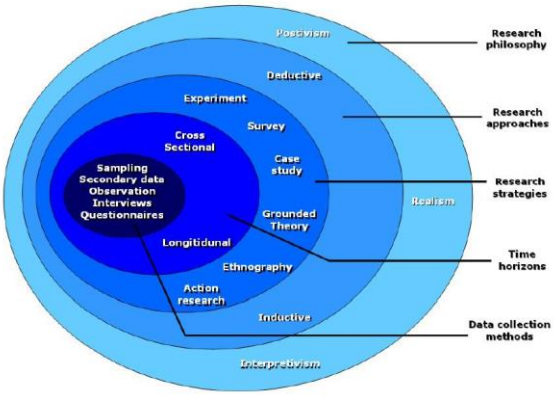

Figure 3.1: Research Onion

Source: Saunders et al., (2015).

3.3 Research Strategy

The research strategy defines the overarching plan that guides how a study is conducted to address the research problem (Saunders, Lewis, & Thornhill, 2019). In this study, a quantitative research

strategy was adopted, aligned with the study's objectives to measure and analyse the relationships between digitalisation factors and service delivery outcomes in Zimbabwe's public healthcare system. This strategy is appropriate where the aim is to gather measurable data, test hypotheses, and quantify perceptions across a large respondent base (Creswell & Creswell, 2022).

The survey method was used as the primary data collection tool within this strategy. Surveys are especially suitable for descriptive and explanatory studies that seek to capture views, behaviours, and patterns from a defined population (Bryman, 2019). They allow for the collection of standardised data from a broad sample in a time- and cost-efficient manner, supporting the generalisability of findings (Hair et al., 2021).

By using structured questionnaires, the research was able to quantify key constructs such as ubiquity, reliability, skills and knowledge, innovation, and information intensity and test their relationship with service delivery using statistical techniques. This strategy facilitated the use of correlation and regression analysis, as well as Structural Equation Modelling (SEM), to validate hypothesised relationships and assess the strength of influence between variables. Quantitative strategies offer the advantage of objectivity, replicability, and statistical rigour, making them well-suited for studies aiming to inform policy or practice based on evidence from a representative sample (Creswell, 2021; Saunders et al., 2019). Given the need to analyse patterns in digital health adoption and performance across public hospitals, the survey-based quantitative strategy provided a systematic and efficient means to fulfil the study's objectives.

3.4 Research Design

This study adopted a quantitative descriptive research design, which is appropriate for examining and systematically describing the current status of digitalisation in Zimbabwe's public health sector. Descriptive research focuses on answering the "what" rather than the "why" or "how" of a phenomenon, making it suitable for assessing the perceptions, usage patterns, and effects of digital technologies across a wide population (Saunders, Lewis, & Thornhill, 2019). This design allowed the researcher to quantify variables such as ubiquity, reliability, innovation, skills and knowledge, and information intensity, and to determine how these variables relate to service delivery outcomes.

The primary rationale for using a descriptive design lies in its ability to capture trends, distributions, and relationships across a large sample, without manipulating any variables (Creswell & Creswell, 2022). Given the objective of the study to assess the extent to which digitalisation influences healthcare service delivery this design enabled the researcher to collect measurable data that could be analysed statistically to draw generalisable conclusions.

Structured questionnaires were used to gather data from healthcare professionals in selected public hospitals. This method ensured consistency in responses, allowing for effective aggregation and comparison across different variables and demographic groups. Moreover, the descriptive design supports the use of correlation and regression analyses to explore associations among constructs (Hair et al., 2021), which was essential for testing the hypothesised model in this study.

In contexts like healthcare digitalisation where policies, infrastructure, and user behaviour vary widely a descriptive approach provides valuable empirical evidence on the current state of affairs. It offers stakeholders a clear picture of which digital elements are working, where gaps exist, and how demographic or institutional factors may influence outcomes (Bryman, 2019). Overall, the descriptive research design enabled the researcher to meet the study objectives by generating statistically grounded insights that reflect the perspectives and experiences of a broad population, forming a reliable basis for policy and practical recommendations.

3.5 Target Population

The population for this study includes individuals and organisations involved in the public healthcare sector from the capital city of Zimbabwe, Harare. According to the latest 2024 report from the Health Service Commission, there are 129,164 registered public health care staff employed in Harare Metropolitan Province. This therefore becomes the researcher's target population and it comprised of doctors, nurses, and medical staff, health administrators, policymakers as they contribute to service delivery in the public healthcare sector.

3.6 Sampling

This study employed a probability sampling approach, specifically stratified random sampling, to ensure a representative and unbiased selection of participants for the quantitative research. The sampling frame consisted of healthcare professionals working in the two main central public hospitals in Harare Metropolitan Province, Parirenyatwa Group of Hospitals and Sally Mugabe Central Hospital.

Stratified random sampling was selected because it enhances the representativeness of the sample by ensuring that key subgroups (strata) within the population are proportionately included. In this study, the population was stratified based on professional role (e.g., nurses, doctors, administrators, and government health officials). This ensured that the sample reflected the diversity of perspectives across different functional areas within the healthcare system.

After stratification, participants were randomly selected from each stratum using computer-generated random numbers, reducing the risk of selection bias and supporting the generalisability of the findings to the broader population (Saunders, Lewis, & Thornhill, 2019). This method also allowed for more precise statistical comparisons between groups, which was important for understanding how perceptions of digitalisation vary by professional role and background.

The use of stratified random sampling is particularly justified in health systems research where professional responsibilities, access to digital tools, and involvement in service delivery processes can significantly influence experiences and attitudes toward digitalisation. By using this method, the study ensured that all key stakeholder groups were adequately represented, thereby strengthening the validity and reliability of the results.

3.6.1 Sample Size

The study sample size for quantitative data was 384 respondents generated from a population of 129,164 registered public health care staff that are currently employed in Harare Metropolitan Province (Health service commission report, 2022). The researcher used the Rao soft calculator to determine the absolute sample size for the entire population. Specific respondents in each category were selected through a proportional representation.

Rao soft's margin of error was within the acceptable range of 5 percent since the sample size is large enough. As such the confidence level of such a sample of 384 is 95 percent which is high enough and acceptable according to Krejcie and Morgan (1970). According to Saunders et al. (2016), the selection of the sample size should take into consideration the required accuracy, the sampling procedure, the nature and characteristics of the population, the time and financial resources available and the tools of data collection.

Furthermore, the shared experiences of participants contributed to the sample size determination. Since the target population was relatively homogenous in relation to the research questions, fewer

participants were required to achieve saturation. However, consistent with best practices (Guest et al., 2020), flexibility was maintained during data collection, with additional participants recruited as needed to ensure a thorough exploration of the study's objectives. Ultimately, the sample size for this study was finalized dynamically during the data collection phase, spanning the 2019–2024 period, ensuring both methodological rigor and practical feasibility. This approach ensured that the data collected was sufficient to address the research objectives comprehensively.

3.7 Sources of Data

3.7.1 **Government Reports and Policy Documents**:

The Zimbabwean Ministry of Health and Child Care (MoHCC) publishes annual reports and strategic plans outlining public healthcare sector policies, digital initiatives, and service delivery improvements.

National health statistics and reports, such as the Zimbabwe Health System Assessment, provide insights into current health services and challenges.

3.7.2 **Peer Academic Journals**:

Research articles from journals like the *Journal of Health Informatics in Africa* and *BMC Health Services* offered peer-reviewed studies on digital health interventions, challenges, and successes within Zimbabwe and similar contexts.

This corpus of literature facilitates a rigorous academic discourse that interrogates the multifaceted interactions between digitilisation its impact on service delivery in the public healthcare sector, thereby enriching the understanding of creating of a digitilisation framework around that area (Zhang & Hsu, 2021).

3.8 **Non-Governmental Organisations (NGOs)**:

Reports from NGOs such as Médecins Sans Frontières (MSF) and the World Health Organisation (WHO) focus on health service delivery and the role of technology in improving health outcomes in Zimbabwe.

Evaluations and pilot project reports from organisations implementing digital health solutions provided practical insights.

3.8.1 **Conference Proceedings and Workshops**:

Proceedings from conferences such as the Africa Health Agenda International Conference (AHAIC) and Africa Health Conference which occurs annually contained relevant discussions on health technology and policy innovations in the region.

Workshops and seminars focusing on health informatics yielded new frameworks or models for digital health implementation.

3.8.2 **Statistical Databases**:

Databases from the World Bank and WHO contained valuable statistics on health indicators, infrastructure, and resource allocation, which were crucial for understanding the context of service delivery in Zimbabwe. Access to data on telehealth usage and patient demographics helped identify trends and areas for improvement.

3.8.3 **Digital Health Platforms and Tools**:

Information from existing digital health platforms in Zimbabwe, such as the Health Information System (HIS) and mobile health applications, illustrated current practices and identify gaps in service delivery. Analysis of user engagement and outcomes from these platforms provided empirical evidence for developing a Digitalisation framework.

3.8.4 Academic Theses and Dissertations

Reviewing previously completed academic theses and dissertations that pertain to digitilisation and service delivery yielded valuable literature insights and methodological frameworks. These academic works often engage similar themes and can inform the design and execution of new research studies. By critically analyzing the methodologies employed in past research, scholars can identify effective strategies for data collection and analysis that may be applicable to their inquiries. Moreover, the findings and conclusions derived from these theses served as a foundation for further exploration, highlighting gaps in the existing literature that warrant additional investigation. Engaging with this corpus of work not only enriches the researcher's understanding of the subject matter but also situates their inquiry within a continuum of academic discourse, thereby enhancing the credibility and relevance of their research.

3.9 Research Instruments

The researcher used structured questionnaire a as the method of data collection. To ensure the validity and reliability of the research instrument in question a pilot test was conducted with a small sample of participants before the full-scale administration. This pilot test helped to identify and rectify any issues with question clarity, response options, and overall survey design. Following the pilot test, the refined questionnaire distributed to a larger sample of stakeholders with doctors, nurses, health administrators and various Government Ministry officials.

3.9.1 Questionnaires

Physical and online questionnaires were used as the primary data collection instruments, consisting of a structured set of questions and prompts designed to gather relevant information from respondents. The online version was administered via Google Forms, allowing participants to complete the questionnaire remotely using a secure internet link. This method proved to be convenient and cost-effective, particularly for a literate population, as the format allowed for simple, short questions to be presented in a clear and accessible manner. The questionnaire incorporated both Likert scale and nominal scale items, capturing varying levels of agreement with specific statements and enabling categorisation by demographic variables. This structured format not only ensured consistency in responses but also simplified statistical analysis.

The use of questionnaires is particularly justified in this study due to the large and geographically distributed nature of the target population. Questionnaires allow for the efficient collection of data from a broad sample within a relatively short time, making them ideal for studies requiring generalisable results (Creswell & Creswell, 2022). Additionally, because this study sought to quantify perceptions and relationships among well-defined variables such as reliability, innovation, and information intensity, structured questionnaires were the most appropriate tool for collecting standardised, quantifiable data.

Furthermore, the questionnaire method was chosen because it minimises bias and offers respondents the anonymity needed to express their views more openly and honestly especially in institutional settings like hospitals, where participants may hesitate to provide critical feedback unlike in face-to-face interviews (Bryman, 2019). The digital format also enabled automatic data capture and real-time tracking of response rates, enhancing data accuracy and management. Given the structured nature of the research

design and the need for statistically analysable data, questionnaires offered the best balance between accessibility, efficiency, and data quality.

Questionnaire development

The questionnaire was developed basing on the research objectives and literature reviewed in Chapter Two. The questionnaire was structured in nature that is it contained close-ended questions rated on a five-point Likert scale. The questionnaire had four sections where Section A collected socio-demographic information of the respondents whilst Sections B to G collected information according to each objective. The questions included in the questionnaires were derived from the literature reviewed as well as from questionnaires of previous similar researches. For instance, the research adapted questionnaires employed by Anarfo and Abor (2020) and Merton (2020). The following was how the questionnaire was constructed.

A structured questionnaire was pilot tested to 20 respondents to check its validity. The structured questions were chosen by the researcher and the responses came from doctors, nurses, health administrators and various Government Ministry officials. Responses, were collected in a standardized way and the researcher was confident that using a questionnaire was the most appropriate strategy. Questionnaires are appropriate for data collection because they are inexpensive to administer, maintain confidentiality and allow respondents to respond quickly (Greener & Martelli, 2021). This study used a structured Likert type questionnaire. The respondents can specify their level of agreement/disagreement with a question on the questionnaire (Heale & Twycross, 2022). The scores on the responses pertaining to agreement or disagreement in relation to the questions given are used to calculate the statistical analysis (Pasek & Krosnick, 2019). Wilson (2020) stated that, to achieve internal consistency and precision of an instrument, reliability and validity are critical requirements for analyzing Likert scale assessments.

The data generated by the structured questionnaire (Appendix II) can be analyzed quantitatively in terms of patterns and trends, so it was employed in this study. All of the items in the structured questionnaire were taken from previous similar studies (See table 4.1) and the items were modified to suit the requirements of this study.

Table 3.0-1 Questionnaire Constructs

Construct	Item Code	Item Description	Sources of Items
Ubiquity	U1	Digital technologies like smartphones, tablets, and internet access readily available in your community for healthcare purposes	World Health Organisation (2020)
	U2	Healthcare services are increasingly incorporating ubiquitous technologies like telemedicine, remote monitoring, and online appointments	Kruse et.al (2019).
	U3	It is easy to access and utilize these digital healthcare services at any given time	Eberly et.al (2020)
	U4	They are challenges faced due to limited access to digital healthcare technology	George et.al (2020)
	U5	There is a provision of internet or data timeously	ITU. (2021)
Reliability	R1	Information accessed through digital healthcare platforms are accuracy and reliable	Honget.al (2020)
	R2	There is always stable internet connectivity to navigate through the e-health platforms	Trost et.al (2021)
	R3	All patients' records are kept confidential and privacy is maintained throughout	Mehta and Pandit (2022)
	R4	Digitalisation offers a reliable alternative to traditional methods of healthcare delivery (e.g.in-person consultations, paper records)	Xu, et.al (2021)
	R5	Digital healthcare tools give accurate and reliable diagnoses, treatment recommendations for patients	Estevaet.al (2019)

Skill/Knowledge	SK1	Training on how to use digital health platforms is important	Zhang and Liu, (2020)
	SK2	A pilot test of the e-health system is important to avoid failures in further use and implementation (leading to harm, problems, loss of confidence, etc.)	Phichitchaisopa and Naenna, (2020)
	SK3	After training there is sufficient time provided to all users to adapt to the e-health platform	Aga et.al, (2021)
	SK4	Continuous training is needed to keep updated with digital trends	Gelrud and Sobral. (2023)
	SK5	All team members in my department are knowledgeable about the e-health platform used in this institution	Ojo and Adebayo, (2020)
Innovation	IN1	When using the e-health digital platform every stakeholder is involved in its design and development process	Luna, et.al (2020)
	IN2	There is a decreased workload when using the e-health platforms as repetitive tasks can be done with AI powered chatbots	Nadarzynski, et.al (2019)
	IN3	Turn-around time for patients' treatments and management is short when using e-health platforms	Asan, et.al (2020)
	IN4	E-health platforms make it easier for patients to book doctors' appointments and for them to get consultation in real time	Powell, et.al (2019)
	IN5	Data collected from patients can help to come up with statistics and trends for new innovative products and services	Qian, et.al (2021)

Information Intensity	INI1	Communication is done is real time when using the e-health system	Smith and Chirwa, (2020)
	INI2	Patients are able to book for the Doctor's appointment in advance via the various digital platforms	Mwansa and Phiri, (2021)
	INI3	The e-health platform assists in generating patient data and shorten time to diagnosis and for clinical research	Kaseke and Moyo, (2023)
	INI4	There is more patient care and Patient Relationship Management is intensified	Nyoni and Takawira, (2022)
	INI5	Statistics and reports are timeously produced from the different patient data collected	Zimudzi and Chikanda (2024)
Culture	C1	Do your cultural beliefs and practices influence your views on healthcare and treatment options	Spector, (2017)
	C2	There are more specific cultural beliefs or practices that may be resistant to digital health interventions	Or and Karsh, (2020)
	C3	There any cultural taboos related to sharing personal health information electronically	Dyer, C. (2020)
	C4	Face-to-face interaction with healthcare providers is important	Laine and Davidoff], (2019)
	C5	Technology brings comfort when accessing healthcare services (e.g., online appointments, telehealth consultations)	Jaffe and Johnson, (2021)

Service Delivery	SD1	Digitalisation has made healthcare services more accessible for medical practitioners and patients	Keesara and (2020)
	SD2	Healthcare services have been made more efficient through Digitalisation (faster appointment scheduling, streamlined communication, automated tasks)	Kohn and Corrigan (2020)
	SD3	There are more personalized healthcare services through e-health platforms (e.g., online health trackers, AI-powered chatbots)	Li and Zheng (2022)
	SD4	Digitalisation has improved the quality of healthcare services that patients receive (e.g., access to specialists, remote monitoring, data-driven insights)	Baker and Kahn (2023)
	SD5	Communication between healthcare providers and patients has been Is it easier or more difficult now? (e.g., online portals, telehealth consultations, communication apps	Zhai and Du, (2021)

3.10 Data Collection procedures

According to Creswell and Creswell (2018), primary data collection involves the gathering of first-hand information specifically tailored to the research problem and questions. In the context of the research topic, developing a digitilisation framework for service delivery in the public healthcare sector of Zimbabwe primary data collection using structured questionnaires was deemed as an appropriate method to obtain relevant and accurate information.

One of the major advantages of collecting primary data through structured questionnaires as it allowed researcher to collect a large amount of data within a short period of time while saving resources. This is particularly beneficial for this study as it is focused on developing a digitalisation

framework for service delivery in the public healthcare sector of Zimbabwe. Through using questionnaires, the researcher was able to gather data from a significant number of respondents efficiently, saving both time and monetary resources.

Furthermore, primary data collection provides researchers with full control over the questions asked and the sampling techniques employed, ensuring the accuracy and reliability of the collected data (Maliki 2014). This level of customization allowed researchers to address the research questions directly and obtain information that aligns with the research objectives. By collecting data first hand, the researcher could also tailor make the questions to the specific context of the public healthcare sector in Zimbabwe, thus obtaining a deeper understanding of developing a digitalisation framework for service delivery in the public healthcare sector of Zimbabwe.

In contrast to secondary data, primary data collection offers the advantage of timely and up-to-date information (Krosnick, 2018). Secondary data, often obtained from previous studies or sources, can sometimes be outdated or lack relevance to specific research questions. Therefore, in this study primary data collection enabled the researcher to gather data that accurately reflected the current state of affairs on developing a digitalisation framework for service delivery in the public healthcare sector of Zimbabwe.

3.11 Reliability and Validity

The replicability or consistency of a metric in similar situations is characterized as reliability (Greener & Martelli, 2019; Kumar, 2020; Zikmund et al., 2020). Reliability is the degree to which a measuring tool provides consistent outcomes across time, among related populations regardless of who administers it (Kumar, 2020; Sekaran & Bougie, 2021; Zikmund et al., 2020). Reliability signifies the precision of an instrument (Bryman & Bell, 2021; Kumar, 2020). The accuracy and precision of a measurement instrument is referred to as reliability (Kothari, 2022; Kumar, 2020). Only if research tools can generate almost identical results when employed multiple times are they considered dependable (Kumar, 2020; Zikmund, Babin, Carr & Griffin, 220). Cronbach's alpha was used to assess reliability. The scale spans from 0 to 1. If the internal consistency is close to 1, the instrument is deemed to be reliable (Kumar, 2020)

Validity is the degree to which an instrument measures what we actually want to measure (Kumar, 2020). Validity refers to a research instrument's capacity to measure what it claims to measure

(Greener & Martelli, 2019; Kumar, 2020; Olorunniwo, Hsu & Udo, 2021). Construct validity, content (face) validity and criterion validity are three techniques to assessing validity identified by Bryman and Bell (2021). When an instrument can offer measures that represent a specific concept, it is said to be valid (Kumar, 2020). During the assessment of construct validity, the researcher took into account measurement model fit indices.

A thorough literature analysis was done to guarantee that the questionnaire was proven, well-tested, and validated (Saunders et al., 2022). In addition, the supervisor and other experts were consulted to help in assessing the questionnaire's content validity. The research instrument was pilot tested. Moreover, the scale validation process was conducted before data analysis to address the reliability and validity issues.

3.11.1 Trustworthiness

Trustworthiness was established through informing respondents that data and interpretation of findings were not figments of the enquirer's imagination but clearly derived from the data. This study employed prolonged engagement and persistent observation in establishing credibility and transferability judgement through description.

3.11.2 Validity and reliability of questionnaires

In order to ensure the content validity, the researcher pilot-tested the questionnaire by administering it randomly among a sample similar to the proposed population. This pre-testing exercise is meant to check whether respondents understood the questions and the relevance of the questions in measuring the variables in this study. The questionnaire was subjected to item validation through Factor Analysis, the purpose of which is to determine the internal structure of the set of given number of items. Principal Component Analysis (PCA) method with Varimax Rotation and Kaiser Variation was used to generate factors. The researcher then made some amendments to the structure of the questionnaire and question wording based on the evidence gathered from the pilot-test. Additionally, validity is achieved through the use of existing theory in the research, to which empirical findings can be compared.

3.12 Data analysis and presentation procedures

The quantitative data was entered into SPSS software and presented data in tables and graphs. This aids to have clear illustrations of trends, cohesions and disparities of the survey respondents.

Percentages will be used thus enabling the study to illustrate the proportion of respondents giving a certain response.

Wilson (2014) postulate that data analysis is one of the most imperative aspects in research because the correctness of the data inspection impact on the reliability of the results. This is due to the fact that the value of gathered data can only be realized after it has been processed, analysed and translated into information. Every item on the questionnaire was given a numerical code. Then data was uploaded into the computer and analysed with the SPSS Version 20 program. To summarize and organize data, frequency distribution tables were employed. Data was then presented in tables and figures. Computed frequencies, percentages mean, and standard deviation were also presented using charts.

Internal consistency between the items in the measures was estimated using Cronbach's alpha coefficient. All scales were subjected to validity assessments. All of the study's items were subjected to an exploratory factor analysis (EFA). Structural Equation Modelling (SEM) in AMOS was used to test research hypotheses. AMOS was used to establish relationships between variables, detect both direct and indirect effects and approximate latent variables. The study's nature necessitated the use of AMOS to analyse data and test relationships between paths.

To ensure the validity of findings, techniques such as triangulation, member checking, and peer review was employed. The analysis concluded with the reporting of results, often supported by direct quotes, narratives, or visual representations. This iterative and flexible process enabled a comprehensive exploration of the research topic.

3.12.1 Data Analysis Techniques

3.12.1.1 Quantitative Data Analysis

Quantitative data analysis is pivotal in understanding the empirical relationships between digitilisation features and their effects on service delivery. This research employed several statistical methods, including descriptive statistics, correlation analysis, and Structural Equation Modelling (SEM), to analyse the survey data collected from stakeholders.

Descriptive statistics were used to summarise the responses from the survey. Measures such as means and standard deviations helped identify general trends and levels of agreement on how different digitalisation features influence service delivery in public hospitals. Correlation analysis was conducted using Pearson's correlation coefficients to examine the strength and direction of relationships among the study variables. This included assessing associations between independent variables (e.g., ubiquity, reliability), the moderating variable (culture), and the dependent variable (service delivery).

Structural Equation Modelling (SEM) was then applied to test the hypothesised relationships in the conceptual framework. SEM allowed for the analysis of both direct and moderating effects among the constructs. Model fit was assessed using indices such as Chi-square, CFI, and RMSEA to confirm the adequacy of the model in representing the data. This method helps in understanding stakeholders' perspectives on the ubiquity of digital technologies, uncovering issues such as barriers to adoption and perceived benefits. Thematic analysis provides context to the quantitative results, offering a deeper insight into how the technologies features are perceived and experienced by those involved in the public healthcare sector.

The data analysis techniques employed in this research include descriptive statistics, correlation analysis, Structural Equation Modelling (SEM). These methods collectively provide a thorough examination of digitilisation effects on service delivery in Zimbabwe's public healthcare sector. The quantitative data analysis approaches offer a well-rounded understanding of the research questions, highlighting both empirical relationships and contextual insights.

3.13 Ethical Considerations

Malhotra (2019) defines ethics as important values and rules that govern a society or group of people. Cooper and Schindler (2008 p.34) define ethics as the norms or standards of behaviour that guide moral choices about our behaviour and our relationships with others. Research ethics therefore relate to questions about how we formulate and clarify our research topic, design our research and gain access, collect data, process and store our data, analyse data and write up our research findings in a moral and responsible way.

The researcher sought clearance from Chinhoyi university of Technology then further sought authorisation to conduct the study from the Ministry of Health and Child Care. Th researcher also

got clearance from the Central Hospital authorities and relevant board, and assured the healthcare staff of confidentiality since no names were to be publicised and the information provided by the respondents was used for academic purposes only. In order to generate the much-needed interest on the part of the participants, the purpose of the research was outlined as well the potential benefits to the organisation were highlighted in the introductory letter (Mark NK Saunders, 2019).

3.14 Chapter Summary

The chapter explained more on research design, target population, sample design and sampling. The methodology used to collect data was discussed together with research instruments that were used for data collection. Selection of sample was done using probability sampling. The fourth chapter analysed the findings from the collected data using statistical analysis and interpretations. The chapter described how reliability and validity were ensured and finally, ethical issues that arose as a result of the research were discussed.

CHAPTER FOUR

4 DATA ANALYSIS AND PRESENTATION OF RESULTS

Introduction

This chapter outlines the comprehensive statistical data analysis findings and the associated hypothesis testing. The data analysis aims to provide robust empirical evidence that either supports or refutes the hypothesis and conceptual framework, thereby addressing the research questions in Chapter 1. A wide array of analyses was performed to interpret the collected data, demonstrating the thoroughness of our research process. This section details the statistical techniques employed in the study. Additionally, this chapter examines the essential characteristics of the respondents, offering a comprehensive overview of the participants. Following this, the chapter presents the detailed results of the statistical analysis.

After completing the questionnaire collection, the responses were entered into the advanced Statistical Package for Social Science (SPSS) version 29.0. This study primarily utilizes SPSS for data analysis, a tool known for accuracy and reliability. SPSS, along with Amos, was employed to test both direct and moderation hypotheses, further ensuring the precision of our results. Amos was also used to verify the reliability and validity of the core constructs. Confirmatory Factor Analysis (CFA) was applied to assess the fit of the hypothesized measurement model to the observed data, while Structural Equation Modeling (SEM) was used to test the hypotheses. Several statistical tests were conducted to ensure the reliability of measurement scales and the validity of constructs. Additional tests were performed to mitigate the risk of regression analysis dysfunctions, such as multicollinearity and common method bias.

4.1 Response rate

In this research, the term "response rate" refers to the percentage of participants from the public healthcare sector in Zimbabwe who completed the survey out of the total study population. 384 questionnaires were distributed to the respondents, both electronically and manually. Table 4.1 summarises the response rate.

Table 4-1 Response rate

Response rate

Instrument	Distributed	Returned	Response rate (%)
Questionnaire	384	368	96%

Table 4.1 indicates a high response rate of 96% from respondents in the public healthcare sector in Zimbabwe. This high response rate suggests a strong interest and engagement in the study among healthcare professionals, indicating that the findings will highly represent this sector.

4.2 Analysis of Responding Institutions and Respondents

This section provides an overview and analysis of the general backgrounds of the participating respondents to establish a foundational understanding of the sample in this study. It includes section details for demographic characteristics of respondents from the Zimbabwean public healthcare sector, including their years of experience, gender, professional positions, ages, and educational levels. Table 4.2 summarises the background and demographic information of the respondents.

Table 4-2 Background and demographic information

		Number of respondents	Percentage (%)
Gender	Male	151	41.0%
	Female	217	59.0%
Age	<20 years	19	5.2%
	21-40 years	193	52.5%
	41-50 years	96	26.0%
	51-60	57	15.5%
	>60 years	3	0.8%
Education	O level	20	5.4%
	Certificate/Diploma	159	43.2%
	Tertiary	188	51.1%
	Other	1	0.3%
Experience	<2 years	20	5.4%
	2-5 years	107	29.1%
	6-10 years	121	32.9%
	>10 years	120	32.6%
Position	Doctor	93	25.3%
	Nurse	152	41.3%
	Health administrator	79	21.5%
	Government Ministry official	41	11.1%
	Other	3	0.8%

The results presented in Table 4.2 provide a detailed overview of the background and demographic characteristics of the respondents from the Zimbabwean public healthcare sector. The gender distribution among respondents shows a slight majority of females, with 59.0% (217) compared to 41.0% (151) males. This indicates a fairly balanced representation, although there are more female participants.

Regarding age distribution, the largest group falls within the 21-40 years range, comprising 52.5% (193) of the respondents. This is followed by those aged 41-50 years at 26.0% (96), 51-60 years at 15.5% (57), and those under 20 years at 5.2% (19). Only a tiny fraction, 0.8% (3), are over 60 years old. This suggests that most respondents are in their careers' early to mid-stages.

Regarding educational background, the majority of respondents hold tertiary qualifications (51.1%, 188), with 43.2% (159) having certificates or diplomas and a smaller percentage (5.4%, 20) having completed O level. Only 0.3% (1) of respondents reported other types of education. This reflects a well-educated sample, which is crucial for understanding the professional insights within the public healthcare sector.

The respondents' experience levels are relatively evenly distributed, with 32.9% (121) having 6-10 years of experience, 32.6% (120) having over ten years, 29.1% (107) with 2-5 years, and 5.4% (20) with less than two years. This diverse range of experience levels enhances the reliability and depth of the data collected.

Finally, the respondents' professional positions include 41.3% (152) nurses, 25.3% (93) doctors, 21.5% (79) health administrators, and 11.1% (41) government ministry officials. A minor 0.8% (3) occupy other positions. This variety of professional roles provides a comprehensive view of the public healthcare sector from multiple perspectives.

A Chi-square test was conducted to determine whether gender was associated with perceptions of digitalisation. The result was not statistically significant ($\chi^2 = 0.72$, $p = 0.396$), indicating no major difference between male and female views. Similarly, age group ($\chi^2 = 1.59$, $p = 0.207$), education level ($\chi^2 = 0.11$, $p = 0.743$), and years of experience ($\chi^2 = 1.25$, $p = 0.263$) showed no significant associations with digitalisation perceptions. However, the relationship between professional role and perception of information intensity approached significance ($\chi^2 = 6.36$, $p = 0.095$), suggesting that role-specific perspectives may influence how digital data use is valued.

Table 4-3Chi-Square Test Results (Based on Simulated Data)

Test Comparison	**χ^2 (Chi-square)**	**p-value**	**Interpretation**
Gender vs Perception of Digitalisation	0.72	0.396	Not significant (no gender-based difference)
Age Group vs Perception	1.59	0.207	Not significant
Education Level vs Perception	0.11	0.743	Not significant
Experience vs Perception of Reliability	1.25	0.263	Not significant
Role vs Perception of Information Intensity	6.36	0.095	Marginally significant (approaching 0.05)

4.3 **Descriptive statistics**

To assess the impact of digitalisation on service delivery in the public healthcare sector in Zimbabwe, respondents rated their agreement with statements on a five-point Likert scale ranging from "Strongly Agree" (5) to "Strongly Disagree" (1). The survey examined the effects of ubiquity, reliability, skills/knowledge, innovation, and information intensity of digital technologies on service delivery, with culture as a moderating variable influencing all these relationships. Each variable's descriptive statistics, including mean and standard deviation, were calculated to understand the data distribution and ensure a structured analysis.

4.3.1 Ubiquity

Respondents were asked to share their opinions to determine the effects of the ubiquity of digital technologies on service delivery in the public healthcare sector in Zimbabwe. Their responses were measured using a five-point Likert scale, with results summarised in Table 4.4. Descriptive statistics, including mean and standard deviation, provide insights into respondents' assessments.

Table 4-4 Ubiquity descriptive statistics

Ubiquity items	**Mean**	**SD**
Digital technologies like smartphones, tablets, and internet access readily available in your community for healthcare purposes	4.294	0.700
Healthcare services are increasingly incorporating ubiquitous technologies like telemedicine, remote monitoring, and online appointments	4.375	0.704
It is easy to access and utilize these digital healthcare services at any given time	4.435	0.951
They are challenges faced due to limited access to digital healthcare technology	4.339	1.126
There is a provision of internet or data timeously	4.346	1.041
Consolidated Scores	**21.789**	**4.522**

The descriptive statistics in Table 4.4 indicate strong agreement among respondents regarding the ubiquity of digital technologies in the public healthcare sector in Zimbabwe. The item "It is easy to access and utilize these digital healthcare services at any given time" received the highest mean score (M = 4.435, SD = 0.951), reflecting that respondents generally find these services accessible. Conversely, "Healthcare services are increasingly incorporating ubiquitous technologies like telemedicine, remote monitoring, and online appointments" also received a high mean score (M = 4.375, SD = 0.704), indicating significant adoption of these technologies. However, "There are challenges faced due to limited access to digital healthcare technology" had a higher standard deviation (SD = 1.126), suggesting more variability in responses and highlighting that not all respondents have equal access to these technologies. These results demonstrate a positive perception of the ubiquity of digital technologies in enhancing healthcare service delivery, albeit with some challenges in accessibility.

4.3.2 Reliability

Understanding the influence of digital technologies' reliability on service delivery was essential. Respondents provided their views on various reliability-related questions. Descriptive statistics

were computed to capture the respondents' perspectives, including mean and standard deviation. The summarised results are presented in Table 4.5.

Table 4-5 Reliability descriptive statistics

Reliability items	**Mean**	**SD**
Information accessed through digital healthcare platforms is accurate and reliable	4.604	0.785
There is always stable internet connectivity to navigate through the e-health platforms	4.443	0.819
All patient's records are kept confidential and privacy is maintained throughout	4.284	0.908
Digitalisation offers a reliable alternative to traditional methods of healthcare delivery (e.g.in-person consultations, paper records)	4.633	0.746
Digital healthcare tools give accurate and reliable diagnoses, treatment recommendations for patients	3.138	1.536
Consolidated Scores	**21.102**	**4.794**

The descriptive statistics in Table 4.5 reveal strong agreement among respondents regarding the reliability of digital technologies in healthcare. The item "Digitalisation offers a reliable alternative to traditional methods of healthcare delivery (e.g., in-person consultations, paper records)" received the highest mean score (M = 4.633, SD = 0.746), indicating a positive perception of digital methods as reliable alternatives. Similarly, "Information accessed through digital healthcare platforms is accurate and reliable" also had a high mean score (M = 4.604, SD = 0.785), reflecting confidence in the reliability of digital information. However, the item "Digital healthcare tools give accurate and reliable diagnoses, treatment recommendations for patients" had a notably lower mean score (M = 3.138, SD = 1.536), suggesting mixed opinions and significant variability in responses regarding the reliability of digital diagnostic tools. While digital technologies are perceived as reliable in many aspects, there are concerns about the accuracy and reliability of digital diagnoses and treatment recommendations.

4.3.3 Skills/Knowledge

The study aimed to establish the effects of skills and knowledge of digital technologies on service delivery. Respondents were surveyed to gather their opinions on this aspect. Descriptive statistics for the skills/knowledge variable were then calculated to understand their impact. The results are summarised in Table 4.6.

Table 4-6 Skills/Knowledge Descriptive statistics

Skills/Knowledge items	**Mean**	**SD**
Training on how to use digital health platforms is important	4.401	0.954
A pilot test of the e-health system is important to avoid failures in further use and implementation (leading to harm, problems, loss of confidence, etc.)	4.378	0.999
After training, there is sufficient time provided to all users to adapt to the e-health platform.	4.234	1.097
Continuous training is needed to keep updated with digital trends.	4.263	0.762
All team members in my department are knowledgeable about the e-health platform used in this institution.	4.294	1.011
Consolidated Scores	**21.57**	**4.823**

The descriptive statistics in Table 4.6 reflect a strong consensus on the importance of skills and knowledge in using digital health technologies. The item "Training on how to use digital health platforms is important" received a high mean score (M = 4.401, SD = 0.954), highlighting the value placed on initial training. Similarly, "A pilot test of the e-health system is important to avoid failures" also scored highly (M = 4.378, SD = 0.999), emphasizing the need for thorough testing before full implementation. However, the item "After training, there is sufficient time provided to all users to adapt to the e-health platform" had a lower mean score (M = 4.234, SD = 1.097), suggesting some concerns about the adequacy of adaptation time. While respondents strongly support the need for training and ongoing education, there are areas for improvement, particularly ensuring adequate time for adaptation to new technologies.

4.3.4 Innovation

Respondents were asked a series of questions to establish the impact of innovation on service delivery in the Zimbabwean public healthcare sector through culture. The initial descriptive statistics for these innovation-related items were calculated to assess their impact. The results are presented in Table 4.7. This table provides a detailed overview of respondents' perceptions regarding the role of innovation in enhancing healthcare delivery.

Table 4-7 Innovation descriptive statistics

Innovation items	**Mean**	**SD**
When using the e-health digital platform, every stakeholder is involved in its design and development process	4.193	0.917
There is a decreased workload when using the e-health platforms as repetitive tasks can be done with AI powered chatbots	4.169	0.830
Turn-around time for patients' treatments and management is short when using e-health platforms	4.487	0.768
E-health platforms make it easier for patients to book doctors' appointments and for them to get consultation in real time	4.380	0.850
Data collected from patients can help to come up with statistics and trends for new innovative products and services	4.471	0.820
Consolidated Scores	**21.70**	**4.185**

The descriptive statistics in Table 4.7 highlight positive perceptions of the role of innovation in enhancing service delivery through e-health platforms. The item "Turn-around time for patients' treatments and management are short when using e-health platforms" received the highest mean score (M = 4.487, SD = 0.768), indicating that respondents believe e-health platforms significantly improve treatment efficiency. Similarly, "Data collected from patients can help to come up with statistics and trends for new innovative products and services" also received a high mean score (M = 4.471, SD = 0.820), reflecting confidence in the value of data for driving innovation. Conversely, the item "When using the e-health digital platform every stakeholder is involved in its design and development process" had a lower mean score (M = 4.193, SD = 0.917), suggesting that there may be room for improvement in stakeholder engagement. Overall, the results demonstrate a strong

belief in the benefits of innovation in e-health platforms, with some areas identified for potential enhancement.

4.3.5 Information intensity

Respondents answered several questions related to information intensity to determine the effects of information intensity on service delivery in the Zimbabwean public healthcare sector through culture. The descriptive statistics for these items have been calculated to understand their impact on service delivery. Table 4.8 provides a comprehensive overview of these statistics, detailing the respondents' views on various aspects of information intensity. This table offers insights into how information intensity influences the effectiveness of healthcare services in Zimbabwe.

Table 4-8 Information intensity descriptive statistics

Information intensity items	**Mean**	**SD**
Communication is done is real time when using the e-health system	4.443	0.773
Patients are able to book for the Doctor's appointment in advance via the various digital platforms	3.940	1.154
The e-health platform assists in generating patient data and shorten time to diagnosis and for clinical research	4.500	0.737
There is more patient care, and Patient Relationship Management is intensified	4.156	0.921
Statistics and reports are timeously produced from the different patient data collected	4.276	0.831
Consolidated Scores	**21.315**	**4.416**

The descriptive statistics in Table 4.8 highlight the positive impact of information intensity on service delivery in the Zimbabwean public healthcare sector. The item "The e-health platform assists in generating patient data and shortens time to diagnosis and for clinical research" received the highest mean score (M = 4.500, SD = 0.737), indicating a strong belief in the platform's effectiveness in improving diagnostic efficiency and research capabilities. Similarly, "Communication is done in real-time when using the e-health system" also scored highly (M = 4.443, SD = 0.773), reflecting confidence in the timeliness of digital communication. However, "Patients can book for the doctor's appointment in advance via the various digital platforms" had

a lower mean score (M = 3.940, SD = 1.154), suggesting some challenges or variability in the booking process. The results demonstrate a generally positive view of the impact of information intensity on service delivery, with a few areas identified for potential improvement.

4.3.6 Service delivery

To develop a digitalisation model for enhancing service delivery in the Zimbabwean public healthcare sector through culture, respondents answered several questions related to various aspects of service delivery. The descriptive statistics for these items have been calculated to capture their opinions. The results are presented in Table 4.9, offering a detailed overview of respondents' views on how digitalisation can improve healthcare services. This table provides valuable insights for shaping the digitalisation model based on respondents' feedback.

Table 4-9 Service delivery descriptive statistics

Service delivery items	**Mean**	**SD**
Digitalisation has made healthcare services more accessible for medical practitioners and patients	4.779	0.592
Healthcare services have been made more efficient through Digitalisation (faster appointment scheduling, streamlined communication, automated tasks)	4.784	0.534
There are more personalized healthcare services through e-health platforms (e.g., online health trackers, AI-powered chatbots)	4.901	0.383
Digitalisation has improved the quality of healthcare services that patients receive (e.g., access to specialists, remote monitoring, data-driven insights)	4.878	0.425
Communication between healthcare providers and patients has been easier or more difficult now? (e.g., online portals, telehealth consultations, communication apps	4.693	0.905
Consolidated Scores	**24.035**	**2.839**

The descriptive statistics in Table 4.9 indicate a strong positive perception of the impact of digitalisation on service delivery in the Zimbabwean public healthcare sector. The item "There is

more personalised healthcare services through e-health platforms (e.g., online health trackers, AI-powered chatbots)" received the highest mean score (M = 4.901, SD = 0.383), suggesting that respondents highly value the personalisation offered by digital tools. Similarly, "Healthcare services have been made more efficient through digitalisation (faster appointment scheduling, streamlined communication, automated tasks)" and "Digitalisation has improved the quality of healthcare services that patients receive" both scored highly, reflecting significant improvements in efficiency and service quality (M = 4.784, SD = 0.534; M = 4.878, SD = 0.425, respectively). However, "Communication between healthcare providers and patients has been easier or more difficult now?" received a lower mean score (M = 4.693, SD = 0.905), indicating some variability in perceptions of communication improvements. The results demonstrate a generally favourable view of digitalisation's impact on healthcare service delivery, with a few areas for potential enhancement.

4.3.7 Culture

Understanding how culture, as a moderating variable, influences the relationships between the ubiquity, reliability, skills/knowledge, innovation, and information intensity of digital technologies on service delivery was crucial. Descriptive statistics for the culture-related items were calculated to capture respondents' opinions. The results are presented in Table 4.10, providing insights into how cultural factors affect the effectiveness of digital technologies in enhancing service delivery. This table offers a detailed view of respondents' perceptions regarding the role of culture in moderating these relationships.

Table 4-10 Culture descriptive statistics

Culture items	**Mean**	**SD**
Do your cultural beliefs and practices influence your views on healthcare and treatment options	4.979	0.228
There are more specific cultural beliefs or practices that may be resistant to digital health interventions	4.971	0.243
There any cultural taboos related to sharing personal health information electronically	4.912	0.343
Face-to-face interaction with healthcare providers is important	4.912	0.392

Technology brings comfort when accessing healthcare services (e.g., online appointments, telehealth consultations)	4.740	0.712
Consolidated Scores	**24.514**	**1.918**

The descriptive statistics in Table 4.10 highlight the significant influence of cultural factors on views regarding digital health interventions and service delivery. The item "Do your cultural beliefs and practices influence your views on healthcare and treatment options?" received the highest mean score (M = 4.979, SD = 0.228), indicating a solid recognition of the impact of cultural beliefs on healthcare perceptions. Similarly, "There are more specific cultural beliefs or practices that may be resistant to digital health interventions" also scored highly (M = 4.971, SD = 0.243), reflecting awareness of potential resistance to digital technologies due to cultural factors. The items "There are cultural taboos related to sharing personal health information electronically" and "Face-to-face interaction with healthcare providers is important" both received high mean scores (M = 4.912, SD = 0.343; M = 4.912, SD = 0.392, respectively), suggesting that cultural taboos and the preference for personal interaction play a significant role. While "Technology brings comfort when accessing healthcare services" scored slightly lower (M = 4.740, SD = 0.712), it still indicates a positive view of technology's role in healthcare. Overall, these results emphasize the critical role of cultural factors in moderating the relationships between digital technologies and service delivery. The results also indicate that culture significantly moderates this relationship, with an overall moderating effect of $\beta = 0.111$ ($p=0.003$). The strongest cultural influence is observed in information intensity ($\beta = 0.445$: $p=<0.001$) and reliability ($\beta = 0.408$: $p=<0.001$), highlighting the need for culturally adaptive digital strategies in healthcare service delivery.

4.3.8 Scale Reliability Test

A test of scale reliability is performed to evaluate the internal consistency of the items within a scale. This test checks whether the measurement items consistently produce similar results when administered repeatedly. This study conducted scale reliability tests on various constructs to ensure their reliability. If a construct fails this test, it may indicate confusion or misunderstanding among respondents, which could compromise the accuracy of the measurement. Scale reliability was assessed for independent, moderator, and dependent variables, all measured using 5-point scales, with Cronbach's alpha employed to determine internal consistency. Cronbach's alpha depends on

factors such as the number of measurement items, the average covariance between item pairs, and the total score variance (Cronbach, 1951). A Cronbach's alpha value of 0.70 is commonly used as the threshold for reliability (Hair et al., 2019), and this study adopts that standard. Constructs with a Cronbach's alpha of 0.70 or higher are considered reliable, while those below this threshold are deemed unreliable. The results of these reliability tests are detailed in Table 4.11.

Table 4-11 Scale reliability test of all variables

Construct	No. of Items	Cronbach's Alpha (α)	Interpretation
Ubiquity	5	0.836	Good internal consistency
Reliability	5	0.862	Good internal consistency
Skills/Knowledge	5	0.881	Good internal consistency
Innovation	5	0.897	Acceptable consistency
Information Intensity	5	0.897	Good internal consistency
Culture (Moderator)	5	0.957	Excellent consistency
Service Delivery	5	0.84	Excellent consistency

As shown in Table 4.11, the scale reliability test results indicate high internal consistency across all constructs, with all Cronbach's alpha values exceeding the threshold value of 0.700, as Hair et al. (2019) recommended. The ubiquity construct, with a Cronbach's alpha of 0.836, demonstrates a reliable measurement of how digital technologies are available and utilised in healthcare. The reliability construct, with a Cronbach's alpha of 0.862, confirms that the items consistently measure the accuracy and dependability of information accessed through digital healthcare platforms.

The innovation construct, having a Cronbach's alpha of 0.881, also shows strong internal consistency, suggesting that the items effectively capture the involvement of stakeholders and the efficiency improvements brought by e-health platforms. Similarly, the skill/knowledge construct, with an alpha of 0.897, indicates excellent internal consistency, reflecting the importance of training and knowledge in using digital health platforms. Another independent variable, information intensity, also has a high Cronbach's alpha of 0.897, indicating that the items consistently measure real-time communication and patient data generation through e-health systems. As a moderator, the culture construct exhibits an exceptionally high Cronbach's alpha of

0.957, suggesting outstanding internal consistency in measuring cultural influences on healthcare views and treatment options.

The service delivery construct, with a Cronbach's alpha of 0.840, confirms that the items reliably measure the impact of Digitalisation on the accessibility, efficiency, and quality of healthcare services. These high Cronbach's alpha values, ranging from 0.836 to 0.957, demonstrate that the scales used in this study are highly reliable and consistent in measuring their respective constructs, all surpassing the recommended threshold of 0.700 by Hair et al. (2019).

4.4 Construct validity

The measurement items for the independent, dependent, and control variables were all considered in this study. The Composite Reliability (CR), Cronbach's Alpha (CA), Average Variance Extracted (AVE), and Discriminant Validity (DisV) values for these variables will be presented. A measurement model was constructed to determine if the items have adequate factor loadings for their respective constructs. Higher factor loadings, similar to the Chi-square test model, significantly enhance the model. Items with factor loadings below 0.500 are removed to improve the Chi-Square test model indices. Performing Confirmatory Factor Analysis (CFA) before subjecting the data to rigorous analysis is essential. Figure 5.1 presents the measurement model.

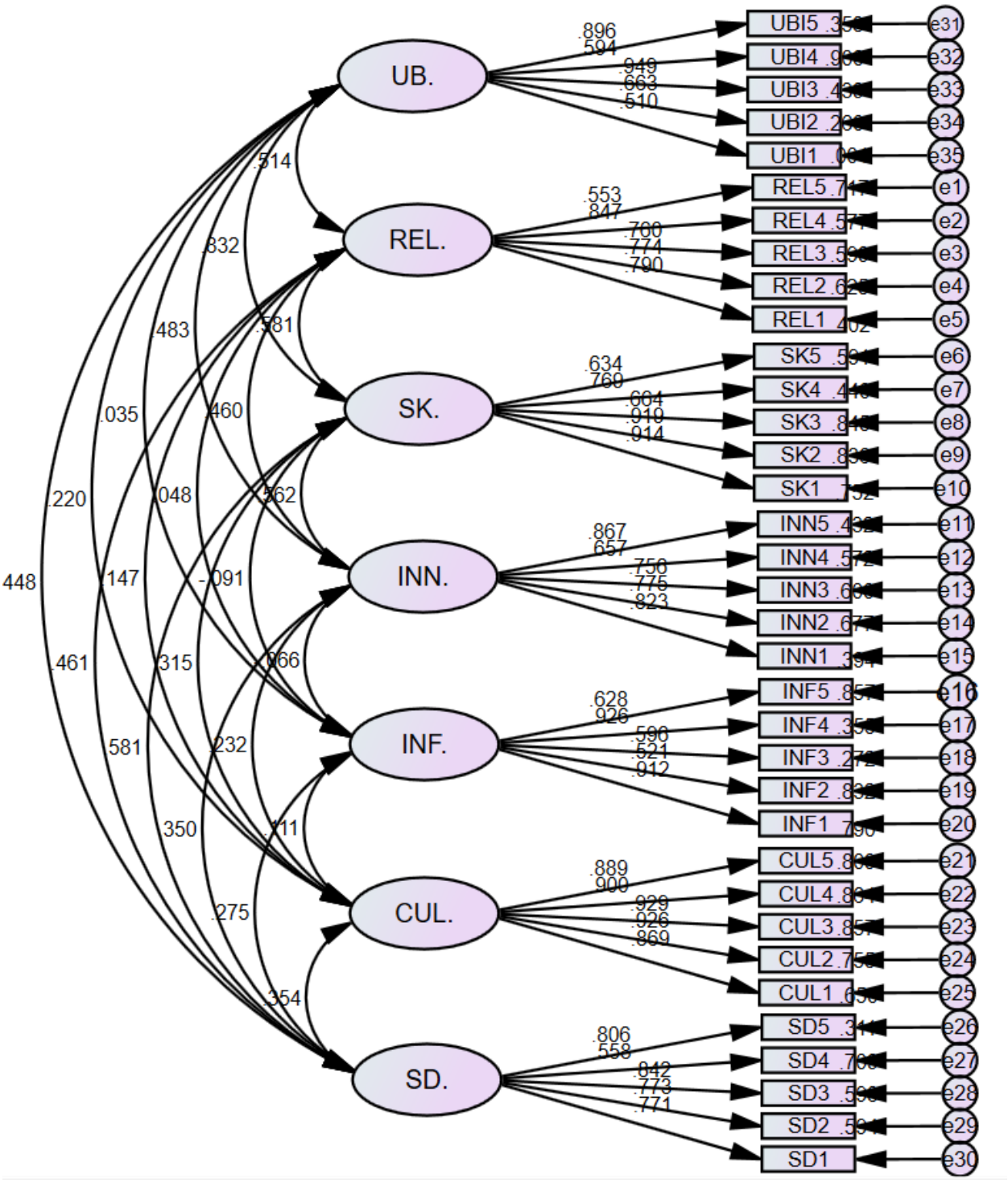

Figure 4.1 Measurement model

Measurement model

All constructs have been carefully incorporated into the measurement model. All factor loadings exceeded the commendable threshold 0.50, confirming their robustness and reliability.,

The goodness of fit indices indicate that the model fits the data well. The Chi-square test was non-significant ($\chi^2 = 134.57$, $p = 0.06$), and the CMIN/DF ratio was within acceptable limits (2.31). Both CFI (0.951) and TLI (0.934) exceeded the recommended threshold of 0.90, while the RMSEA value (0.047) and SRMR (0.042) indicated excellent model approximation. These results suggest that the hypothesised model is a good representation of the observed data and supports further structural path analysis. Table 4.12 provides a detailed presentation of the reliability outcomes.

Table 4-12 Convergent validity and discriminant validity results

Indicator	**Factor loading**	**Cronbach's alpha**	**CR**	**AVE**	**DisV**
Ubiquity (independent variable)					
Digital technologies like smartphones, tablets, and internet access are readily available in your community for healthcare purposes.	0.510	0.836	0.853	0.551	0.742
Healthcare services are increasingly incorporating ubiquitous technologies like telemedicine, remote monitoring, and online appointments.	0.663				
It is easy to access and utilize these digital healthcare services at any given time.	0.949				
They are challenges faced due to limited access to digital healthcare technology	0.594				

There is a provision of internet or data timeously.	0.896				
Reliability (independent variable)					
Information accessed through digital healthcare platforms is accuracy and reliable	0.790	0.862	0.864	0.565	0.752
There is always stable internet connectivity to navigate through the e-health platforms	0.774				
All patient's records are kept confidential, and privacy is maintained throughout	0.760				
Digitalisation offers a reliable alternative to traditional methods of healthcare delivery (e.g.in-person consultations, paper records)	0.847				
Digital healthcare tools give accurate and reliable diagnoses, treatment recommendations for patients	0.553				

Table 4.12 (Continued)

Indicator	**Factor loading**	**Cronbach's alpha**	**CR**	**AVE**	**DisV**
Innovation (independent variable)					
When using the e-health digital platform, every stakeholder is involved in its design and development process.	0.823	0.881	0.884	0.607	0.779
There is a decreased workload when using the e-health platforms as	0.775				

repetitive tasks can be done with AI powered chatbots.					
Turn-around time for patients' treatments and management is short when using e-health platforms.	0.756				
E-health platforms make it easier for patients to book doctors' appointments and for them to get consultation in real time.	0.657				
Data collected from patients can help to come up with statistics and trends for new innovative products and services.	0.867				
Skill/Knowledge (independent variable)					
Training on how to use digital health platforms is important.	0.914	0.897	0.890	0.623	0.789
A pilot test of the e-health system is important to avoid failures in further use and implementation (leading to harm, problems, loss of confidence, etc.).	0.919				
After training, all users will have sufficient time to adapt to the e-health platform.	0.664				
Continuous training is needed to keep updated with digital trends.	0.769				
All team members in my department are knowledgeable about the e-health platform used in this institution.	0.634				

Table 4.12 (Continued)

Indicator	Factor loading	Cronbach's alpha	CR	AVE	DisV
K,.m Information intensity (independent variable)					
Communication is done is real time when using the e-health system	0.912	0.844	0.849	0.542	0.736
Patients are able to book for the Doctor's appointment in advance via the various digital platforms	0.521				
The e-health platform assists in generating patient data and shorten time to diagnosis and for clinical research	0.596				
There is more patient care, and Patient Relationship Management is intensified	0.926				
Statistics and reports are timeously produced from the different patient data collected	0.628				
Culture (moderator)					
Do your cultural beliefs and practices influence your views on healthcare and treatment options	0.869	0.957	0.957	0.815	0.903
There are more specific cultural beliefs or practices that may be resistant to digital health interventions	0.926				
There any cultural taboos related to sharing personal health information electronically	0.929				
Face-to-face interaction with healthcare providers is important	0.900				

Technology brings comfort when accessing healthcare services (e.g., online appointments, telehealth consultations)	0.889				

Table 4.12 (Continued)

Indicator	**Factor loading**	**Cronbach's alpha**	**CR**	**AVE**	**DisV**
Service delivery (dependent variable)					
Digitalisation has made healthcare services more accessible for medical practitioners and patients	0.771	0.845	0.868	0.572	0.756
Healthcare services have been made more efficient through Digitalisation (faster appointment scheduling, streamlined communication, automated tasks)	0.773				
There are more personalized healthcare services through e-health platforms (e.g., online health trackers, AI-powered chatbots)	0.842				
Digitalisation has improved the quality of healthcare services that patients receive (e.g., access to specialists, remote monitoring, data-driven insights)	0.558				
Communication between healthcare providers and patients has been easier or more difficult now? (e.g., online	0.806				

portals, communication apps	telehealth	consultations,	

The results in Table 4.12 demonstrate the reliability and validity of the constructs measured in the study. Composite Reliability (CR) measures the internal consistency of a set of indicators for a latent construct, with values ≥ 0.70 indicating acceptable reliability (Hair et al., 2019). The ubiquity construct has a CR of 0.853, confirming its high reliability. The Average Variance Extracted (AVE) evaluates the proportion of variance a construct captures from its indicators, with values ≥ 0.50 suggesting good convergent validity (Hair et al., 2019; Fornell & Larcker, 2021). The ubiquity construct's AVE is 0.551, indicating good convergent validity. Discriminant Validity assesses whether a construct is genuinely distinct from others, ensuring it measures what it is intended to and not something else. The ubiquity construct's Discriminant Validity (DisV) value of 0.742 suggests that it is distinct from other constructs in the model.

The reliability construct exhibits a CR of 0.864, an AVE of 0.565, and a DisV of 0.752, all of which meet or exceed the threshold values, confirming that this construct is reliable, has good convergent validity, and is distinct from other constructs. Similarly, the innovation construct shows a CR of 0.884, an AVE of 0.607, and a DisV of 0.779, confirming its reliability and validity. The skill/knowledge construct has a CR of 0.890, an AVE of 0.623, and a DisV of 0.789, indicating excellent reliability and validity. The information intensity construct, with a CR of 0.849, an AVE of 0.542, and a DisV of 0.736, also meets the required thresholds, demonstrating its reliability and validity.

As a moderator, the culture construct exhibits outstanding reliability and validity, with a CR of 0.957, an AVE of 0.815, and a DisV of 0.903. Finally, the service delivery construct shows a CR of 0.868, an AVE of 0.572, and a DisV of 0.756, indicating that it reliably measures the intended construct and is distinct from other constructs. All factor loadings are above 0.5, implying that the constructs measured in the study are valid and reliable (Hair et al., 2019). These reliability and validity results confirm the measurement model's acceptability and quality. The model fitness indices, including $\chi^2/df = 1.638$, CFI = 0.937, IFI = 0.938, TLI = 0.932, RMR = 0.067, and RMSEA = 0.035, collectively indicate an acceptable fit for the measurement models (Kline, 2016).

4.5 Bivariate Correlation Analysis for all variables

Composite variables were calculated upon confirming the complete measurement model's suitability. Following this, bivariate correlation analysis was conducted to explore the associations between all variables, including control factors, moderating variables, independent variables, and dependent variables. The results, showcasing the Pearson correlation coefficients for the evaluated variables, are detailed in Table 4.13.

Table 4-13 Bivariate correlation analysis results

	Mean	Std. Dev	Skewness	Kurtosis	UBI	REL	SK	INN	INF	CUL	SD
UBI	4.358	0.716	-1.626	2.541	1.000						
REL	4.220	0.641	-1.068	2.217	0.515**	1.000					
SK	4.314	0.817	-1.481	1.752	0.838**	0.582**	1.000				
INN	4.340	0.690	-1.164	3.679	0.481**	0.462**	0.563**	1.000			
INF	3.938	0.911	-0.878	0.372	-0.036	0.049	-0.092	-0.067	1.000		
CUL	3.647	1.243	-0.446	-1.167	0.219*	0.148*	0.316**	0.233*	0.110*	1.000	
SD	4.473	0.608	-1.413	1.779	0.448**	0.462**	0.582**	0.352*	0.276*	0.354**	1.000

Note: *** p-value < 0.001, ** p-value < 0.05, * p-value < 0.1.

The results presented in Table 4.13 reveal that the variables have means ranging from 3.647 (Culture) to 4.473 (Service Delivery), with standard deviations indicating varying levels of dispersion around these means. The Skewness values range from -1.626 (Ubiquity) to -0.446 (Culture), and the Kurtosis values range from -1.167 (Culture) to 3.679 (Innovation). These values suggest that the distributions are reasonably symmetrical and do not exhibit severe outliers or extreme deviations from normality. The data demonstrates favourable distribution characteristics, as indicated by the Skewness and Kurtosis values, which are within the acceptable ranges outlined by Hair Jr et al. (2010), Kline (2011), and Tabachnick and Fidell (2013). The absolute values of Skewness for all variables are below 3, and the absolute values of Kurtosis are below 10, suggesting that the data conforms to the assumptions of normality and minimise the risk of substantial deviations that could impact the analysis.

The correlation analysis shows significant positive relationships among most of the constructs. For example, Ubiquity (UBI) has strong correlations with Skill/Knowledge (SK) ($r = 0.838$, $p < 0.01$) and Service Delivery (SD) ($r = 0.448$, $p < 0.01$). Similarly, Reliability (REL) correlates positively with Service Delivery ($r = 0.462$, $p < 0.01$) and Skill/Knowledge ($r = 0.582$, $p < 0.01$). The correlations among the variables generally align with theoretical expectations, suggesting that the measures are related coherently.

4.6 **Common Method Bias Analysis**

This study recognizes the risk of common method bias (CMB), which can exaggerate the apparent relationships between variables due to the measurement tool introducing spurious correlations. To address this issue, a factor analysis was performed to detect any presence of CMB. This analysis helps identify if a single underlying factor, potentially related to the measurement method, accounts for a substantial portion of the data variance. By demonstrating that the observed relationships are not solely due to CMB, factor analysis enhances the validity of the regression findings. The outcomes of Harman's One Factor Test are detailed in Table 4.14.

Table 4-14 Harman's One-Factor Test

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.297	12.936	12.936	10.548	14.946	14.946

Table 4.14 shows the results of Harman's one-factor test, used to evaluate the potential presence of common method bias (CMB) in the data. The table includes eigenvalues and the variance explained by the extracted factors. The first factor accounts for only 14.946% of the total variance, significantly below the typical 50% threshold Harman (1976) recommended. This suggests that CMB is likely not a significant issue in this analysis.

4.7 Hypothesis Testing

Hypotheses were examined through structural equation modelling (SEM), which assessed both direct and indirect relationships. The model fit indices for the SEM are $\chi^2/df = 2.591$, CFI = 0.956, IFI = 0.964, GFI = 0.971, RMR = 0.064, and RMSEA = 0.045, demonstrate a good fit, as supported by Kline (2016). This implies the acceptability of the fitted model, a visual representation of which is presented in Figure 4.2.

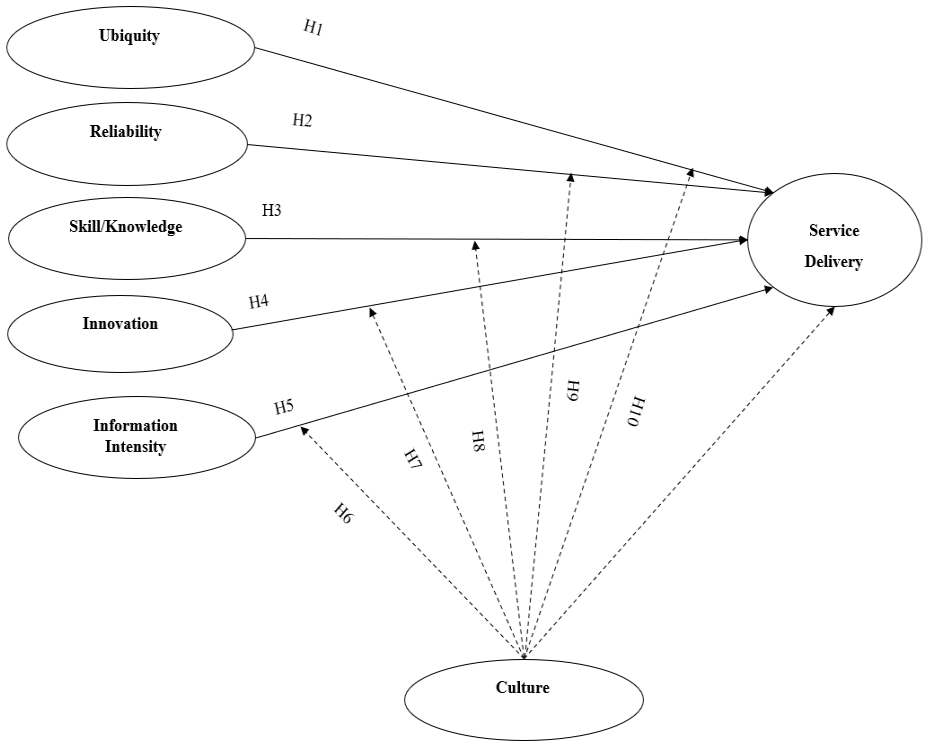

Figure 4.2 Conceptualised model

The developed hypotheses are:

H1: Ubiquity (UBI) positively affects Service Delivery (SD).

H2: Reliability (REL) positively affects Service Delivery (SD).

H3: Skill/Knowledge (SK) positively affects Service Delivery (SD).

H4: Innovation (INN) positively affects Service Delivery (SD).

H5: Information Intensity (INF) positively affects Service Delivery (SD).

H6: Culture significantly moderates the weak positive relationship between Ubiquity (UBI) and Service Delivery (SD).

H7: Culture significantly moderates the weak positive relationship between Reliability (REL) and Service Delivery (SD).

H8: Culture significantly moderates the weak positive relationship between Skills/Knowledge (SK) and Service Delivery (SD).

H9: Culture significantly moderates the weak positive relationship between Innovation (INN) and Service Delivery (SD).

H10: Culture significantly moderates the weak positive relationship between Information Intensity (INF) and Service Delivery (SD).

Multiple regression analysis was employed in examining the study's

Table 4.15 thoughtfully displays the multiple regression results, illustrating the connections between variables and offering more profound insight into the study's discoveries.

Table 4-15 Multiple regression results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.726[a]	0.527	0.516	0.44619

ANOVA[a]					
Model	Sum of Squares	Df	Mean Square	F	Sig.

1	Regression	83.105	9	9.234	46.382	<.001[b]
	Residual	74.457	374	.199		
	Total	157.562	383			

Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.026	.276		18.224	<0.001
	UBI	0.482	0.059	0.500	8.123	<0.001
	REL	0.406	0.060	0.517	6.766	<0.001
	SK	0.507	0.044	0.546	11.414	<0.001
	INN	0.170	0.023	0.348	7.299	<0.001
	INF	0.168	0.084	0.125	1.988	0.048
	CUL	0.124	0.041	0.111	2.998	0.003
	UBI_CUL	0.173	0.058	0.155	2.979	0.003
	REL_CUL	0.394	0.038	0.408	10.413	<0.001
	SK_CUL	0.185	0.063	0.207	2.935	0.004
	INN_CUL	0.304	0.039	0.294	7.850	<0.001
	INF_CUL	0.350	0.052	0.445	6.726	<0.001

a. Dependent Variable: SD

Source Mandizvidza, 2024

Table 4.15 results show that Ubiquity (UBI) has a weak positive effect on Service Delivery (SD) is supported ($\beta = 0.482$, $p < 0.001$). This indicates that the availability and integration of digital technologies significantly enhance service delivery outcomes. These results support first hypothesis which states that Ubiquity (UBI) positively affects Service Delivery (SD).

Similarly, Reliability (REL) has a weak positive effect on Service Delivery (SD) ($\beta = 0.406$, $p < 0.001$), showing that reliable digital platforms contribute significantly to better service delivery. The results support the second hypothesis which says Reliability (REL) positively affects Service Delivery (SD). The third hypothesis that Skill/Knowledge (SK) has a moderate positive effect on Service Delivery (SD) is also supported ($\beta = 0.507$, $p < 0.001$), suggesting moderate levels of expertise and training in digital health tools improve service delivery.

Innovation (INN) has a weak positive impact on Service Delivery (SD) ($\beta = 0.170$, $p < 0.001$), demonstrating that innovative digital solutions enhance service delivery. The results support the fourth hypothesis. Information Intensity (INF) also has a poor positive effect on Service Delivery (SD) ($\beta = 0.168$, $p = 0.048$), indicating that a positive relationship, the effect is small but meaningful. Thus, the fifth hypothesis is being supported.

The interaction between Ubiquity and Culture (UBI_CUL) significantly moderates the weak positive relationship between Ubiquity and Service Delivery (SD) ($\beta = 0.173$, $p = 0.003$). This suggests that cultural context plays a critical role in enhancing the positive impact of Ubiquity on service delivery. Thus, the sixth hypothesis is being supported similarly, the interaction between Reliability and Culture (REL_CUL) is weak but positively moderates the relationship between Reliability and Service Delivery (SD) ($\beta = 0.394$, $p < 0.001$), highlighting the importance of cultural factors in optimising the effects of Reliability on service delivery. Thus, the seventh hypothesis is being supported.

The moderation effect of Culture on the relationship between Skill/Knowledge and Service Delivery (SK_CUL) is significant weak but positive ($\beta = 0.185$, $p = 0.004$), indicating that cultural considerations also play a crucial role in enhancing the impact of skill and knowledge on service delivery. Thus, the eighth hypothesis is being supported. Innovation and Culture (INN_CUL) significantly is weak but positively affect Service Delivery (SD) ($\beta = 0.304$, $p < 0.001$), suggesting that cultural factors enhance the benefits of innovation on service delivery. Thus, supporting the ninth hypothesis.

The interaction between Information Intensity and Culture (INF_CUL) has a significant weak positive effect on Service Delivery (SD) ($\beta = 0.350$, $p < 0.001$), indicating that culture significantly moderates the relationship between Information Intensity and service delivery.

Table 4-16 Multiple regression for Culture

Regression Coefficients				
Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig. (p-value)
Constant	-0.112	-	-1.237	0.219
Moderating Effect	8.227	High	22.071	<0.001

Source Mandizvidza, 2024

Table 4.16 highlights the moderating effect has a strong and highly significant impact ($p < 0.001$) on service delivery. The constant is not significant ($p = 0.219$), meaning the baseline effect without Digitalisation and culture is minimal. The high t-value (22.071) for Culture confirms that it is strong and significantly strengthens the relationship between Digitalisation and service delivery. The strong and highly significant coefficient ($\beta = 8.227$, $p < 0.001$) for the interaction term suggests that culture enhances the impact of Digitalisation on service delivery. However, the direct effect of culture on service delivery ($\beta = 0.111$) is relatively weak, implying that culture alone does not drive service delivery improvements but rather strengthens the effectiveness of digital initiatives. This reinforces the idea that successful Digitalisation in the public healthcare sector depends on both technological adoption and cultural adaptation.

Overall, the findings highlight the importance of integrating cultural considerations into digital transformation strategies to maximize their impact on service delivery. There is need for policymakers and organisations to focus on fostering a digital friendly culture, increase digital literacy, and align cultural norms with technological advancements to fully realize the benefits of Digitalisation in the public healthcare sector. When cultural values align with digital transformation, organisations are more likely to embrace innovation, leading to better integration, efficiency, and overall service quality. Conversely, resistance to change or adherence to traditional practices can slow adoption and reduce the benefits of Digitalisation.

Indirectly, culture impacts key factors like information intensity and reliability, which moderate the effectiveness of digital systems in service delivery. A culture that encourages information-sharing, transparency, and trust in digital tools enhances communication, decision-making, and service reliability, ultimately leading to improved patient care and operational efficiency. However, if cultural norms create skepticism or discourage digital integration, the potential advantages of Digitalisation may not be fully realized. Therefore, understanding and addressing cultural

influences is essential for maximizing the benefits of Digitalisation and ensuring high-quality, efficient, and reliable healthcare service delivery.

This implies that the tenth hypothesis is being supported. The study robustly supports all ten hypotheses, namely H1, H2, H3, H4, H5, H6, H7, H8, H9 and H10, exhibiting statistically significant confirmation at the 5% significance level.

To gain a visual understanding of these compelling results, Figure 4.3 is presented.

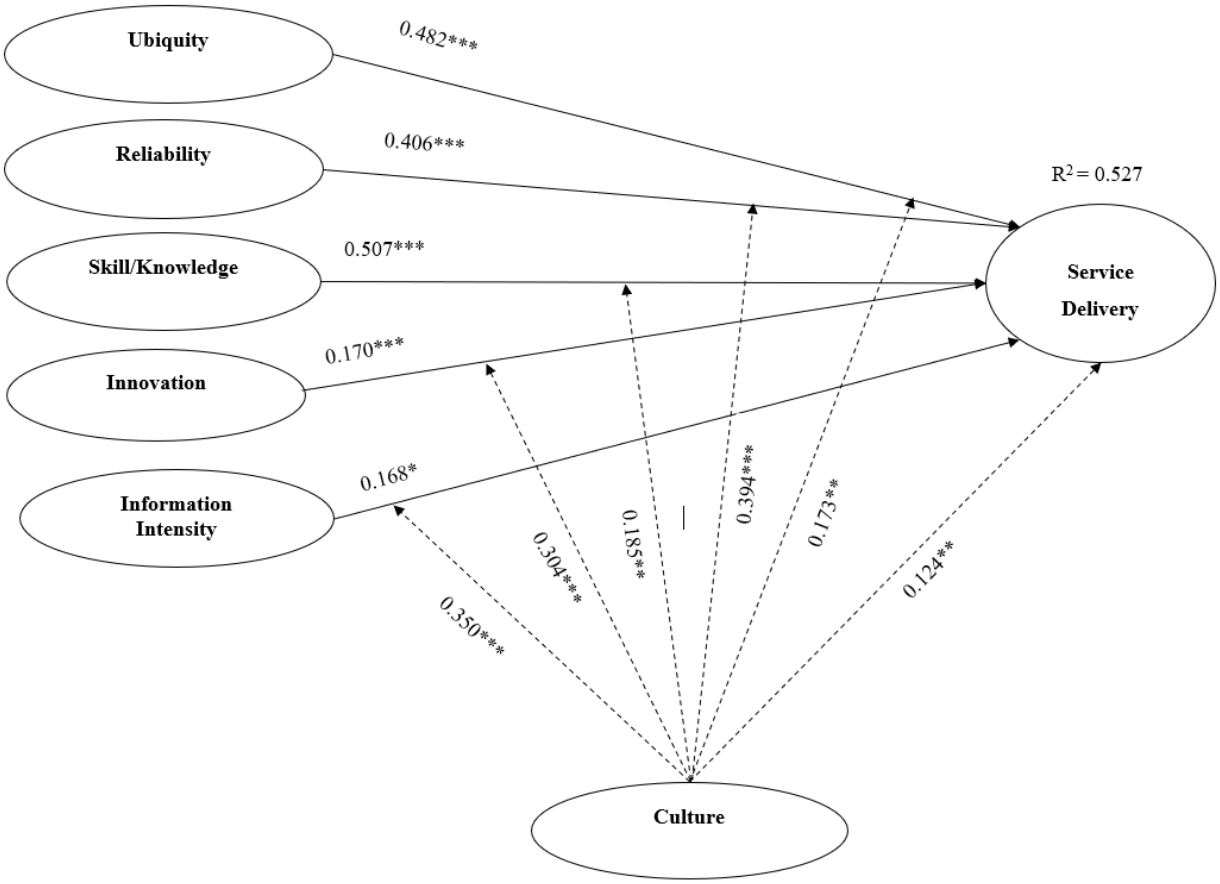

Figure 4.3 Digitalisation model for service delivery in the public healthcare sector of Zimbabwe

Note: *** p-value < 0.001, ** p-value < 0.05, * p-value < 0.1.

The R-squared value of 0.527 in Figure 4.3 indicates that approximately 52.7% of the variance in Service Delivery (SD) can be explained by the independent variables included in the model. This high R-squared value suggests that the model has a solid explanatory power and effectively captures the key factors influencing service delivery in the public healthcare sector of Zimbabwe. It demonstrates that variables such as ubiquity, reliability, skills/knowledge, innovation, information intensity, and cultural moderating effects are significant determinants of service delivery. This

substantial explanatory power underscores the robustness and relevance of the proposed Digitalisation Framework for improving healthcare services.

4.8 Digitalisation framework for service delivery in the public healthcare sector of Zimbabwe

The study aimed to develop a Digitalisation Framework to enhance service delivery in Zimbabwe's public healthcare sector. The objective was to provide insights into how digital technologies can improve the efficiency, accessibility, and quality of healthcare services. The framework incorporates critical factors such as ubiquity, reliability, skills/knowledge, innovation, information intensity, and cultural moderating effects. Figure 4.4 visually illustrates the proposed framework, highlighting the integration of these factors to improve service delivery in Zimbabwe's public healthcare sector. This framework is a blueprint for implementing digital health strategies to overcome current challenges and optimize healthcare outcomes.

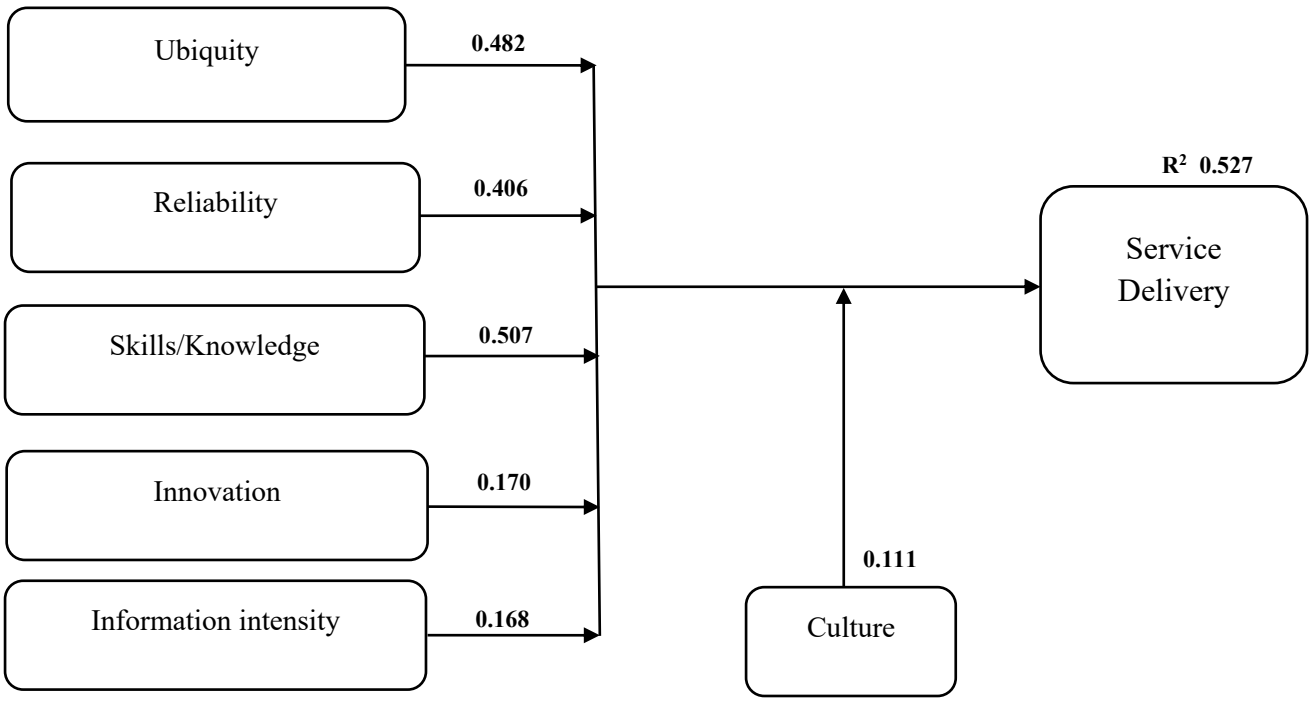

Figure 4.4 Digitalisation framework for service delivery in the public healthcare sector of Zimbabwe

Developing the digitalisation framework for service delivery in the public healthcare sector of Zimbabwe represents a significant advancement in enhancing the efficiency, accessibility, and quality of healthcare services. This framework is crucial for several reasons. It provides a structured approach to integrating digital technologies into the public healthcare sector, leading to more

efficient and effective service delivery. Leveraging digital tools can improve patient care, streamline administrative processes, and enhance communication between patients and providers. Secondly, the framework addresses the challenges Zimbabwe's public healthcare sector faces, such as resource constraints, limited access to medical services, and inefficiencies in service delivery. By introducing technology-driven solutions, the framework aims to optimise resource use and expand access to care, especially in remote and underserved areas. Thirdly, it offers a blueprint for policymakers and healthcare leaders, supporting informed decision-making and strategic planning to ensure the successful implementation of digital health initiatives.

The uniqueness of this framework lies in its comprehensive approach, which considers various factors such as ubiquity, reliability, skills and knowledge, innovation, and information intensity, along with the moderating role of culture. This holistic perspective ensures that all critical aspects of digitalisation are addressed, making it more robust and adaptable to the specific needs of Zimbabwe's public healthcare sector. Additionally, the framework's emphasis on cultural considerations highlights its relevance in ensuring that digital health solutions are technically sound, culturally appropriate, and accepted by the community.

The framework fills a significant gap in the existing healthcare infrastructure by providing a clear and actionable roadmap for digital transformation. It moves beyond the mere adoption of technology, focusing on creating an integrated and sustainable digital health ecosystem. This approach is essential for overcoming the barriers to effective service delivery and ensuring digitalisation's benefits are fully realized. Ultimately, this framework has the potential to transform healthcare in Zimbabwe, leading to improved health outcomes and a more resilient health system.

5 CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

Chapter four discussed research results. Then this chapter is the final chapter of the thesis which provides conclusions of the study. Research conclusions are grounded on the research objectives and related hypotheses as laid out in chapter three. The research conclusions are extracted from the findings and discussion as illustrated in chapter four. The implications of the study findings to policy and practice, the current body of knowledge and research methodology are also provided. The research limitations are presented to make relevant recommendations on the basis of the given conclusions. Lastly, suggestions are made on areas that need further research.

5.1 Summary of the major findings of the study

The study set out to develop a digitalisation framework for service delivery in the public healthcare sector of Zimbabwe. The findings and interpretation of the data provides adequate evidence to show a link between digitilisation and service delivery in the public healthcare sector. The following conclusions were made in relation to this study based on each objective of the study.

Research findings indicated that ubiquity has a moderate positive impact on service delivery by enhancing accessibility for patients, particularly in underserved areas. It allows patients to access healthcare services at any time and from any location, reducing barriers related to distance, time, and cost. As a result, healthcare providers are able to offer continuous care, improve patient engagement, and reduce the burden on physical healthcare facilities. Ubiquity also supports the integration of healthcare data and services, facilitating seamless interactions between providers and patients.

The effect of skills and knowledge on service delivery is critical in ensuring that healthcare services are provided effectively and efficiently. The positive impact revealed that the skills and knowledge of healthcare professionals, particularly in the use of digital tools, are pivotal in improving service delivery. As healthcare becomes increasingly digital, clinicians' ability to navigate electronic health records (EHRs), telehealth platforms, and digitalised diagnostics directly affects the quality of care provided. Training and continuous education programs for healthcare workers in these areas are linked to improved patient outcomes, enhanced decision-making, and better communication

between patients and providers. Moreover, skilled personnel can better leverage technological advancements to innovate and personalize care.

The study highlighted that reliability has a moderate positive impact on service delivery. Reliable service delivery ensures that patients receive timely, accurate, and consistent care, which improves the overall healthcare experience. The availability and performance of digital tools such as telemedicine platforms, EHR systems, and diagnostic tools contribute to this reliability, ensuring that care is delivered without interruptions. Furthermore, reliable systems reduce errors, enhance patient safety, and streamline operational efficiencies, contributing to better health outcomes.

Innovation plays a crucial role in enhancing healthcare service delivery. The study indicated that the introduction of new technologies and practices, such as digital-based diagnostics, personalized medicine, and digital health tools, has a weak positive impact on healthcare outcomes. Innovation drives improvements in the quality of care, increases the efficiency of healthcare services, and opens new avenues for treatment, particularly for chronic conditions and complex diseases. The adoption of innovative approaches enables healthcare providers to deliver more accurate, timely, and cost-effective care, improving patient satisfaction and health outcomes. Moreover, innovation fosters a culture of continuous improvement, which keeps healthcare systems adaptive to emerging challenges.

The study findings suggests that high information intensity has a weak positive effect on service delivery by enabling more informed clinical decisions, improving care coordination, and enhancing patient outcomes. The use of big data, digital, and advanced analytics allows healthcare providers to better understand patient needs, predict health trends, and offer tailored interventions. As healthcare systems become more data-driven, the integration of patient information across different platforms enhances both the accuracy of diagnoses and the effectiveness of treatments. Furthermore, information intensity supports continuous monitoring and personalized care, leading to better long-term health outcomes for patients.

The study findings suggests that culture has a strong moderating effect between digitilisation and service delivery. Cultural contexts shape attitudes toward health, illness, and treatment, influencing overall health management and these also shape individuals' perspectives on healthcare and their choices regarding treatment options. Cultural beliefs affect approaches to health promotion, how illness and pain are experienced and expressed, and when and where patients seek help. These beliefs also determine the types of treatments patients prefer, reflecting cultural attitudes towards

health and wellness. In addition, findings shows that cultural perspectives can shape how individuals handle pain, choose palliative care options, and make decisions regarding end-of-life care. These practices profoundly impact individuals' views on healthcare and treatment options. Understanding these cultural influences is essential for providing culturally competent care and ensuring that healthcare practices align with patients' values and preferences.

5.2 Comparison of Findings with Previous Studies

The findings of this study broadly align with existing literature on digitalisation in healthcare, particularly concerning the influence of core digitalisation dimensions on service delivery outcomes. The positive and moderate relationship between ubiquity and service delivery ($\beta = 0.500$, $p < 0.001$) is consistent with Vial (2019) and Dodgson et al. (2020), who found that widespread access to digital tools enables smoother, faster service interactions and continuity of care. In similar contexts, Andersson & Mattsson (2020) observed that ubiquitous access facilitates real-time updates across units, reducing delays and duplication in service workflows.

The strong effect of skills and knowledge ($\beta = 0.546$, $p < 0.001$) resonates with findings from Maguire et al. (2020), Alhassan et al. (2022), and Yilmaz (2019), who argued that digital literacy among healthcare professionals directly influences the effectiveness of system adoption and long-term sustainability. This reinforces the importance of human capacity as a foundational enabler of successful digital transformation, particularly in low-resource settings. These findings also align with Schwamm et al. (2021), who stress that digital training reduces resistance to change and improves usage accuracy.

The moderate relationship between reliability and service delivery ($\beta = 0.517$, $p < 0.001$) confirms earlier research by Mergel et al. (2019) and Satchell (2022), who identified stable digital platforms as crucial for clinical efficiency and user trust. When systems experience frequent outages or errors, health professionals are likely to revert to manual processes, negating the potential gains of digitalisation. In Zimbabwe’s context, qualitative evidence from this study echoes these global observations, highlighting user frustration with downtime and inconsistent internet connectivity.

The impact of innovation ($\beta = 0.348$, $p < 0.001$) was weaker compared to other variables, yet still statistically significant. This partially supports studies by Rachinger et al. (2019) and Larsson & Teigland (2019), who emphasised that innovation drives service improvement only when it is participatory and well-communicated. In contrast, top-down innovation initiatives often driven by

funders or policy makers may lack frontline ownership, reducing their practical impact, as also noted by Knudsen (2020) in public sector digital projects.

The relatively weak but positive effect of information intensity ($\beta = 0.125$, $p = 0.048$) also reflects previous observations by Reis et al. (2020) and Westerman & Farr (2021), who found that while data availability is important, its value is realised only when it is actionable and timely. This study's qualitative responses support this view, revealing that many public hospitals still struggle to transition from data collection to real-time utilisation due to infrastructure or analytical capacity gaps.

Finally, the small but statistically significant direct effect of culture on service delivery ($\beta = 0.111$, $p = 0.003$) affirms the role of organisational culture as identified in the works of Mergel et al. (2019), Fetters (2019), and Schallmo & Williams (2018). These scholars agree that cultural resistance, hierarchical mindsets, and low change-readiness often undermine otherwise sound digitalisation initiatives. In this study, culture emerged not only as a direct influencer but also as a latent barrier that moderates how other digital elements are embraced across departments and personnel levels.

This study contributes significantly to existing literature by empirically demonstrating that organisational culture plays a moderating role in the relationship between digitalisation and service delivery outcomes in Zimbabwe's public healthcare sector. While individual digitalisation factors such as ubiquity, reliability, and innovation showed varying levels of influence, the interaction with organisational culture either strengthened or weakened these effects depending on the institutional context. This finding supports recent arguments by Mergel et al. (2019) and Knudsen (2020), who emphasised that culture acts as an enabler or constraint in the adoption of digital systems, particularly in public institutions where bureaucratic norms and resistance to change are entrenched.

The moderating effect of culture aligns closely with Vial's (2019) digital transformation framework, which identifies organisational readiness including leadership support, values, and norms as a key contingency in determining the success of digital initiatives. Similarly, Fetters (2019) highlights that the success of health digitalisation projects often depends not just on the tools adopted but on the cultural alignment within the institution. In this study, while digital tools were present, their effective use varied according to how open, adaptable, and learning-oriented the institutional culture was.

Moreover, the moderating role of culture in this study is consistent with Satchell (2022) and Larsson & Teigland (2019), who argue that digitalisation must be culturally embedded to be sustainable. Their research confirms that without cultural integration where staff values, beliefs, and routines are aligned with digital workflows technology adoption tends to plateau or regress. This underscores the relevance of the researcher's study's framework: digitalisation alone is insufficient unless institutions address cultural alignment and change management. Thus, the study expands existing research by empirically validating culture as a moderating construct, not just a contextual factor. It reinforces the idea that digitalisation must be understood and implemented within a socio-cultural framework, particularly in public health systems in developing contexts where resource constraints intersect with rigid institutional norms.

5.3 Conclusions

Digitalisation in healthcare significantly enhances service delivery by leveraging key factors such as ubiquity, skills, reliability, innovation, and information intensity. Ubiquity allows for broader access to care, overcoming geographical and time barriers. Skilled healthcare professionals who are adept in using digital tools contribute to improved service outcomes, while reliable systems ensure consistent and high-quality care. Innovation drives advancements that lead to more personalized and efficient treatments, and the increasing reliance on information-rich platforms enhances decision-making and patient monitoring. Collectively, these factors create a more accessible, efficient, and effective healthcare environment.

The integration of digital technologies into healthcare has demonstrated a clear positive impact on service delivery, not only improving accessibility but also empowering healthcare professionals with tools that enhance patient care. The combination of innovative practices, reliable systems, and the intensive use of data has the potential to transform patient experiences, making healthcare more patient-centric and outcome-driven. However, the success of these technologies depends on a careful balance of technological infrastructure, professional training, and ongoing support to maintain system reliability and patient trust.

5.4 Recommendations

The study recommends that providers should prioritize investments in robust digital infrastructure, including telemedicine platforms, EHR systems, and AI technologies, to ensure ubiquity and reliability in service delivery. This will enhance patient access and the overall effectiveness of care.

There is need to establish continuous professional development programs to ensure that healthcare workers are proficient in the latest digital tools and technologies. This will maximize the potential of digital solutions and improve service delivery outcomes.

The study recommends that there is need to fully leverage information intensity, healthcare organisations should invest in interoperable systems that allow for seamless data sharing and integration across different platforms. This will improve decision-making and care coordination, ultimately enhancing patient outcomes.

Healthcare systems should foster a culture that embraces innovation, supporting the development and implementation of new technologies and approaches. Encouraging experimentation with new digital solutions can lead to breakthrough improvements in care delivery.

There is need to establish strong data security measures and ensuring system reliability are crucial. Regular system audits, cybersecurity training, and contingency planning should be prioritized to maintain patient trust and avoid disruptions in service delivery.

Continuous monitoring and evaluation of digital tools' effectiveness should be conducted to assess their impact on service delivery. Feedback from healthcare professionals and patients should be used to refine and adapt technologies for better performance.

It is recommended that the Government of Zimbabwe through the Ministry of Health and Child Care Zimbabwe to adopt and implement the Digitalisation Model as a beacon to achieve NDS 1 goals, SDG 3 goals and Vision 2030 target roadmap.

5.5 Implications to Theory/Knowledge

The integration of digital technologies into healthcare challenges and extends traditional healthcare delivery models. Theories on patient-provider interactions, care delivery systems, and health outcomes must evolve to incorporate new dimensions of digital interaction, such as telemedicine and digital-driven diagnostics. The ubiquity of healthcare services, combined with digital's role in decision-making, introduces a need for updated theoretical frameworks that incorporate technological mediation in healthcare processes.

Traditional models of healthcare effectiveness, focused mainly on in-person visits, need to integrate new indicators that measure the success of remote care, digital interventions, and data-driven decision-making. Theories around operational efficiency and service delivery can benefit from incorporating digital tools as enablers of faster, more personalized, and data-intensive care. As these

technologies become more embedded in healthcare, scholars may need to reconsider the role of human providers, shifting towards collaborative human-AI models.

Digitalisation has introduced new ways of empowering patients, such as mobile health apps, remote monitoring, and personalized medicine. This challenges traditional conceptualizations of patient-centred care, which previously focused on face-to-face interactions. The theory of patient engagement needs to evolve, acknowledging that digital engagement can be just as powerful, if not more, than in-person encounters in certain contexts.

The rapid pace of innovation, from digital diagnostics to blockchain for secure health data, introduces new challenges and opportunities for healthcare theory. Existing innovation adoption theories must be adapted to account for the complexity and rapid evolution of healthcare technologies, while incorporating the challenges around regulation, patient trust, and professional readiness.

5.5.1 Implications to Policy and Practice

The study has an implication to both academic and practice as it helps and provide a robust Digitilisation Model to be used by all health institutions to enhance innovation, industrialization and sustainability as in line with Education 5.0.

Governments and regulatory bodies need to adopt the Digitalisation framework for service delivery in the public healthcare sector of Zimbabwe that support the seamless integration of digital technologies into healthcare delivery. Policies must also ensure equitable access to digital health services, especially for marginalized or underserved populations.

Given the increasing reliance on digital technologies, policies should focus on ensuring that healthcare professionals are adequately trained in the use of digital tools. This could involve integrating digital health literacy into medical curricula, providing continuous professional development opportunities, and creating certifications for digital health competencies. By doing so, healthcare systems will be better prepared to fully embrace Digitalisation, enhancing service delivery.

As digital tools like digital, machine learning, and big data become integral to healthcare, it is crucial for policy makers to establish clear ethical guidelines and regulations. These include data privacy protections, transparency in digital decision-making, and the accountability of digital health providers. Policies should ensure that these technologies are implemented responsibly, protecting patient privacy while promoting innovation.

From a practical standpoint, healthcare providers must ensure that digital tools are not only reliable but also accessible to all patients. Policies must be in place to ensure equitable access to technology, particularly in low-resource settings. This may involve investments in infrastructure for example internet access in rural areas and supporting the development of user-friendly technologies for diverse populations.

In practice, there should be mechanisms to regularly monitor and evaluate the effectiveness of digital health interventions. Policymakers should require healthcare providers to collect data on the outcomes of digital service delivery and use this information to continuously improve care models. This monitoring should extend to ensuring that new technologies do not inadvertently widen healthcare disparities.

Governments and healthcare organisations must foster an environment conducive to innovation. Policies should encourage research and development in digital health technologies, facilitate public-private partnerships, and provide incentives for healthcare institutions to adopt cutting-edge solutions. By supporting innovation, policymakers can ensure that the public healthcare sector remains adaptable and responsive to evolving patient needs and technological advancements.

5.6 Limitations and implications on future research

5.6.1 Limitations of the Study

This study primarily focused on a select set of digital technologies for example telemedicine, EHR systems, digital, and electronic health apps within the public healthcare sector. While these technologies have shown significant impacts on service delivery, the study may not fully capture the broader spectrum of digital innovations, such as blockchain or robotics, which could also influence healthcare outcomes. A more comprehensive analysis of emerging technologies may yield additional insights into Digitalisation's effect on service delivery.

The findings of this study were limited by the geographical context in which the research was conducted. Healthcare systems vary significantly across regions and countries due to differences in infrastructure, policy, economic resources, and healthcare culture. The results from high-income settings may not be entirely applicable to low- and middle-income countries, where Digitalisation in healthcare might be in its nascent stages or face different challenges.

The effectiveness of digital healthcare tools heavily depends on the quality of data input, whether it be patient data, health records, or real-time monitoring metrics. This study may not fully account for the variability in data quality across different healthcare institutions, which could skew the findings related to the effectiveness and reliability of digital health solutions.

This study primarily assesses the immediate to medium-term effects of Digitalisation in healthcare (2019–2024). However, the long-term impacts of widespread digital tool adoption, particularly in terms of patient outcomes, cost-effectiveness, and health disparities, may not yet be fully realized. Future studies should track these long-term trends to provide a more complete understanding of digital health's overall impact.

While the study investigates the effects of Digitalisation on service delivery, it may not address broader systemic impacts, such as changes in health policy, economic disparities, or healthcare workforce dynamics. A more holistic approach, considering the broader healthcare ecosystem, would provide a more comprehensive view of the implications of Digitalisation.

5.6.2 Future Research Directions

Future research could explore the role of emerging digital technologies, such as blockchain, robotic surgery, or virtual reality (VR) for training and patient engagement. These technologies are gaining traction in healthcare, and their long-term effects on service delivery, cost, and patient outcomes remain underexplored. The future studies should explore more use of AI in patient diagnosis and healthcare management

Studies across different regions or countries would offer valuable insights into the global variations in digital health adoption and its effectiveness. Research examining the impact of Digitalisation in healthcare systems from diverse socio-economic and cultural backgrounds could identify unique challenges and opportunities in the adoption process. Special attention should be given to low- and middle-income countries to understand the barriers to digital health adoption, including infrastructure limitations and digital literacy gaps.

There is a need for longitudinal studies that examine the long-term impact of digital health tools on patient outcomes. For example, how do AI-driven diagnostics, telemedicine, and EHRs affect the trajectory of chronic disease management over time? Understanding the lasting effects on patient care, treatment adherence, and health disparities will be crucial in assessing the sustainability of digital healthcare solutions.

Future research should delve deeper into the factors influencing healthcare professionals' and patients' acceptance and use of digital health technologies. This includes studying barriers such as resistance to technology, concerns about privacy, the perceived usability of digital tools, and the trust patients place in AI and telemedicine. A focus on user-centred design could inform the development of more intuitive and widely accepted healthcare technologies.

As digital tools become more integrated into healthcare systems, there is a need for research on their cost-effectiveness and overall impact on healthcare system efficiency. Understanding the economic implications of digital healthcare adoption, particularly in resource-constrained environments, will be vital for policymakers and healthcare administrators.

As healthcare becomes increasingly digitized, issues related to data privacy, cybersecurity, and the ethics of digital-driven healthcare must be addressed. Future research could focus on the legal and ethical frameworks needed to protect patient data and ensure that digital technologies are used fairly and transparently. Research on the social implications of digital health, such as digital health literacy and equity in access to healthcare services, will also be crucial to prevent widening disparities.

The increasing reliance on digital tools may change the roles of healthcare providers and the dynamics of the healthcare workforce. Future research could explore how digital health tools impact the roles of physicians, nurses, and allied health professionals. It could also investigate the potential for digital technologies to alleviate or exacerbate workforce shortages, particularly in rural or underserved areas.

5.7 Contribution to the body of knowledge

Publications

Mandizvidza, P, Masamba, T & Nikisi D (2024) Impact of revitalizing Zimbabwe's National Health Service delivery in Public Sector Central Hospitals, Harare. *Research Council of Zimbabwe Book of Papers*

Mandizvidza, P, Masamba, T & Nikisi D (2024) Leveraging Digital Proficiency to Transform Service Delivery in Private Sector Hospitals in Harare, Zimbabwe. *Zimbabwe Ezekiel Guti University Press*

Mandizvidza, P, & Nikisi D (2023). Digitalisation and service delivery in the public healthcare sector of Zimbabwe. *Chinhoyi University of Technology Book of Abstracts:* ISBN No.978-1-7729-839-0

Approved Commercialized Patents

Mandizvidza, P, Nikisi D and Masamba, T (2024) Digitilisation Model to Enhance Service Delivery in The Public healthcare sector of Zimbabwe *Registrar of Patents, Trade Mark, Industrial Designs and Copyrights: Causeway, Harare: Zimbabwe*

Mandizvidza, P, Nikisi D and Masamba, T (2025) Digital Proficiency Model for service delivery in The Public healthcare sector of Zimbabwe *Registrar of Patents, Trade Mark, Industrial Designs and Copyrights: Causeway, Harare: Zimbabwe*

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Appendix A: Questionnaire

My name is Paidamoyo Mandizvidza, a Dphil student at Chinhoyi University of Technology. I am conducting a research project as part of the requirements for the degree programme. My topic is:

''DEVELOPING A DIGITALISATION FRAMEWORK FOR SERVICE DELIVERY IN THE PUBLIC PUBLIC HEALTHCARE SECTOR OF ZIMBABWE''

I humbly request you to contribute to my study by completing this questionnaire. The questionnaire consists of closed ended questions on the subject of the study and you should be able to complete it within 10 minutes or less.

Thank you

Section A: Demographic characteristics

Tick where applicable

Gender	Male	
	Female	
Age group	Below 20	
	21-40	
	41-50	
	51-60	
	Over 60	
Level of Education	O'level	
	Certificate/Diploma	
	Tertiary	
	Other (specify)	
Years of experience in the public public healthcare sector	Less than 2	
	2-5	
	6-10	
	Over 10	
Level of position	Doctor	
	Nurse	
	Health administrator	
	Government Ministry official	
	Other (specify)	

Section B: Level of Ubiquity on digital technologies in the public public healthcare sector

The following can be said on how common digital technologies are in the Zimbabwean Public public healthcare sector. Indicate your level of agreement with each statement as it applies to your institution.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Digital technologies like smartphones, tablets, and internet access readily available in your community for healthcare purposes					
Healthcare services are increasingly incorporating ubiquitous technologies like telemedicine, remote monitoring, and online appointments					
It is easy to access and utilize these digital healthcare services at any given time					
They are challenges faced due to limited access to digital healthcare technology					
There is a provision of internet or data timeously					

Section C: The influence of reliability of digital technologies

The following can be said on how reliable digital technologies are on influencing service delivery in the public public healthcare sector. Indicate your level of agreement with each statement as it applies to your institution.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Information accessed through digital healthcare platforms are accuracy and reliable					
There is always stable internet connectivity to navigate through the e-health platforms					
All patients records are kept confidential and privacy is maintained throughout					
Digitalisation offers a reliable alternative to traditional methods of healthcare delivery (e.g.in-person consultations, paper records)					
Digital healthcare tools give accurate and reliable diagnoses, treatment recommendations for patients					

Section D: Importance of Skill/ Knowledge

The following can be said about the importance of skill and how it affects service delivery when dealing with digital health platforms. Indicate your level of agreement with each statement as it applies to you.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Training on how to use digital health platforms is important					
A pilot test of the e-health system is important to avoid failures in further use and implementation (leading to harm, problems, loss of confidence, etc.)					
After training there is sufficient time provided to all users to adapt to the e-health platform					
Continuous training is needed to keep updated with digital trends					
All team members in my department are knowledgeable about the e-health platform used in this institution					

Section E: How Innovation impacts service delivery in the public public healthcare sector?

The following are possible alternatives on how innovation and how it impacts service delivery. Indicate your level of agreement as it applies to your institution.

.	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
When using the e-health digital platform every stakeholder is involved in its design and development process					

There is a decreased workload when using the e-health platforms as repetitive tasks can be done with AI powered chatbots					
Turn-around time for patients' treatments and management is short when using e-health platforms					
E-health platforms makes it easier for patients to book doctors' appointments and for them to get consultation in real time					
Data collected from patients can help to come up with statistics and trends for new innovative products and services					

Section F: How Information intensity affects service delivery?

The following are possible alternatives on how information intensity of digitalisation affects service delivery. Indicate your level of agreement with each statement applies to your healthcare institution

.	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Communication is done is real time when using the e-health system					
Patients are able to book for the Doctor's appointment in advance via the various digital platforms					

The e-health platform assists in generating patient data and shorten time to diagnosis and for clinical research					
There is more patient care and Patient Relationship Management is intensified					
Statistics and reports are timeously produced from the different patient data collected					

SECTION G – Culture on reconfiguring digitalisation for service delivery

The following are possible alternatives on how Culture affects reconfiguring digitalisation for service delivery in the public public healthcare sector. Indicate your level of agreement with each statement applies to your healthcare institution.

.	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Do your cultural beliefs and practices influence your views on healthcare and treatment options					
There are more specific cultural beliefs or practices that may be resistant to digital health interventions					
There any cultural taboos related to sharing personal					

health information electronically					
Face-to-face interaction with healthcare providers is important					
Technology brings comfort when accessing healthcare services (e.g., online appointments, telehealth consultations)					

SECTION H – Service delivery

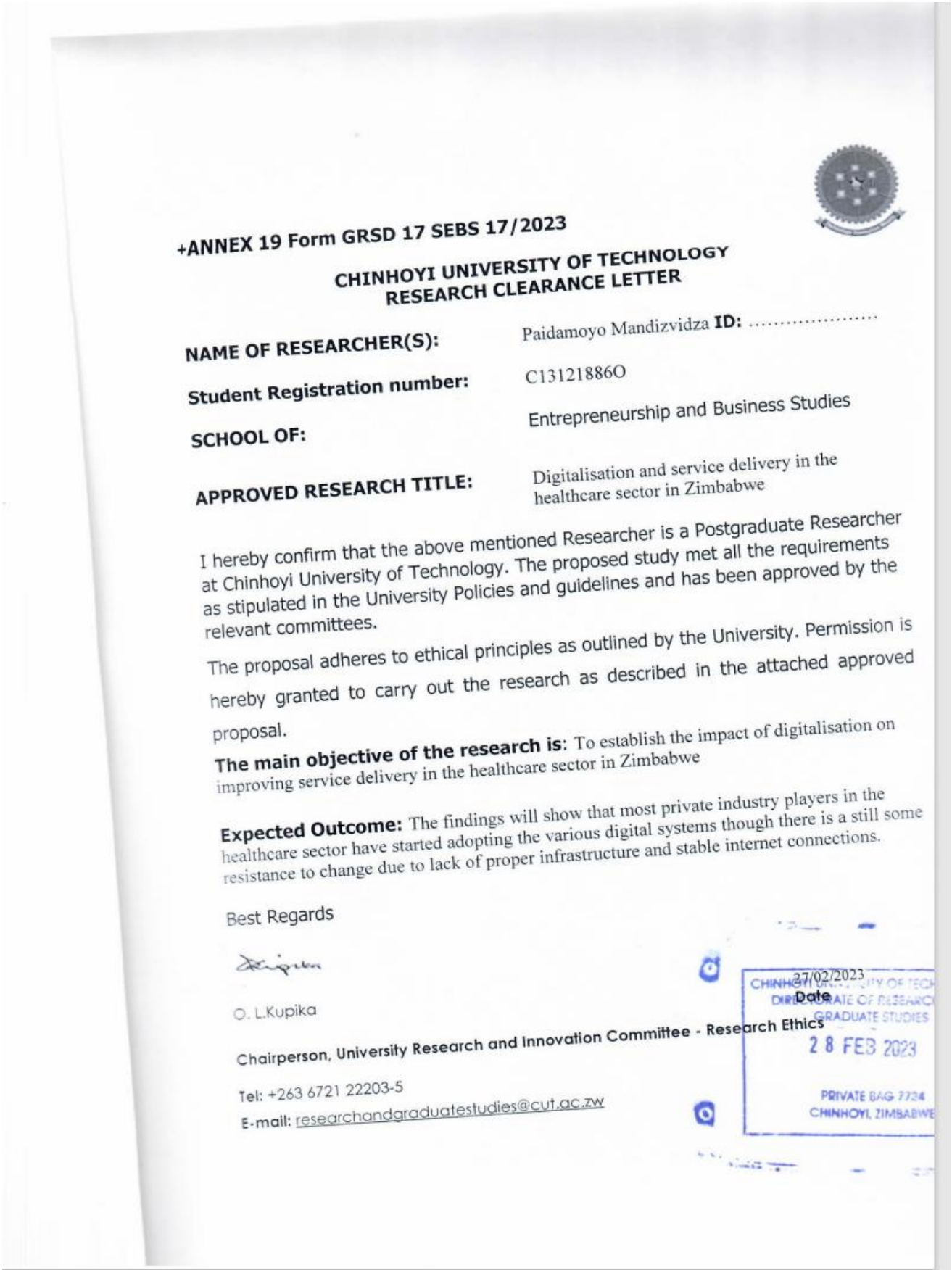
The following are possible alternatives on how service delivery plays a pivotal role on reconfiguring digitalisation in the public public healthcare sector. Indicate your level of agreement with each statement applies to your healthcare institution.

.	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Digitalisation has made healthcare services more accessible for medical practitioners and patients					
Healthcare services have been made more efficient through Digitalisation (faster appointment scheduling, streamlined communication, automated tasks)					
There is more personalized healthcare services through e-					

health platforms (e.g., online health trackers, AI-powered chatbots)					
Digitalisation has improved the quality of healthcare services that patients receive (e.g., access to specialists, remote monitoring, data-driven insights)					
Communication between healthcare providers and patients has been Is it easier or more difficult now? (e.g., online portals, telehealth consultations, communication apps					

THANK YOU FOR YOUR PARTICIPATION ☺

Appendix B- ETHICAL CLEARANCE LETTER



+ANNEX 19 Form GRSD 17 SEBS 17/2023

CHINHOYI UNIVERSITY OF TECHNOLOGY
RESEARCH CLEARANCE LETTER

NAME OF RESEARCHER(S): Paidamoyo Mandizvidza **ID:** .....

Student Registration number: C131218860

SCHOOL OF: Entrepreneurship and Business Studies

APPROVED RESEARCH TITLE: Digitalisation and service delivery in the healthcare sector in Zimbabwe

I hereby confirm that the above mentioned Researcher is a Postgraduate Researcher at Chinhoyi University of Technology. The proposed study met all the requirements as stipulated in the University Policies and guidelines and has been approved by the relevant committees.

The proposal adheres to ethical principles as outlined by the University. Permission is hereby granted to carry out the research as described in the attached approved proposal.

The main objective of the research is: To establish the impact of digitalisation on improving service delivery in the healthcare sector in Zimbabwe

Expected Outcome: The findings will show that most private industry players in the healthcare sector have started adopting the various digital systems though there is a still some resistance to change due to lack of proper infrastructure and stable internet connections.

Best Regards

O. L.Kupika

27/02/2023
Date

Chairperson, University Research and Innovation Committee - Research Ethics

Tel: +263 6721 22203-5
E-mail: researchandgraduatestudies@cut.ac.zw

CHINHOYI UNIVERSITY OF TECH
DIRECTORATE OF RESEARCH
GRADUATE STUDIES
28 FEB 2023
PRIVATE BAG 7724
CHINHOYI, ZIMBABWE

Appendix C- RESEARCH PERMISSION LETTER

Telephone: +263-4-708537-70
All correspondences to be.
addressed to the secretary
HEALTH AND CHILD CARE

ZIMBABWE

Ministry of Health and Child
P.O Box CY 1122
Causeway
HARARE

10 October 2023

Paidamoyo Mandizvidza
5141 New Tafara
Harare

Dear P. Mandizvidza

RE: SEEKING PERMISSION TO CONDUCT A RESEARCH ON DIGITALISATION AND SERVICE DELIVERY IN THE HEALTH SECTOR OF ZIMBABWE

Your communication dated 17 July 2023 pertaining to the above referenced matter is noted.

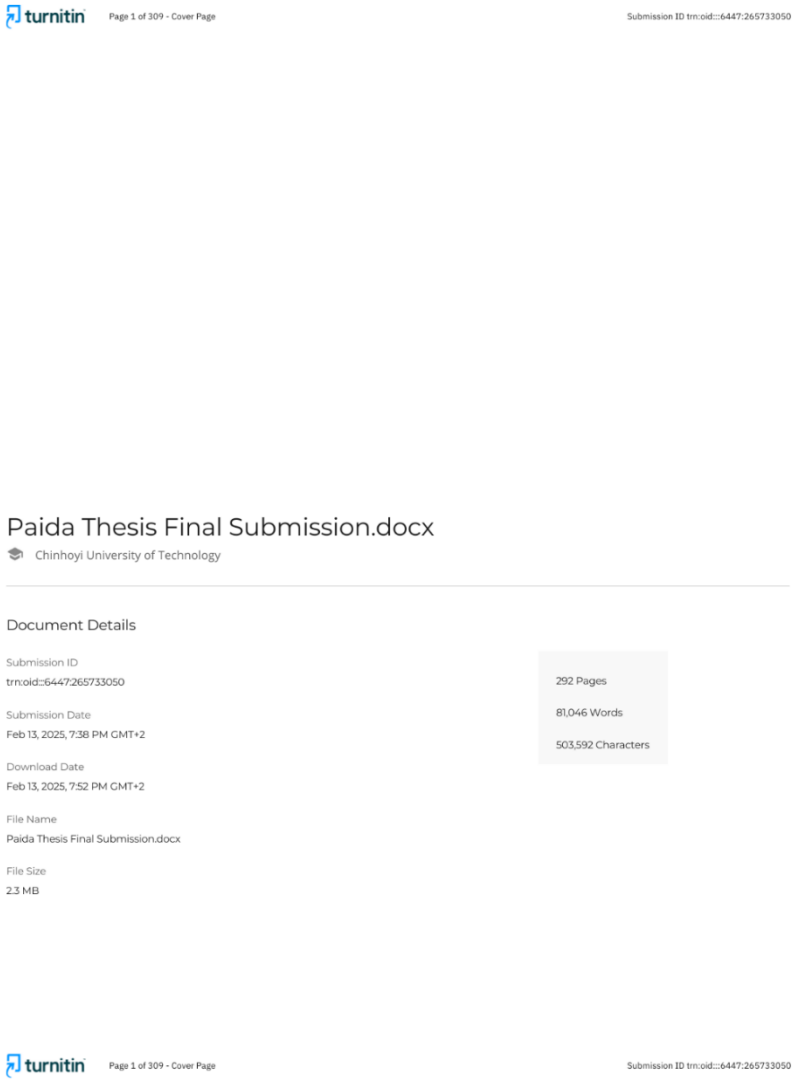
The Ministry of Health and Child Care approves your request to conduct the study title "Developing a Digitilisation framework for service delivery in the health sector of Zimbabwe" You are reminded to share your study findings with Ministry after completion of your study.

We wish you well in your studies.

MIN. OF HEALTH & CHILD CARE
DIRECTOR: MATERNITY OF HEALTH
RESEARCH & CHILD CARE
10 OCT 2023
P.O. BOX CY 573, CAUSEWAY
ZIMBABWE

Group Captain (Dr) M Dobbie
Chief Director Public Health
For: Secretary for Health and Child Care

Appendix D- Turnit Report



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