EFFECTS OF TRAINING ON SERVICE DELIVERY IN SELECTED MEDICAL LABORATORIES IN KENYA

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DECLARATION

I declare that this dissertation is my original work and has not been previously published or submitted elsewhere for award of a degree. I also declare that this contains no material written or published by other people except where due reference is made and author duly acknowledged.

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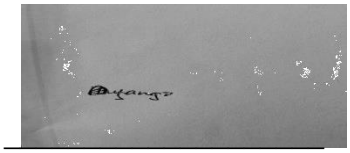
Sign:  Date: _04/10/2025_____

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ABSTRACT

Medical laboratories are essential in healthcare delivery, providing critical diagnostic services; however, service quality often suffers due to gaps in training among laboratory practitioners. This study examines the effects of training on service delivery in selected medical laboratories in Kenya, focusing on technical, soft skills, digital, and cognitive skills training. Grounded in the Theory of Reasoned Action, the Technology Acceptance Model, and Social Learning Theory, the study employed a descriptive cross-sectional design. The target population consisted of 4,053 laboratory practitioners in 18 accredited laboratories in Nairobi County, with a sample selected using simple random and convenience sampling. Data were collected via self-administered, semi-structured questionnaires, analyzed through both quantitative (SPSS v.22.0) and qualitative (thematic analysis) techniques. The findings showed that all forms of training positively influenced service delivery. Regression analysis revealed that technical skills training had the most significant effect ($B = 0.364$, $p = 0.000$), followed by digital skills ($B = 0.310$, $p = 0.000$), soft skills ($B = 0.247$, $p = 0.000$), and cognitive skills ($B = 0.145$, $p = 0.000$). The study recommends the establishment of structured, continuous training programs with an emphasis on technical and digital skills, alongside soft and cognitive skills, to improve laboratory service delivery.

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LIST OF ABBREVIATIONS

ACT	Assertive Community Treatment
CBSST	Cognitive Behavioral Social Skills Training
CBT	Cognitive Behavioural Therapy
CPD	Continuing Professional Development
EBPs	Evidence-Based Practices
HR	Human Resource
ICT	Information and Communications Technology
IT	Information Technology
KMTTLB	Kenya Medical Laboratory Technicians & Technologists Board
MTRH	Moi Teaching and Referral Hospital
NACOSTI	The National Council for Science Technology and Innovation
OECD	The Organization for Economic Co-operation and Development
PEU	Perceived Ease of Use
PU	Perceived Utility
TAM	Technology Acceptance Model
TRA	Theory of Reasoned Action

UCD	User-Centered Design
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The concept of service delivery encompasses various interactions between public services and citizens, communities, or businesses. These interactions enable stakeholders to request and provide information, manage activities, and fulfill obligations efficiently. According to the Organization for Economic Co-operation and Development (OECD, 2023), effective service delivery should maintain security, consistency, and a customer-centric approach to meet diverse needs. In Kenya, enhancing healthcare quality remains a priority for the Ministry of Health (2023). With increasing demand for improved healthcare services, there is a need to focus on transforming delivery service in medical laboratories, which play an essential role in diagnosis, disease prevention, and treatment effectiveness. Effective service delivery in healthcare extends beyond financial stability; it involves creating systems that enhance efficiency, ultimately contributing to the nation's public health goals (World Health Organization [WHO], 2023). This study, however, focuses specifically on the delivery of services within medical laboratories, aiming to explore how training influences the effectiveness of laboratory services and their impact on overall healthcare outcomes.

The WHO (2022) emphasizes that high-quality healthcare services and a people-centered approach are fundamental to achieving universal health coverage. People-centered healthcare focuses on addressing the comprehensive needs of individuals and communities rather than solely managing diseases. This approach considers not only the

clinical experiences of patients but also the involvement of communities in shaping healthcare policies and services. The integration of patient-centered care into healthcare systems enhances patient outcomes and satisfaction.

An ideal healthcare system is characterized by high-quality patient care, advanced technologies, effective medicines, favorable staff-to-patient ratios, and affordability. Quality service provision depends on rapid access to prescription medications, the availability of specialized facilities, and the capabilities of medical personnel to set objectives, make informed decisions, and solve complex issues (Walusimbi & Wamema, 2022). The integration of healthcare systems to provide a continuum of care spanning health promotion, disease prevention, diagnosis, treatment, management, recovery, and palliative care is essential for effective and efficient service delivery (WHO, 2022).

Medical laboratories are core components of healthcare systems, responsible for conducting diagnostic tests that inform critical health interventions, treatment plans, and preventive measures (Omorodion, Achukwu, & Umeh, 2017). The efficiency of medical laboratories relies on highly trained personnel capable of delivering accurate, timely, and reliable results. However, delivering high-quality laboratory services remains challenging in resource-limited settings due to financial constraints, inadequate infrastructure, and insufficient training of laboratory personnel (International Federation of Clinical Chemistry and Laboratory Medicine, 2023).

In Kenya, diagnostic errors and malpractice in laboratory services have raised public concerns. Reports attribute these issues to insufficient training, limited technological skills, and delays in digitalization, which contribute to diagnostic errors that negatively

impact patient outcomes (Allen, 2023). Such errors compromise the reputation of medical laboratories, underscoring the urgent need for targeted training programs. Enhancing the technical, digital, cognitive, and soft skills of laboratory personnel can significantly improve service delivery, reducing errors and fostering public trust in healthcare services (Kavinya, Lugulu, & Mosol, 2023).

Training is a proactive strategy that healthcare institutions can adopt to improve employee competencies and enhance service delivery. Research suggests that training initiatives align with Technical Efficiency Theory, which posits that organizations achieve success by optimizing inputs to generate desired outputs. In healthcare, training is a crucial input that enhances the performance of laboratory practitioners, ultimately improving service delivery outcomes (Kaguta & Iraki, 2017). The theory advocates for maximizing efficiency by integrating the most appropriate resources in this case, technical skills, soft skills, digital skills, and cognitive skills to achieve optimal results. This study explores how specific training components; technical, soft skills, digital, and cognitive skills can enhance service delivery in Kenyan medical laboratories. By addressing existing gaps in training, this research aims to position medical laboratories as integral components of Kenya's healthcare system, contributing to the achievement of national healthcare goals. This research examines how specific gaps in training, including technical, digital, cognitive, and soft skills, directly impact service delivery in Kenyan medical laboratories.

1.1.1 Global Perspective

In its commitment to health improvement, the Institute of Medicine (IOM), now the National Academy of Medicine (NAM), has emphasized the responsibility of health

organizations, professional groups, and both public and private sector entities to continuously work toward reducing disease burdens and improving the population's health and functional capabilities. This mandate is central to the United States healthcare system, an intricate network comprising various providers, including physicians, clinics, hospitals, insurers, and benefit purchasers, which collectively span governmental, private, and nonprofit sectors. Despite the diversity within this system, which includes both regulatory and volunteer-based organizations, their primary responsibility is unified: to provide quality, patient-centered healthcare that is accessible and effective. However, the fragmented nature of the U.S. healthcare landscape presents challenges in program design, coordination, and cooperation between organizations, impacting overall service delivery and efficiency (National Academy of Medicine, 2022).

Globally, the healthcare sector faces challenges in harmonizing service delivery standards. In the United States, the healthcare workforce reflects a mix of generational and educational diversity, as highlighted by the Association of Public Health Laboratories (APHL) workforce data from 2022. This study shows that the U.S. public health laboratory (PHL) workforce is highly educated and demographically diverse, with representation across multiple generations. The workforce values continued education and training; however, gender-related pay disparities remain a concern, with men generally earning more than women in similar roles. Additionally, while job satisfaction levels are moderately high, wage satisfaction remains a significant concern among PHL employees, potentially impacting retention and overall job performance (APHL, 2022). The APHL data underscore the importance of competitive, equitable compensation in

fostering a motivated workforce, which is essential to maintaining service quality in healthcare.

In developing regions, healthcare training tailored to local needs has become a critical area of focus. In Saint Lucia, a study by Rajapakshe, Weerarathna, Pathirana and Malage (2022) highlighted the importance of need-based training programs in developing countries, where resources are often limited, and healthcare demands are diverse. The study noted that the training requirements in such regions cover a broad spectrum of skills, from effective communication, nursing techniques, and time management to digital literacy, disaster management, and accurate documentation practices. However, one of the study's limitations was the lack of clear assessment criteria to help healthcare professionals determine task importance and measure outcomes against expected standards. This gap underscores the need for comprehensive needs assessments in healthcare settings to ensure training programs are aligned with actual service requirements, thus improving healthcare quality and workforce satisfaction (Rajapakshe et al., 2022).

To bridge these training gaps, institutions like the Sir Arthur Lewis Community College’s Department of Health Science in Saint Lucia have emerged as essential contributors to healthcare training, especially for nursing and other clinical skills. As developing nations work toward achieving sustainable healthcare goals, including those outlined in the Sustainable Development Goals (SDGs), institutions like these play a vital role in equipping healthcare professionals with skills that align with evolving healthcare needs. Notably, skill-based training initiatives focused on clinical and digital competencies contribute to improved healthcare quality, supporting global efforts to

make quality healthcare more accessible and effective across diverse settings (United Nations, 2023).

Globally, training gaps in medical laboratories remain significant, especially in resource-limited settings. The lack of structured professional development programs and technological training opportunities limits laboratory personnel's ability to adopt and integrate new diagnostic technologies effectively.

1.1.2 Regional Perspective

Access to Continuing Professional Development (CPD) remains a significant challenge for laboratory personnel across many African countries, largely due to limited availability and resource constraints. Laboratory professionals in these regions are under pressure to maintain competence in emerging laboratory technologies and evolving healthcare demands. However, without accessible CPD programs, they often struggle to meet these standards effectively (Gebregzabher et al., 2023; LaVigne et al., 2018). Healthcare laboratories in sub-Saharan Africa face several systemic challenges, such as inadequate infrastructure, shortages in skilled personnel, and weaknesses in underlying health systems, all of which impact the delivery of quality health services (Nkengasong, Yao and Onyebujoh, 2018).

Providing high-quality laboratory services has been particularly challenging in sub-Saharan Africa, where national tuberculosis reference laboratories (NTRLs) have struggled to meet certification and quality standards. A 2022 report by Odhiambo et al. highlights that only 36% of NTRLs in the African Region had completed quality audits, a critical step toward achieving certification and quality improvement in diagnostic

services. Barriers to certification include limited training and CPD opportunities, inadequate budgeting, and a lack of structured quality management systems (QMS). Although countries like South Africa, Botswana, Mozambique, and Uganda have made significant progress in certifying their NTRLs, challenges remain for many others, where quality management systems are less consistently applied (Odhiambo et al., 2023).

The role of CPD in retaining professionalism within the healthcare sector cannot be understated, especially in clinical and laboratory settings where rapid technological advancements constantly reshape best practices. LaVigne et al. (2018) emphasize that CPD participation by laboratory professionals is associated with improved patient care and the adoption of innovative treatment approaches. For example, CPD programs enable healthcare providers to cease outdated procedures and embrace new, evidence-based methods that enhance patient outcomes (Samuel et al., 2021). In Botswana, where CPD formalization has been limited, the Botswana Health Professionals Council (BHPC) has introduced CPD credit requirements for laboratory scientists, aiming to ensure that professional development continues throughout practitioners' careers (Botswana Health Professionals Council, 2021).

Similar CPD gaps are seen in other countries. In Ethiopia, for example, Gebregzabher et al. (2022) found that laboratories struggled with quality due to various issues, including inadequate management support, equipment quality, resource shortages, and high workloads. The Ebola outbreak in West Africa (2014-2016) underscored the vulnerabilities of such under-resourced laboratory systems. Laboratory networks in countries like Guinea, Liberia, and Sierra Leone became overwhelmed, hindering timely diagnostics and response efforts (Ondoa et al., 2020).

Despite these challenges, progress has been made in some areas of African laboratory medicine. For instance, HIV-related laboratory medicine in Africa has seen improvements in procedures, quality management, and infrastructure. Over 1,100 HIV research laboratories have now achieved global accreditation standards, which enhances their capacity to respond to broader health challenges on the continent, such as emerging infectious diseases (Ondoa et al., 2020).

Following the World Health Organization's (WHO) resolution and the Maputo Declaration, WHO-AFRO and its partners launched several quality management initiatives. The Stepwise Laboratory Quality Improvement Process Towards Accreditation (SLIPTA), introduced in 2016, is one of the prominent programs that assess laboratories on a zero-to-five-star rating based on their compliance with ISO 15189 standards (WHO, 2020). In Tanzania, the Abbott Fund's investment of $200 million allowed the restoration of 23 regional laboratories, demonstrating the impact of substantial financial investments on regional healthcare infrastructure (Abbott Fund. (n.d.)., 2024).

Moreover, the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) has played a crucial role in establishing advanced laboratory facilities across Africa, including Botswana, Kenya, Mozambique, and Uganda. In Ethiopia, PEPFAR funded the development of the National Public Health Laboratory in Addis Ababa, along with six additional regional labs, which are now equipped to address critical emerging diseases such as Ebola, Marburg, and Crimean-Congo hemorrhagic fever. In Uganda, the Uganda National Laboratory Services was established to address diagnostic needs in viral load monitoring and other essential laboratory services, playing an important role in managing

both common and emerging health threats (PEPFAR, 2022). The lack of a standardized approach to training in many African countries contributes to disparities in the competency of laboratory personnel, which, in turn, affects the quality of diagnostic services.

In regions such as sub-Saharan Africa, the role of CPD programs in enhancing laboratory service delivery is critical. When well-implemented, CPD programs lead to improved patient care, the adoption of innovative treatment approaches, and greater overall efficiency in medical laboratories. However, without structured and consistent training initiatives, laboratory personnel continue to face challenges in maintaining high standards of practice, particularly in resource-constrained environments.

1.1.3 Local Perspective

Kenya, like many African nations, faces significant challenges in meeting its healthcare workforce needs, particularly in specialized areas such as laboratory services. The Ministry of Health (MOH) acknowledges this shortage, which affects the quality and efficiency of healthcare delivery nationwide. With increasing demand for specialized healthcare services, Kenya has been exploring short-term solutions such as task shifting to optimize the existing workforce while implementing strategies to improve retention and expand the production of human resources for health (HRH) (MOH, 2022). The Ministry defines the healthcare workforce as the number of qualified providers physicians, nurses, laboratory technicians, and others willing to work at a given pay rate in the sector. Factors influencing the supply of healthcare workers include training capacity, education level, cost, personal interest in the profession, and the likelihood of employment post-training (MOH, 2022). The development and implementation of targeted

training programs that focus on technical skills, digital literacy, cognitive skills, and soft skills are critical in improving the overall performance of laboratory personnel.

Data from the Oral and Dental Health Division of the Ministry of Health illustrates a stark disparity between workforce availability and demand. There are currently only 100 dental specialists and 339 dental officers in the public sector, against the required 1,340 specialists and 7,400 officers. Similarly, the Community Health Services Unit reports a workforce of 2,100 community health workers, falling far short of the 46,470 needed, resulting in a gap of over 44,000 positions (MOH, 2021). In the realm of laboratory services, there is a shortage of graduate laboratory technologists; the staffing standard requires 3,196 technologists, but the system currently lacks enough graduates to meet this demand. Additionally, while there are 2,067 clinical laboratory technologists with diploma-level training, the public sector needs 13,678 to meet optimal staffing levels, leaving a shortfall of 11,647. Addressing these shortages is part of the government's goal to meet adequate staffing levels by 2030 (MOH, 2021).

In addition to workforce shortages, healthcare facilities face technological challenges that affect service delivery. A study by Muinga et al. (2020) highlighted gradual adoption of management technologies in Kenyan healthcare facilities, yet identified ongoing issues with system reliability, user training, resource allocation, and maintenance. Although electronic health records (EHRs) have been introduced in some facilities, users report insufficient system support and limited post-implementation assistance, which impedes effective utilization of these systems. Inadequate and inconsistent funding further exacerbates these challenges, making it difficult for facilities

to maintain the necessary quality and operational efficiency of these technologies (Muinga et al., 2020).

These issues underscore the need for targeted training to bridge the skills gap among healthcare providers. The current study identifies critical training gaps, specifically in technical, digital, cognitive, and soft skills, that contribute to suboptimal healthcare service delivery by laboratory personnel. Addressing these training needs aligns with the Ministry of Health's focus on building a competent and well-prepared healthcare workforce. The MOH emphasizes the need for training that includes proper equipment handling, such as color-coded bins, liners, and signage, to streamline waste segregation in medical facilities, which remains essential for infection control and operational efficiency (Muinga et al., 2020).

Further, WHO's *Blue Book* advocates for comprehensive training that includes occupational safety, financial management, environmental stewardship, and regulatory compliance for healthcare staff. By providing such training, healthcare institutions can foster an environment of shared responsibility and collaborative improvement, enhancing overall service delivery (World Health Organization, 2023). To support these goals, the MOH has proposed establishing the Kenya Institute of Health System Management (KIHSM) to focus on healthcare leadership, human resource management, and service quality improvement. The KIHSM would oversee the implementation of a comprehensive recruitment and training program, establishing clear competencies and milestones for all leaders and laboratory technicians (MOH, 2022). The challenges facing Kenya's healthcare system underscore the importance of a strategic approach to training healthcare workers, especially in laboratory services. By focusing on skill development in

technical, digital, cognitive, and interpersonal areas, this study aims to contribute valuable insights that can help bridge existing service delivery gaps and support Kenya's healthcare system in delivering high-quality services to meet the needs of its growing population.

In addition to workforce shortages, Kenya's healthcare facilities face significant technological challenges that affect service delivery. Studies, such as those by Muinga et al. (2020), have highlighted issues related to system reliability, user training, and maintenance of digital systems in healthcare facilities. Although systems like EHRs have been introduced, their impact is limited by inadequate post-implementation support and inconsistent funding for ongoing technological upgrades. This technological gap underscores the need for robust training programs that equip laboratory personnel with the skills necessary to effectively use new technologies and improve service delivery.

The research will contribute valuable insights into the training needs of Kenyan medical laboratories and propose actionable recommendations to enhance the skills of laboratory personnel, ultimately improving service delivery and supporting the achievement of national healthcare goals.

1.2 Statement of the Problem

High-quality laboratory services are critical to achieving Kenya's national healthcare goals, particularly in terms of diagnostic accuracy, patient care, and overall health outcomes. Laboratory service quality is a key determinant in ensuring accurate diagnoses, timely interventions, and effective treatment plans, making the competence of laboratory practitioners a central factor in healthcare delivery. Despite the importance of quality laboratory services, Kenya continues to face challenges, including diagnostic errors that have resulted in patient harm and, in some cases, loss of life (Kasprowicz et al., 2020; Ministry of Health [MOH], 2022). These issues persist even in accredited hospitals, where accreditation systems intended to reduce diagnostic errors have not entirely eradicated them. Concerns about diagnostic errors and other malpractices in laboratories are frequently raised by the public, with recurring complaints about service delivery quality and practitioner competency (Allen, 2023). While these challenges are critical, they are compounded by issues that are specific to the medical laboratory context, which is the focus of this study.

Kenya's healthcare system faces significant workforce shortages that directly impact service delivery. According to the Oral and Dental Health Division of the MOH, there is a considerable gap in the number of trained professionals in the public sector. For instance, the country currently has only 100 oral health specialists and 339 dental officers, far below the required numbers of 1,340 and 7,400, respectively (MOH, 2021). However, it is the shortage of laboratory technologists, specifically, that affects the efficiency and effectiveness of medical laboratory services. The Medical Laboratory Division has set a target to fill the gap of 3,196 laboratory technologists by 2030, but the workforce remains

under-resourced, with only 2,067 trained professionals available (MOH, 2021). This shortage creates an environment where undertrained and overworked laboratory personnel are more prone to errors, directly impacting patient outcomes.

The impact of errors in medical laboratories is well-documented in Kenya. A study by Arthy et al. (2021) found that pre-analytical errors, such as specimen handling and labeling mistakes, account for 42.8% of all laboratory errors. Analytical errors make up 32.9%, and post-analytical errors comprise 24.3%. These errors often lead to delayed test results, misdiagnoses, unnecessary medical interventions, repeated testing, and increased patient visits. Errors of this nature are not only costly but also pose a serious risk to patient safety, contributing to adverse outcomes such as prolonged treatments, additional medical procedures, disability, and even death. Moreover, a significant proportion of laboratory reports are delayed or undelivered due to missing information, such as ward or clinic details, which further hinders efficient service delivery (Arthy et al., 2021). These delays and errors highlight the urgent need for interventions to address these systemic issues within Kenya's medical laboratories.

Although various studies have explored the challenges faced by Kenya’s medical laboratories, few have examined the role of training in enhancing service delivery and reducing diagnostic errors. For instance, while Arthy et al. (2021) investigated the causes of errors in laboratory services, they did not explore how targeted training programs for laboratory personnel could reduce such errors. Similarly, Wilson et al. (2018) assessed the quality of laboratory services in Kenya but did not address how different types of training could mitigate service delivery challenges within the laboratory sector. This lack of

research on the impact of training represents a significant gap in understanding how to improve service quality through practitioner development.

This study seeks to fill this gap by examining the impact of various types of training—technical, digital, cognitive, and soft skills training—on service delivery in Kenyan medical laboratories. The findings of this study will provide critical insights that can guide the development of targeted training programs to address competency gaps and improve the overall quality of laboratory services. By addressing training deficiencies, this research aims to contribute to the delivery of safer, more reliable, and more effective laboratory services across the country, thereby enhancing patient care and supporting national healthcare objectives.

In conclusion, while Kenya's medical laboratories face several challenges, this study focuses on the critical role that training can play in addressing these challenges. Specifically, it will explore how targeted training can directly improve the performance of laboratory personnel, reduce errors, and enhance service delivery, ultimately leading to better healthcare outcomes.

1.3 Objectives of the study

1.3.1 General objective of the study

To establish the effect of training on service delivery in the selected medical laboratories.

1.3.2 Specific objectives

i. To examine the effect of technical training on service delivery in the selected medical laboratories.
ii. To assess the effect of soft skills training on service delivery in the selected medical laboratories.
iii. To analyze the effect of digital skills training on service delivery in the selected medical laboratories.
iv. To evaluate the effect of cognitive skills training on service delivery in the selected medical laboratories.

1.4 Research Questions

i. What is the effect of technical training on service delivery in the selected medical laboratories?
ii. How does soft skills training influence service delivery in the selected medical laboratories?
iii. What is the impact of digital skills training on service delivery in the selected medical laboratories?
iv. To what extent does cognitive skills training affect service delivery in the selected medical laboratories?

1.5 Significance of the study

1.5.1 Policy Makers

This study is essential for policymakers in the health sector, particularly those focused on enhancing public healthcare quality. By examining the effects of training on service delivery in Kenyan medical laboratories, the study offers valuable insights into practical challenges faced by laboratory professionals that may be beyond managerial control. Equipped with these insights, the Ministry of Health will be better positioned to assess and address specific training needs within laboratory settings, guiding the formulation or revision of policies that support enhanced service delivery across the public health sector.

1.5.2 Laboratory Management

As the study explores how skill development and competence elevate professionalism in laboratory settings, the findings will aid laboratory management teams across Kenya in identifying and addressing current gaps in workforce capabilities. Recommendations from the study will provide actionable guidance for improving training practices, which can be disseminated through all management levels and extended to technical staff. Ultimately, the study's insights will support efforts to uphold and enhance service standards in medical laboratories, reinforcing a culture of continuous learning and competence.

1.5.3 Academicians and Scholars

This study contributes to the academic body of knowledge on public healthcare and service delivery within the Kenyan context, serving as a reference for future research. By

identifying existing gaps and providing data-driven insights, the study opens new avenues for scholarly exploration and improvement within the field. Future researchers and academicians may build upon these findings to further examine the impact of training in public health services, thereby enhancing the depth and scope of literature on effective service delivery in medical laboratories.

1.6 Scope of the Study

This study aims to assess the effects of training on service delivery within selected medical laboratories. Employing a descriptive cross-sectional design, the research will investigate how various training components influence service outcomes in laboratory settings. The target population for this study comprises 4,053 laboratory practitioners across 18 accredited medical laboratories in Nairobi County. A combination of simple random sampling and convenience sampling will be used to select a representative sample from this population, ensuring that participants reflect the diversity within the laboratories. The study is scheduled to be conducted in 2024, providing timely insights into current training practices and their impact on healthcare service delivery in Nairobi's laboratory sector.

1.7 Limitations to the study

The study anticipates potential challenges in obtaining sensitive data due to confidentiality policies within medical laboratories. Both private and government-affiliated laboratories may face strict policy constraints that limit the sharing of specific information. To mitigate these challenges, the study will present an official introduction letter from the university, along with an authorization letter from the National Council for

Science, Technology, and Innovation (NACOSTI). These documents are intended to build trust with the participating organizations and assure them of the study's legitimacy and adherence to ethical standards, thereby encouraging cooperation and data disclosure necessary for the research.

1.8 Assumptions of the study

This study assumes that the required permissions to collect data from relevant organizations will be granted and that participants will be cooperative and willing to provide accurate information. It is also presumed that there will be adequate resources, such as time and financial support, to conduct the research effectively. Furthermore, the study assumes that the responses gathered through the questionnaires will be honest and reflective of the participants' true perspectives, enabling generalization to the broader population of medical laboratory professionals in Kenya.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section explains the research writings which the research builds from in order to defend the research project. This is accomplished through an evaluation of the theoretical literature and methodologies that demonstrate how numerous scholars have explored the impact of professional development on service provision in chosen medical labs in Kenya and other environments. Empirical experiments are often analyzed in order to determine the weaknesses that the research would aim to address. Finally, a methodological structure is built based on a study of current studies.

2.2 Theoretical Review

The study is grounded on the Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM) and the Social Learning Theory.

2.2.1 Theory of Reasoned Action (TRA)

The Theory of Reasoned Action (TRA), developed by Ajzen and Fishbein (1980), posits that an individual's behavior is primarily determined by their intention to perform that behavior, which is in turn influenced by their attitude toward the behavior and their perception of social norms. TRA is built on three key principles: behavioral intention, attitude, and subjective norms. Behavioral intention reflects an individual's motivation or desire to engage in a specific behavior, shaped by both their attitude toward the behavior

and perceived social expectations (Ajzen & Fishbein, 1980). Attitude refers to the individual's beliefs and evaluations about performing the behavior, encompassing their positive or negative judgments of the action's outcomes. Subjective norms, meanwhile, involve the perceived social pressures or expectations from others that may influence the individual's decision to engage in the behavior (Ajzen, 1980).

TRA operates under the premise that if an individual has a favorable attitude toward a behavior and perceives significant social support for performing it, they are more likely to form a strong intention to carry out that behavior. However, TRA is also recognized as a general framework that does not prescribe specific beliefs for a given behavior. Instead, it suggests identifying salient beliefs relevant to the specific population being studied, which can be derived from a representative sample (Ajzen & Fishbein, 1980). For example, Fredricks and Dossett (1983) utilized TRA to predict technology adoption behaviors by assessing user attitudes and the expectations of others in relation to new technologies, effectively illustrating TRA's application in behavior prediction.

In the context of this study, TRA is instrumental in understanding employees' intentions toward participating in training programs in medical laboratories. It helps to predict how employees' attitudes toward different types of training (technical, soft skills, digital skills, and cognitive skills) and perceived organizational norms may influence their motivation to engage in such development activities. By examining these intentions, TRA aids in exploring how these attitudes and subjective norms drive service delivery improvements. Thus, TRA provides a theoretical foundation to examine the factors influencing employees' acceptance and motivation for training, potentially leading to enhanced service delivery in healthcare laboratories.

2.2.2 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), introduced by Fred Davis in 1986, is designed specifically to explain users' acceptance of information systems and technologies. Rooted in the Theory of Reasoned Action by Fishbein and Ajzen (1975), TAM provides a framework to understand the factors influencing technology acceptance. According to Davis (1989), TAM has two primary constructs that determine user acceptance: Perceived Usefulness (PU) and Perceived Ease of Use (PEU). Perceived Usefulness refers to the degree to which individuals believe that using a specific technology will enhance their job performance, while Perceived Ease of Use refers to the extent to which they believe the technology will be effortless to use. These constructs reflect the subjective perceptions of users, which in turn influence their attitudes toward the technology, their behavioral intentions, and, ultimately, their actual usage (Davis, 1989).

TAM has evolved and been widely applied to examine user acceptance of various technologies. Venkatesh and Davis (2000) extended TAM by incorporating the influence of social factors and subjective norms on technology adoption, acknowledging that individuals' perceptions are shaped not only by the system's features but also by the influence of peers and organizational culture. This is particularly relevant in contexts where technology is central to workplace functions, as social influences can either support or inhibit the perceived ease and utility of the system, ultimately affecting adoption (Venkatesh & Davis, 2000). Additionally, Lee, Kozan, and Larsen (2003) emphasized TAM's importance in understanding long-term issues in technology

acceptance, reinforcing the model's applicability across a variety of organizational contexts.

In the context of this study, TAM provides insight into the factors that might influence employee acceptance of training in digital and soft skills within Kenyan medical laboratories. The model helps explain how employees' perceptions of the training's usefulness and ease of adoption impact their willingness to engage with and utilize the new skills. Specifically, if employees perceive digital and soft skills training as beneficial to improving their service delivery (high PU) and as easy to incorporate into their daily routines (high PEU), they are more likely to adopt these skills. This, in turn, aligns with the study's objective of assessing how training in various skills affects service delivery outcomes in medical laboratories. As proposed by Surendran (2012), TAM underscores that behavioral intentions are shaped by attitudes toward the system and the surrounding social norms, which in this case, relate to the organizational culture and peer expectations within healthcare settings.

2.2.3 Social Learning Theory

Social Learning Theory (SLT), developed by Albert Bandura in 1971, emphasizes that individuals acquire new behaviors by observing others rather than solely through direct experience. Unlike earlier theories focused on inner drives and unconscious motivations, Bandura (1971) proposed that behavior can be learned through environmental interactions and observational learning, where stimuli and responses play crucial roles. SLT suggests that behavior is shaped by observing and modeling others, particularly when reinforced by internal and external factors. Bandura and Walters (1963) highlighted

that behavior and cognition are intertwined, providing a robust framework for understanding how individuals acquire knowledge and behaviors through social contexts. Bandura (1988) later elaborated those internal factors, such as self-efficacy and cognitive processes, often moderate behavior more than external factors.

A key element of SLT is that people influence and are influenced by their environment, making this theory applicable to social and behavior change programs (Gerbner, 1973; Bandura, 1971). Observational learning is especially relevant when traditional reinforcement methods cannot address all learning needs, as certain social experiences are unavailable through direct instruction alone. Zhou and Brown (2015) argued that organizational climate plays an important role in learning; a professional atmosphere fosters learning through social interactions. SLT also suggests that learning does not necessarily result in immediate behavioral changes, as personal motivation and psychological states significantly impact engagement and learning outcomes. For instance, a positive mental state is crucial for successful learning in corporate training programs, where employees are inspired by rewards and positive interactions with colleagues and managers (Kay & Kibble, 2016).

In this study, SLT is pertinent in understanding how employees in medical laboratories learn soft skills, technical skills, and behavioral norms by observing supervisors and colleagues, as the theory posits that collaborative learning and professional modeling shape workplace behavior. Encouraging employees to support each other fosters an environment for constructive learning and reflection (Keen, Brown, & Dyball, 2005). By emphasizing observation, modeling, and the influence of mental

states, SLT provides insight into how training and development can improve service delivery in medical laboratories (Mosharafa & Mosharafa, 2015).

2.3 Empirical Literature

This section is important because it describes how the current study compares to previous researches. This shows the nature and importance of the study problem and, specifically, how this research differs from other surveys. This illustrates the methodology proposed and demonstrates the commitment to carry out the analysis. The literature review is an essential analysis and interpretation of the statistical analyses of general and specialized importance in the field and subject of the study problem (Long, 2014).

2.3.1 Technical skills Training and Service Delivery

Habon, Enriquez, Dinglasan, Habon, Punzalan, and Pulhin (2019) conducted a study to evaluate the impact of training and development programs on employee performance and productivity within quick-service restaurants. Using a descriptive research method, the study surveyed 195 employees from Jollibee and McDonald's branches in Batangas City, Philippines. The data analysis involved statistical tools such as percentages, frequency distribution, weighted mean, and analysis of variance. The majority of respondents were young (18-29 years old), male, and had worked for 1-3 years, primarily at Jollibee. Findings revealed that employees perceived the training and development programs to be extensive, which they felt significantly enhanced their ability to perform job roles and increased productivity. Additionally, no significant differences were found across respondents' demographic profiles, suggesting consistent effectiveness of the training programs. The study proposed an action plan to further enhance training and

development efforts within quick-service restaurants to maintain and improve employee productivity. This highlights the positive role that training can have on employee performance and indirectly suggests the importance of similar training initiatives in medical laboratories.

Tanui and Kwasira (2019) conducted a study to examine the influence of staff training on service delivery at Moi Teaching and Referral Hospital (MTRH) in Kenya. Using a descriptive research design, they targeted a population of 120 employees and collected data through structured questionnaires. The study's objective was underpinned by Cognitive Theory, which emphasizes the role of mental processes in learning and behavior. The data analysis employed both descriptive statistics (such as mean and standard deviation) and inferential statistics, including multiple regression and Pearson correlation analysis, facilitated by SPSS version 24. Findings indicated that staff training had a significant positive impact on service delivery ($\beta 4=0.138$, $p=0.018<0.05$), with specific improvements noted in record management and service quality. The study concluded that well-structured training, including induction programs and employee motivation, enhances operational efficiency and service outcomes at MTRH, highlighting the importance of skills and expertise in public sector service provision. This study's findings are directly applicable to Kenyan medical laboratories, where similar training interventions could enhance service delivery outcomes by improving technical competencies.

Wabomba (2019) conducted a study to assess the impact of in-service training on service delivery in public hospitals in Bungoma County, Kenya. The research employed a correlational research design, with a target population of nurses in public hospitals. A sample of 196 nurses was selected using stratified proportionate random sampling, and

data collection was performed through questionnaires. Validity was ensured through a pilot study at Matete Health Centre in Kakamega County, while reliability was confirmed with a Cronbach's alpha score of 0.7. Data were analyzed using SPSS version 21, applying descriptive statistics (measures of central tendency and dispersion) and inferential statistics (Pearson's correlation and T-test). Findings indicated that in-service training positively affected nurses' productivity, enhancing service delivery through timely patient treatment, increased patient turnover, and minimized patient complaints. This study highlighted that effective training programs improve essential skills and foster motivation, directly influencing healthcare quality and patient satisfaction in public hospitals. By drawing parallels to medical laboratories, this study suggests that effective training can similarly address issues in laboratory service delivery, improving the quality and efficiency of diagnostic services.

Adebola (2020) conducted a study to investigate the relationship between in-service vocational training and service delivery among teachers of technical colleges in Ekiti State, Nigeria. Using a descriptive survey design, the study targeted a population of 1,791 teachers and selected a sample of 601 teachers from three technical colleges through a multistage sampling procedure. Data were collected using two self-designed instruments: the In-service Vocational Training Questionnaire (IVTQ) and the Service Delivery Questionnaire (SDQ), both validated by experts in Test and Measurements and yielding reliability coefficients of 0.781 and 0.71, respectively, via Cronbach's Alpha. Analysis was conducted using Pearson's Product Moment Correlation at a 0.05 significance level. Findings indicated a positive relationship between technical workshops, collaborative activities, and teacher service delivery, while higher education programs showed no

significant relationship with service delivery. The study recommended increased government funding for technical workshops to enhance teachers' technical skills, thereby improving service quality in technical colleges. This study underscores the importance of targeted technical training, which could similarly enhance the competencies of laboratory personnel in Kenya, ultimately improving service delivery in medical laboratories.

Mutegi, Nzioki, and King'oriah (2021) conducted a study to examine the role of employee training in enhancing public service delivery (PSD) at Huduma centres in Kenya, with a focus on the mediating effect of government policies. The study was based on the SERVQUAL model, human capital theory, and the new public management model. Using a descriptive research design, the study targeted branch managers, section supervisors, and public customers across all 521 Huduma centres. A sample of 461 branch managers and 314 section supervisors was selected through simple random sampling, while 360 public customers were chosen through purposive sampling. Primary data was gathered via self-administered questionnaires, with validity and reliability established through a pilot study and Cronbach's alpha. Descriptive and inferential analyses, including correlation and multiple regression, were applied. Results revealed a positive but low linear association between employee training and PSD, with government policies moderately enhancing this relationship. The study recommends policy reevaluation and standardized human resource practices in public organizations to improve PSD. While this study's focus is on general public service delivery, it supports the notion that employee training can positively affect service delivery outcomes, including those in medical laboratories.

Nama, Daweti, Lourens, and Chikukwa (2022) conducted a study to explore the impact of training and development on employee performance and service delivery at a

local municipality in South Africa. Adopting a cross-sectional research design, they surveyed a target population of 2,651 municipal employees, with a stratified random sample of 1,151 respondents who completed questionnaires. The participants held diverse roles, including general managers, assistants, and administrators, representing varied levels of experience. Data analysis employed quantitative methods, including correlation (r) and Chi-square (χ^2) tests, to evaluate the hypotheses. Results indicated that training and development had a positive effect on employee performance, with a particularly strong impact from coaching and mentoring. The findings underscored that trained employees were more likely to improve service delivery, though the municipality lacked adequate training programs. The study concluded by recommending that the municipality invest in relevant training to equip employees with essential skills for better service provision. This study further reinforces the importance of investing in employee training to enhance service delivery, an insight that is directly relevant to improving service outcomes in Kenyan medical laboratories.

2.3.2 Soft Skills Training and Service Delivery

Ibrahim, Boerhannoeddin, and Bakare (2017) conducted a study to assess the impact of soft skills acquisition and training methodology on employee performance in Malaysian private companies. Using a quantitative approach, they surveyed 260 managers, executives, and supervisors from a target population of 810 employees across nine companies, selected with a 95% confidence level and a 0.05 margin of error. The study aimed to shift the focus of training from technical skills to soft skills, which the authors argued have a more enduring impact on performance. Data were collected via questionnaires designed to evaluate the soft skills competencies of participants who

underwent spaced training programs. Regression analysis revealed that both soft skill acquisition and training methodology significantly enhanced employee performance, with "time-spaced learning" identified as particularly effective in facilitating skill transfer. The study recommended that employers incorporate intermittent breaks in training to allow employees to apply and internalize new skills, which can enhance performance and foster positive workplace behavior. This suggests that in environments such as medical laboratories, where interpersonal skills like communication and adaptability are essential, soft skills training could significantly improve service delivery and reduce errors.

Deshpande and Munshi (2022) conducted a study examining the impact of soft skills training on employee knowledge and work performance within service organizations. Using Kirkpatrick's model of training evaluation, they assessed whether soft skills training enhanced knowledge and affected work performance dimensions for employees in the service sector. Findings indicated that soft skills training significantly improved employee knowledge and positively influenced work performance. The study provided valuable insights into effective pedagogical tools and training models for soft skills development, emphasizing the role of structured training in promoting service sector effectiveness. These results suggest that training programs aimed at developing soft skills in laboratory personnel could enhance their interpersonal and cognitive abilities, which are crucial for improving interactions with patients and colleagues, thereby elevating overall laboratory service delivery.

Emmanuvel and Kumar (2022) conducted a study assessing the impact of soft skills training on MBA students' job readiness in and around the Tiruchirappalli district. The study focused on areas such as communication, behavior, interview techniques, case study

analysis, body language, and presentation skills. Using a structured questionnaire, data were collected from 491 students, and the analysis involved correlation and ANOVA tests. Results indicated that soft skills training significantly boosted students' self-confidence during interviews and improved their job selection process by aligning their skills with suitable opportunities. Furthermore, employers found it easier to identify suitable candidates, enhancing the overall recruitment process. The study concluded that the training positively influenced job satisfaction for candidates as they transitioned into their roles, underscoring the value of targeted soft skills training in enhancing employability and job alignment for MBA graduates. This study highlights how soft skills training, particularly in communication and interpersonal skills, can enhance the effectiveness of professionals, including laboratory staff, in dealing with patients and colleagues, which is vital for improving service delivery in healthcare settings.

Ubfal, Arraiz, Beuermann, Frese, Maffioli, and Verch (2022) conducted a study to evaluate the impact of soft-skills training on entrepreneurs' business outcomes in Jamaica. Using a randomized controlled trial, 945 entrepreneurs were assigned to one of two training programs: one focusing solely on soft skills related to personal initiative and resilience, and the other combining soft skills with traditional hard skills training or a control group. Data were collected through a baseline survey and two follow-up surveys, conducted 3 and 12 months post-intervention. The study found that intensive soft-skills training significantly improved business outcomes in the short term, primarily by increasing the adoption of effective business practices, especially among male participants. However, the combined soft and hard skills training did not yield statistically significant effects. Although the positive impact on business practices did not persist at the 12-month follow-

up, the soft-skills training had lasting effects on the entrepreneurs' self-reported soft skills. This suggests that soft skills training, particularly in areas like resilience and initiative, could have a long-lasting effect on the interpersonal effectiveness of laboratory personnel, which in turn could improve service delivery and reduce operational inefficiencies in medical laboratories.

Colaco (2024) conducted a study to explore the impact of soft skills training on guest satisfaction in the hospitality industry. Recognizing the industry's fast-paced environment, the research emphasized that while technical (hard) skills remain vital for operational tasks, soft skills are equally critical. These skills, such as adaptability, communication, empathy, and emotional control, enable hospitality staff to manage stressful situations, maintain a positive attitude, and better understand guest needs. The study found that soft skills training significantly contributed to improving guest satisfaction by enhancing staff interactions with guests, fostering a more attentive and responsive service approach. The research highlights that developing soft skills is essential for cultivating a positive guest experience, as these skills help employees address guest issues effectively, thus raising overall satisfaction levels in the hospitality setting. This aligns with the needs of medical laboratory personnel, where soft skills like empathy, adaptability, and effective communication are crucial in delivering a positive experience for patients and healthcare providers.

Islam and Mostafiz (2024) conducted a study on the impact of soft skills training on the development of rural women in Bangladesh, focusing on business performance and personal growth. Using a mixed-method approach, the study employed both structured and semi-structured questionnaires with open-ended questions, combining exploratory and

descriptive research techniques. Findings revealed that soft skills training significantly improved the business performance of rural female entrepreneurs and enhanced their daily life activities. Key areas of improvement included communication, leadership, problem-solving, decision-making, and self-motivation. The study emphasized the importance of integrating soft skills training into programs aimed at supporting rural women's economic progress, recommending that policymakers, NGOs, and private sectors prioritize this integration to bridge skill gaps. This study suggests that soft skills training can be transformative not only for entrepreneurship but also for personal and professional development. It highlights the potential for soft skills training to enhance the personal competencies of laboratory staff, leading to better patient interactions and improved service delivery in medical laboratories.

2.3.3 Digital Skills training and Service Delivery

Slovensky, Malvey, and Neigel (2017) presented a model for mHealth skills training aimed at clinicians, addressing the growing demand for technology proficiency in healthcare due to the rise of telemedicine and mobile phone ubiquity. The study highlighted existing gaps in clinical training programs concerning digital skills and proposed a comprehensive framework for mHealth training. The model comprises five essential domains: digital communication skills, technology literacy and usage, telehealth product deployment, regulatory compliance, and the telehealth business case. This framework supports the development of targeted training programs that equip clinicians with the necessary skills for efficient telehealth delivery within interprofessional teams and organizational settings. The authors advocate for curriculum enhancements to incorporate these domains, preparing clinicians to meet future healthcare delivery needs and improving

patient outcomes through effective use of telehealth technologies. This model suggests that similar frameworks could be adopted to enhance digital skills in medical laboratories, enabling staff to effectively integrate digital tools into service delivery, thereby improving efficiency and accuracy in diagnostics.

Mittal (2020) examined the impact of digital capabilities and technology skills on government effectiveness in public service delivery, presented at the 2020 International Conference on Data Analytics for Business and Industry. The study analyzed the integration of digital tools, data capabilities, and technology innovations, including artificial intelligence (AI) start-ups, in enhancing public sector efficiency. Using the Government's Artificial Intelligence Readiness Index score for 100 countries from Oxford Insights and IDRC, the study investigated how digital tools and data-driven capabilities contribute to modernizing government services in response to evolving citizen and business expectations. Findings indicated that advanced digital public services, robust data capabilities, and continuous innovation significantly improve government service delivery. The research underscores the need for governments to strategically incorporate digital skills and tools to align public services with digital economies, enhancing collaboration with citizens and businesses, and ultimately achieving more effective digital transformation. These findings highlight the importance of integrating digital skills into service sectors such as healthcare, where digital technologies can enhance the efficiency and accessibility of medical laboratory services.

Barke (2021) assessed the gap in advanced digital skills in Kenya, utilizing the design-reality gap framework to explore misalignments between ICT training in higher education institutions and industry demands. This doctoral study employed an archival

research strategy, analyzing dimensions such as student enrollment, curriculum, faculty, and resources across Kenyan institutions offering ICT programs. Findings indicated that low enrollment in ICT courses and curriculum mismatches have resulted in a workforce underprepared for the digital demands of the modern workplace. Despite existing standards from regulatory bodies, enforcement is weak, further contributing to a digital skills gap that forces Kenya to rely on foreign expertise. The study proposed an implementation strategy to bridge this gap, involving collaboration among government agencies, educators, and employers. The study highlights the urgent need for policies and training alignment to empower a digitally skilled workforce capable of advancing Kenya's economic growth and digital transformation goals. The implications for the medical laboratory sector in Kenya are clear: aligning digital skills training with industry demands is essential to preparing laboratory personnel for the increasingly digital healthcare environment.

Hakim, Laelawati, and Mardiana (2022) conducted a systematic literature review to examine the impact of digital skills, technological innovation, and entrepreneurial orientation on the performance of small and medium industries. In the context of increased market competition and challenges posed by the COVID-19 pandemic, this study sought to identify critical variables that enable small and medium industries to compete effectively and improve performance. The review analyzed findings from 301 journals, divided equally across the variables of digital skills, technological innovation, and entrepreneurial orientation. Results highlighted digital skills and technological innovation as significant contributors to industrial performance, influencing a company's ability to adapt, innovate, and maintain competitiveness. The study's findings offer valuable insights for business managers and policymakers, suggesting that enhancing digital skills and fostering

innovation are essential strategies for improving performance and resilience in small and medium-sized enterprises. These insights are directly applicable to the medical laboratory sector, where the integration of digital skills is critical for maintaining competitiveness, improving operational efficiency, and enhancing service delivery.

Lopes, Sargento, and Farto (2023) explored digital skills training needs among Portuguese public sector workers to support digital transformation efforts. The study, based on Human Capital Theory, aimed to link perceived digital literacy levels with training needs and identify demographic and professional factors influencing training propensity. Data from 573 public sector workers were collected via an online questionnaire and analyzed using probabilistic regression models. Findings showed that workers with higher education and advanced professional skills were more likely to engage in digital skills training. Despite a low average digital knowledge score of 2.71 (on a 1-5 scale) and minimal training participation (72% had no recent training), there was strong interest in future training, particularly in areas like data management, cybersecurity, and communication systems. The study highlights the importance of targeted digital skills training for public sector readiness in digital transformation, offering insights that can extend to other sectors. This study underscores the importance of digital skills training for professionals in all sectors, including medical laboratories, where digital literacy is essential for modern diagnostic practices and enhancing service delivery.

2.3.4 Cognitive skills training and Service Delivery

Turi, Sorooshian, and Javed (2019) examined the impact of cognitive learning factors on sustainable organizational development, focusing on universities as learning

organizations. Using a cross-sectional quantitative approach, they surveyed 137 faculty members from 221 universities in Pakistan via convenient sampling. Data analysis was conducted using SPSS to assess the influence of cognitive factors such as attention, leadership, culture, structure, empowerment, knowledge workers, and decision-making on organizational learning and development. Results indicated that cognitive factors significantly contribute to organizational development, with knowledge workers and empowerment being particularly impactful. The study emphasized the role of cognitive processes in fostering sustainable growth in educational institutions and recommended exploring additional cognitive and contextual elements to further enhance organizational learning and development. These insights underline the value of cognitive factors in improving organizational performance and suggest that similar cognitive training could enhance the decision-making and problem-solving abilities of laboratory personnel, thereby improving service delivery in medical laboratories.

Kabiri, Shokri, and Pourshahriar (2019) investigated the impact of cognitive social skills training on students' positive relationships and adjustment levels. The study employed a quasi-experimental design with pretest-posttest and a nonequivalent control group, involving 581 eighth-grade female students selected from a population of 1481 through convenience sampling. The participants were divided into an experimental group, which received cognitive social skills training over 10 weeks (21 hours per week), and a control group. Assessments were conducted before and after the intervention, with a follow-up two months later. Analysis via univariate and multivariate covariance revealed that cognitive social skills training significantly improved both students' adjustment and positive relationship levels in the post-test and follow-up stages ($P<0.05$). Findings

demonstrated the training's sustained impact on cognitive restructuring, reduction of cognitive impairment, and enhancement of interpersonal skills, indicating its effectiveness in improving social and cognitive skills among adolescents. These results suggest that cognitive training, especially in areas such as interpersonal skills and emotional regulation, could be highly beneficial for laboratory staff, improving their ability to interact effectively with colleagues and patients, which in turn would enhance service delivery.

Sadeghi, Zainali, and Foroughi (2019) investigated the impact of cognitive skills training on cognitive performance in children with learning disabilities. This quasi-experimental study involved 301 third-grade students from primary schools in Rasht, Iran, who were randomly assigned to either an experimental group receiving cognitive skills training or a control group with no intervention. The training program consisted of 14 sessions, each lasting 45 minutes, utilizing the Wisconsin Revised Scale for Children and the Student Wisconsin Test to assess outcomes. Results indicated significant improvement in cognitive abilities and overall performance in the experimental group ($p < 0.01$). The study emphasizes the value of cognitive and metacognitive training strategies in enhancing learning outcomes for children with learning disabilities and recommends incorporating such training across educational stages to align with students' cognitive development levels. The findings highlight the importance of tailored cognitive skills training programs, which could be adapted for medical laboratory personnel to enhance their cognitive performance, problem-solving, and critical thinking skills, leading to more accurate diagnoses and improved service delivery.

Fu, Kessels, and Maes (2020) examined the effects of cognitive training on working memory (WM) in older adults, focusing on the Compensation-Related Utilization of

Neural Circuits Hypothesis (CRUNCH). This study evaluated how initial cognitive ability influenced training outcomes, comparing high and low-functioning participants through repeated WM tasks. Results indicated that high-functioning older adults showed consistent performance improvements across all tasks, aligning with the magnification hypothesis. In contrast, low-functioning participants struggled, with some failing to progress or dropping out. The findings suggest that cognitive training outcomes in older adults are influenced by individual cognitive capacity, highlighting the need for careful assessment and ongoing performance monitoring. These insights into cognitive training outcomes based on individual capacity can inform the design of cognitive skills training for medical laboratory staff, ensuring that training is personalized and adapted to the needs of individual employees, thereby improving service delivery effectiveness.

Kim and Lee (2021) explored the impact of a game-based cognitive training program, Neuro-World, on cognitive learning in children with intellectual disabilities. Recognizing the importance of motivation and engagement in training programs for this population, the study compared the effectiveness of Neuro-World against conventional cognitive training methods. Professional therapists implemented both programs, with participants undergoing pre-test and post-test assessments. Results revealed that the game-based approach significantly outperformed the conventional program, showing superior improvements in cognitive learning abilities. This study highlights the effectiveness of digital, game-based interventions in enhancing motivation and cognitive development, suggesting that such interactive tools may be beneficial for sustained cognitive improvement in children with intellectual disabilities. This approach offers valuable insights for medical laboratory training programs, suggesting that incorporating gamified

cognitive training methods could enhance motivation and engagement, leading to improved cognitive skills and better service delivery in medical laboratories.

Stanford (2022) conducted a causal-comparative study to assess the effectiveness of the LiftOff cognitive training program on cognitive skills in children ages 5 to 7. Using pre-test and post-test data from the Woodcock-Johnson III Tests of Cognitive Abilities and subtests from the Woodcock-Johnson III Tests of Achievement, the study evaluated 1,067 children who completed the LiftOff program through LearningRx from 2010 to 2019. Results revealed significant improvements in cognitive skills, particularly in auditory processing, with statistically significant differences between pre- and post-tests for working memory, processing speed, visual processing, auditory processing, and logic and reasoning, showing medium to very large effect sizes. Notably, age significantly influenced scores for logic and reasoning. The study concludes that the LiftOff program effectively enhances cognitive abilities in early childhood, with auditory processing and processing speed showing the largest improvements. This study suggests that early cognitive training can have lasting effects, which could be applied to enhance the cognitive abilities of medical laboratory personnel, improving their diagnostic accuracy, processing speed, and overall service delivery.

Jacob and Reddy (2024) investigated the effects of Adolescent Social Cognitive Skills Training (A-SCST) on eudaimonic well-being (EWB), focusing on its contribution to adolescents' mental health by fostering purpose and meaning. Using a quasi-experimental design, they assessed the impact of A-SCST on 741 adolescent participants. The PWB-181 scale was used for initial screening, and the PWB-421 scale measured outcomes. The training covered three core social cognitive domains: cognitive Theory of

Mind (ToM), affective ToM, and interpersonal understanding of social norms. Results revealed a significant positive effect on EWB in the experimental group, showing a large effect size ($t = -13.0$, $df = 35$, $p < .001$, $r = -2.17$). The findings underscore A-SCST's potential to enhance adolescents' eudaimonic well-being, supporting its effectiveness as an intervention for promoting meaningful social and emotional development in adolescence. The positive impact of A-SCST on mental and social well-being suggests that similar cognitive training programs for medical laboratory staff could enhance their emotional intelligence, interpersonal skills, and overall effectiveness in patient care, thereby improving service delivery.

2.4 Research Gaps

Despite extensive research on the impact of training on employee performance and service delivery across different sectors, several gaps remain, particularly within the context of medical laboratories in Kenya. While numerous studies focus on technical and vocational training across various industries, there is limited empirical evidence addressing how specific types of training such as technical, soft, digital, and cognitive skills collectively influence service delivery within healthcare laboratory settings. For instance, studies by Habon et al. (2019) and Adebola (2020) examine the effects of training in the fast-food and education sectors, respectively. However, these studies do not address the healthcare sector, leaving a gap in understanding how targeted training within medical laboratories affects service delivery in healthcare contexts. This study aims to fill this gap by examining how training in these specific areas influences the performance of medical laboratory personnel and the overall quality of service delivery in Kenya's medical laboratories.

Furthermore, studies by Tanui and Kwasira (2019) and Wabomba (2019) emphasize the influence of training on service delivery in hospital settings, but they focus broadly on nursing and general hospital services. These studies overlook the unique operational environment of medical laboratories. This study seeks to address this gap by focusing on laboratory-specific training, exploring how training tailored to the unique challenges of laboratory operations impacts service delivery in the medical laboratory sector.

Regarding soft skills training, studies like those by Ibrahim et al. (2017) and Deshpande and Munshi (2022) have demonstrated positive impacts on performance, particularly in enhancing interpersonal and communication abilities within service-oriented sectors. However, there is a lack of studies examining the impact of soft skills on healthcare laboratory personnel, who require both technical and interpersonal competencies to manage patient interactions effectively. This study will explore how soft skills training, specifically tailored for medical laboratory settings, contributes to improved patient satisfaction and operational efficiency.

Similarly, while digital skills are recognized as essential for modern service delivery, studies such as those by Slovensky et al. (2017) and Mittal (2020) focus on digital skills training for clinicians or public service sectors but do not address technological advancements specific to medical laboratories. Barke's (2021) study highlights a general digital skills gap in Kenya, yet it does not focus on laboratory-specific digital skills, such as proficiency in lab information systems or digital diagnostic tools, which are critical for efficient laboratory operations. This study aims to address this gap by examining the impact of digital skills training on service delivery in medical laboratories, where digital

proficiency is increasingly essential for optimizing diagnostic processes and laboratory management.

Cognitive skills training has primarily been explored in educational or developmental contexts, as seen in studies by Turi et al. (2019) and Kim and Lee (2021), which focus on cognitive development in children or students. While cognitive training can enhance problem-solving and critical thinking, there is limited research on its application among healthcare professionals, particularly laboratory personnel who require high-level cognitive abilities for accurate diagnostics and decision-making. This study will explore the effect of cognitive skills training on service delivery in medical laboratories, addressing the gap in understanding how such training can support analytical and problem-solving capacities, ultimately improving the accuracy of diagnostics and decision-making in laboratory settings.

In conclusion, while the literature review provides a broad understanding of the various types of training and their impacts on service delivery, there remains a significant gap in research focused specifically on medical laboratories in Kenya. The majority of studies have concentrated on other industries or general hospital settings, leaving the unique challenges of medical laboratory operations largely unexplored in terms of training interventions. This study aims to fill these gaps by investigating the specific effects of technical, soft, digital, and cognitive skills training on service delivery in Kenyan medical laboratories, offering valuable insights into how targeted training can enhance laboratory operations and improve patient care.

2.5 Conceptual Framework

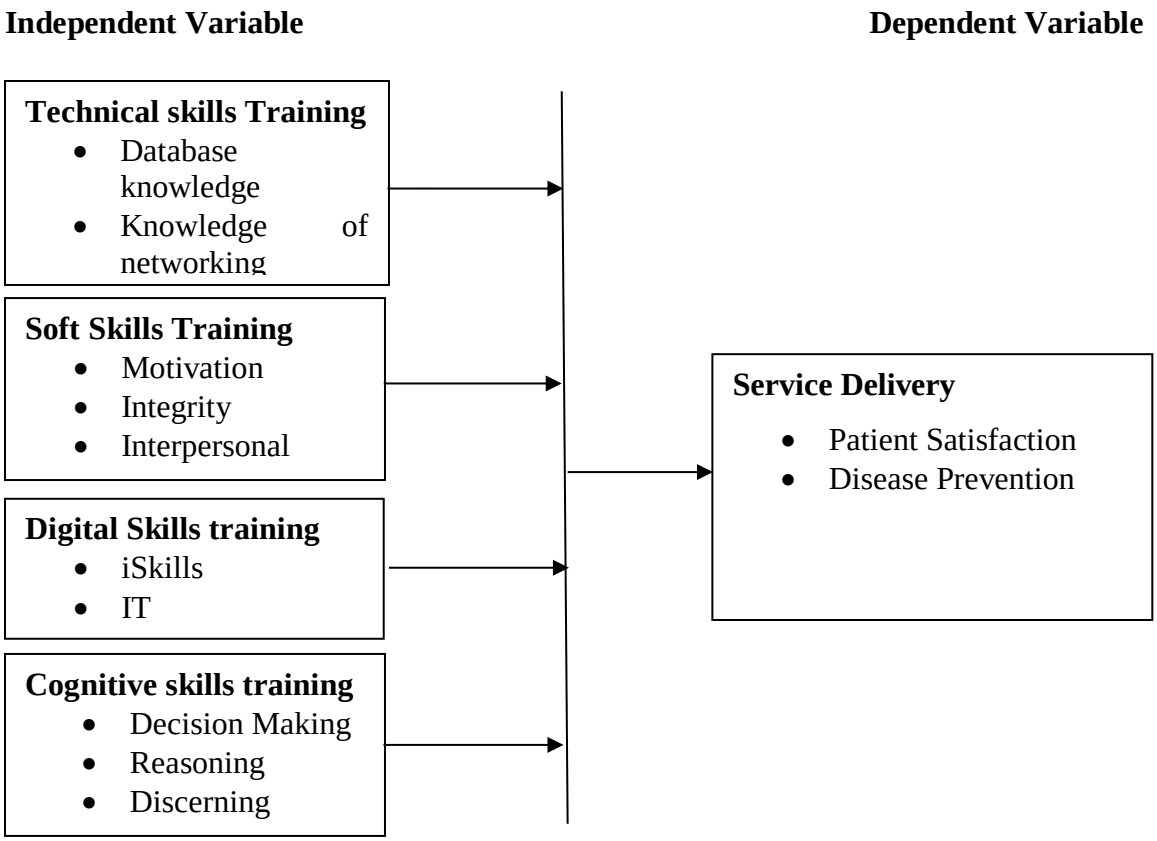

FIGURE 1: Conceptual Framework

Source: Author (2019)

2.6 Operationalization of Variables

TABLE 1:

Operationalization of Variables

Variable	Category	Objective	Measurement	Statistical test	Hypothesized Relationship
Service Delivery	Dependent	-	Patient Satisfaction Disease Prevention	P, F, Beta statistics	Poor
Technical skills Training	Independent	To establish the effect of technical training on service delivery in the selected medical laboratories	Database knowledge Knowledge of networking	P, F, Beta statistics	positive
Soft Skills Training	Independent	To establish the effect of soft skills training on service delivery in the selected medical laboratories	Motivation Integrity Interpersonal	P, F, Beta statistics	positive
Digital Skills training	Independent	To establish the effect of digital skills training on service delivery in the selected medical laboratories	Internet Skills Computing Skills	P, F, Beta statistics	positive
Cognitive skills training	Independent	To establish the effect of Cognitive skills training on service delivery in the selected medical laboratories	Decision Making Reasoning Discerning	P, F, Beta statistics	positive

Source, Author (2019)

2.7 Summary of the Chapter

This section summarizes the foundational literature that supports and contextualizes the present research project. The chapter begins with a review of theoretical frameworks, detailing how various models such as the Theory of Reasoned Action, Technology Acceptance Model, and Social Learning Theory inform the study's focus on the impact of professional development on service delivery in medical laboratories. The review then evaluates empirical studies that investigate different types of training, including technical, soft, digital, and cognitive skills, across diverse settings. This analysis identifies specific gaps in the literature, particularly the limited research on the combined effect of these training types within the Kenyan medical laboratory context. By addressing these gaps, the study aims to contribute new insights into how targeted training can improve operational efficiency, diagnostic accuracy, and patient satisfaction in healthcare. Finally, a conceptual framework is developed, informed by the insights gained from both theoretical and empirical literature, which will guide the research methodology and analysis.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the research methodology used in the study. It covers the research design, study area, target population, sample size determination, sampling techniques, data collection methods, and tools, along with data analysis procedures and ethical considerations. The methodology ensures a structured approach to achieve the study's objectives while adhering to ethical standards.

3.2 Research design

Research design refers to the overall strategy that integrates the various components of a study in a coherent and logical manner, ensuring that the research problem is effectively addressed (Creswell & Creswell, 2018). This study employed a descriptive cross-sectional design, which involves collecting data at a single point in time to describe the characteristics of a population or phenomenon (Levin, 2006). The descriptive cross-sectional approach is advantageous in providing a snapshot of the variables under study, allowing for an efficient and comprehensive analysis of the effect of training (technical, soft, digital, and cognitive) on service delivery within selected medical laboratories in Kenya. According to Nassaji (2015), descriptive research design is suitable for studies aimed at understanding the current state of affairs without manipulating the environment, making it appropriate for the present study's focus on existing training practices and service delivery outcomes.

3.3 Target population

The target population refers to the total group of individuals relevant to the study, ensuring that the findings can be generalized within the research context (Mugenda & Mugenda, 2003). This study targeted laboratory practitioners working in 18 accredited medical laboratories in Nairobi County, with a total population of 4,053 individuals (Ministry of Health, 2019). These practitioners play a critical role in healthcare service delivery, as they are responsible for diagnostics, sample analysis, and overall laboratory management. The unit of analysis in this study was individual laboratory practitioners, as the study evaluates the impact of training on their performance and service delivery. Similarly, the unit of observation is individual laboratory practitioners.

3.4 Sample and Sampling Techniques

The study employed simple random sampling to select laboratory practitioners for participation. Simple random sampling ensures that each practitioner in the population has an equal chance of being selected, reducing sampling bias and enhancing the generalizability of the findings (Taherdoost, 2016). Since the study utilized semi-structured questionnaires, both closed-ended questions for quantitative analysis and open-ended questions for qualitative insights are incorporated, eliminating the need for additional interview sampling. The approach ensures that the selected sample represents the diversity of laboratory practitioners in different medical facilities across Nairobi County.

3.4.1 Sample Size Determination

Sample size determination is essential to achieve sufficient statistical power and reliable results. For this study, Yamane's formula (1967) is used, which is appropriate for a finite population and ensures a representative sample size based on the population size and desired level of precision. The formula is as follows:

$n=N/1+N(e)^2$

where:

- n = sample size,
- N = total population size (in this case, 4,053 laboratory practitioners),
- e = margin of error, typically set at 0.05 for a 95% confidence level.

Applying the values:

$n=4053/1+4053\times (0.05)^2$

$n=4053/1+4053\times 0.0025$

$n=4053/1+10.1325$

$n=4053/11.1325\approx 364$

Thus, a sample size of approximately 364 laboratory practitioners was calculated for this study. This sample size ensures representativeness and enables generalization of

the findings to the entire population of laboratory practitioners in the selected medical laboratories in Nairobi County.

3.5 Research Instruments

Research instruments are tools used to gather data for analysis (Zohrabi, 2013). In this study, data was collected using semi-structured, self-administered questionnaires, which combine structured and open-ended questions. This format enables both quantitative and qualitative data collection, allowing for comprehensive insights into respondents' experiences and perceptions regarding the effects of training on service delivery. The semi-structured format provides flexibility for respondents to express their views while ensuring that specific variables are systematically addressed. Given its efficiency and the ability to capture large samples, the questionnaire is appropriate for this study's data collection needs.

3.5 Pilot Study

A pilot study is a small-scale preliminary study conducted to assess the feasibility, reliability, and validity of the research instrument (Lancaster, Dodd, & Williamson, 2004). For this research, a pilot study involved 10% of the calculated sample size, equating to 36 laboratory practitioners. Pilot testing helps identify any ambiguities or issues in the questionnaire, ensuring it effectively captures the intended data. According to Mugenda and Mugenda (2003), piloting is essential in refining research instruments and increasing the reliability of the collected data. Participants in the pilot study will not be included in the final sample to prevent response bias.

3.5.1 Validity

Validity refers to the extent to which the research instrument accurately measures what it is intended to measure (Creswell, 2014). Ensuring validity is crucial as it directly affects the credibility and generalizability of the research findings. In this study, validity will be assessed through content validity and construct validity.

Content validity ensures that the questionnaire comprehensively covers all aspects of the concepts being studied. Experts in the fields of health services and training programs reviewed the questionnaire to ensure that the questions align well with the study's objectives, specifically the dimensions of technical, soft, digital, and cognitive skills training and their impact on service delivery.

Construct validity was measured using the Kaiser-Meyer-Olkin (KMO) test and Bartlett's Test of Sphericity to ensure that the questionnaire items are appropriate for factor analysis, which helps confirm that they accurately represent the intended constructs. The KMO values are interpreted as follows: marvelous (0.90-1.00), meritorious (0.80-0.89), middling (0.70-0.79), mediocre (0.60-0.69), miserable (0.50-0.59), and unacceptable (below 0.50) (Field, 2013). A KMO value of 0.7 or above will be considered satisfactory for this study.

3.5.2 Reliability

Reliability refers to the consistency of the measurement instrument, indicating its ability to yield the same results under consistent conditions (Bryman & Bell, 2015). In this study, reliability was tested using Cronbach's alpha coefficient, which measures

internal consistency among items in the questionnaire. A Cronbach's alpha value of 0.7 or higher is generally regarded as acceptable, indicating that the items are sufficiently correlated to measure the same underlying construct (Nunnally & Bernstein, 1994).

A pilot test involving 36 respondents (10% of the sample size) was conducted to estimate the reliability of each section of the questionnaire, specifically focusing on technical, soft, digital, and cognitive skills training dimensions. The results of this pilot test allowed for refinement of any items that do not meet the reliability threshold. This iterative process ensures that the final instrument is both reliable and well-suited for accurately measuring the variables in question.

3.6 Data Collection

Data collection procedures involve systematically gathering information to address research questions (Babbie, 2020). This study followed ethical clearance protocols, obtaining approval from the KCAU Graduate School, NACOSTI, and each participating laboratory. Data collection was conducted through self-administered questionnaires, distributed with the support of trained research assistants. This method ensures that respondents understand the questions and are comfortable providing honest and accurate responses (Creswell & Poth, 2016). Interpretations was offered where necessary to ensure clarity and enhance the response rate.

3.7 Data analysis

Qualitative and quantitative techniques will be used and the responses was coded so that the details can be evaluated using SPSS tools. The quantitative information was analysed, and the use of the program SPSS (v.22.0) included explanatory and inferential information. The findings were presented in for of averages, standard deviations, counts and percentages by use of (tables, diagrams and charts) while Qualitative information was analyzed using content analysis and presented thematically in prose form. The analysis causality: squared Rs, F values and beta coefficients at 0.05 significance levels coefficients were tested. The model is shown in the following statistics:

$$Y=\beta_0+ \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + e$$

Where;

Y= the dependent variable (service delivery)

β= Regression constant (the value of Y when $X_1=X_2=X_3=X_4= 0$)

β_i is the coefficient for X_i (where $_{i= 1, 2, 3, 4}$)

β_1, β_2, β_3, β_4= Change in Y with respect to a unit change in X_1, X_2, X_3, X_4 respectively.

Independent variables are:

X_1 = technical training

X_2 = soft skills training

X_3= digital skills training

X_4= cognitive skills training

β_i (where $_{= 0, 1, 2, 3, 4)}$ are coefficients

e = Error term assumed to be normal in distribution (mean zero and variance σ^2)

The inclusion of a random error, e, is important because other unspecified variables may also affect service delivery.

3.8 Data Management

This research prioritizes data confidentiality, participant consent, and adherence to ethical research standards (Bryman, 2016). In addition to obtaining approval from KCAU Graduate School and NACOSTI, participants were fully informed of the study's purpose and their rights. They had the option to withdraw at any stage without repercussions. The researcher ensured data is securely stored and used only for academic purposes, maintaining participant privacy and data integrity throughout the study.

3.9 Diagnostic Tests

Diagnostic tests are essential in assessing the assumptions underlying the regression analysis to ensure the validity and reliability of the results (Tabachnick & Fidell, 2019). Before performing the main regression analysis, diagnostic tests were conducted to verify that the data meets key statistical assumptions, including normality, linearity, independence of errors, homoscedasticity, and absence of multicollinearity.

These tests enhance the robustness of the model and help in identifying potential issues that could distort the findings. Each test is detailed below.

3.9.1 Normality Test

Normality tests are conducted to determine whether the distribution of residuals in the dataset follows a normal distribution, which is a fundamental assumption in parametric tests, including linear regression (Field, 2013). In this study, the Kolmogorov-Smirnov and Shapiro-Wilk tests was applied to check for normality. A non-significant result ($p > 0.05$) from these tests would indicate that the residuals are approximately normally distributed, meeting the assumption of normality. In addition to these tests, visual methods such as the normal Q-Q plot were utilized to provide a graphical assessment of normality. If the residuals deviate from normality, appropriate data transformations will be considered to align with the normality assumption, ensuring the accuracy of the regression estimates (Ghasemi & Zahediasl, 2012).

3.9.2 Linearity Test

The linearity test assesses whether there is a linear relationship between the independent and dependent variables, a core assumption of linear regression (Hair et al., 2018). This study employed scatter plot graphs to visually inspect the relationship between each independent variable (technical, soft, digital, and cognitive skills training) and the dependent variable (service delivery). In each scatter plot, a linear pattern in the plotted points would suggest that the assumption of linearity is met. Deviations from linearity, such as curves or clusters, would indicate non-linearity, suggesting that transformations or polynomial terms may be needed to achieve a linear relationship

(Laerd Statistics, 2015). By ensuring linearity, the study confirmed that changes in the predictor variables lead to proportionate changes in the dependent variable, enhancing the reliability of the regression model.

3.9.3 Autocorrelation Test

Autocorrelation refers to the correlation between residuals from different observations in the dataset, which violates the assumption of independence of errors in regression models (Gujarati & Porter, 2009). The presence of autocorrelation can lead to inefficient estimates and reduce the model's predictive accuracy. In this study, the Durbin-Watson test was applied to detect the presence of autocorrelation in the residuals. A Durbin-Watson statistic close to 2 suggests no autocorrelation, while values significantly different from 2 indicate positive or negative autocorrelation (Field, 2013).

3.9.4 Homoscedasticity Test

Homoscedasticity refers to the constant variance of residuals across all levels of the independent variables, an important assumption for accurate coefficient estimates in linear regression (Hayes & Cai, 2007). Homoscedasticity was tested using the Breusch-Pagan test. A non-significant result ($p > 0.05$) indicates homoscedasticity, while a significant result suggests heteroscedasticity, indicating that residual variance varies with predictor levels. Additionally, a plot of residuals versus predicted values was created, where a random scatter of points would indicate homoscedasticity. If heteroscedasticity is detected, robust standard errors or transformations of the dependent variable will be considered to stabilize variance, ensuring the validity of statistical inferences drawn from the regression model.

3.9.5 Multicollinearity Test

Multicollinearity occurs when independent variables in the regression model are highly correlated with each other, which can inflate standard errors and weaken the predictive power of the model (Tabachnick & Fidell, 2019). To detect multicollinearity, this study used Variance Inflation Factor (VIF) and Tolerance levels. VIF values greater than 10 and Tolerance values below 0.1 indicate severe multicollinearity (Hair et al., 2018). Addressing multicollinearity may involve removing or combining highly correlated predictors, ensuring that each independent variable contributes unique information to the model. By mitigating multicollinearity, the study strengthens the accuracy of its regression coefficients and the reliability of its findings.

3.10 Ethical Considerations

Ethical considerations were integral to this study, and every effort was made to ensure that the research adhered to the highest standards of ethical integrity. In terms of data management, strict measures were implemented to ensure the privacy and confidentiality of all participants. All collected data were anonymized and stored in secure, password-protected files accessible only to the research team. The study adhered to the principles of informed consent by ensuring that all participants fully understood the study's purpose, their role in it, and their right to withdraw at any time without consequences. A detailed informed consent form was provided to each participant, outlining the study's goals, procedures, and potential risks.

Permissions for the study were obtained from relevant institutions, including NACOSTI (National Commission for Science, Technology, and Innovation), which

granted approval for the research to proceed, ensuring compliance with national research regulations. Additionally, ethical approval was secured from KCA University's Institutional Research Ethics and Scientific Review Committee (ISERC) to ensure that the study met both national and institutional ethical guidelines.

Confidentiality was maintained throughout the research process, with all participants' identities protected. Data will not be shared with third parties, and all personal identifiers were omitted from the final report. Upon completion, the findings will be disseminated through formal channels, including academic journals and conferences, ensuring that all participants' privacy is respected. A close-out report will be prepared and submitted to the ISERC, detailing the study's findings, the methodology used, and ethical practices followed throughout the research. This process ensures that the research is transparent, accountable, and aligned with ethical research standards.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents the research findings and discussions based on the study objectives. The results are derived from the analysis of data collected through questionnaires. The findings are presented in tables and figures, accompanied by interpretations and discussions. The chapter begins with an analysis of the response rate, followed by demographic characteristics of the respondents, and then proceeds to examine the effect of various training components; technical skills, soft skills, digital skills, and cognitive skills on service delivery in selected medical laboratories in Kenya. The discussion integrates empirical findings with relevant literature to provide a comprehensive understanding of the study results.

4.2 Response Rate

Table 2 presents the response rate of the study.

TABLE 2:

Response Rate

Response Rate	Frequency	Percent
No of Questionnaires sent out	364	100%
Questionnaires returned	315	86. 5%
Questionnaires not returned	49	13.5%

A total of 364 questionnaires were distributed to the targeted respondents. Out of these, 315 questionnaires were successfully completed and returned, representing a high response rate of 86.5%. However, 49 questionnaires, accounting for 13.5%, were not returned. The high response rate suggests strong engagement and willingness of the respondents to participate in the study, enhancing the reliability and validity of the findings. The unreturned questionnaires could be attributed to various factors, such as respondent unavailability, time constraints, or lack of interest. A response rate above 70% is considered excellent for social science research and ensures the data collected is representative of the study population (Mugenda & Mugenda, 2003). This study's response rate of 86.5% aligns with these recommendations, indicating that the findings can be reliably used for analysis and decision-making.

4.3 Demographic Information

4.3.1 Age of the Respondents

Figure 2 presents the age distribution of the respondents, highlighting a diverse representation across different age groups.

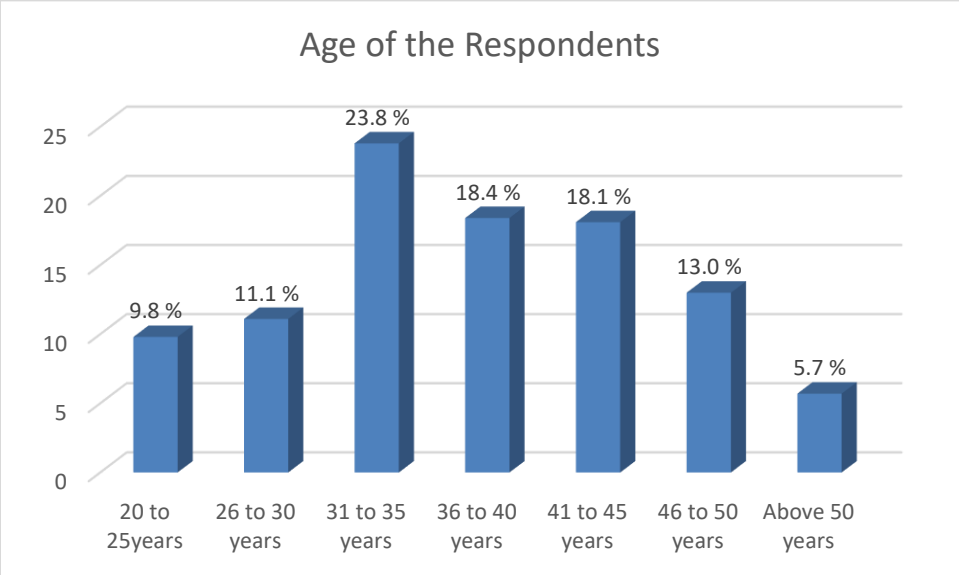

FIGURE 2:

Age of the Respondents

The majority of respondents fall within the 31 to 35 years age bracket, comprising 23.8% of the total sample. This is followed by respondents aged 36 to 40 years at 18.4% and those aged 41 to 45 years at 18.1%, indicating that a significant proportion of participants are in their mid-career stages. The 46 to 50 years category represents 13.0% of the respondents, while the 26 to 30 years group accounts for 11.1%. The youngest age group, 20 to 25 years, makes up 9.8% of the respondents, suggesting relatively lower representation from early-career professionals. Respondents above 50 years form the

smallest category at 5.7%, indicating that fewer older professionals participated in the study. These findings suggest that the workforce is predominantly composed of individuals in their 30s and 40s, a stage where professional expertise and experience are likely to be at a peak.

4.3.2 Gender of the Respondents

Figure 3 presents the gender distribution of the respondents.

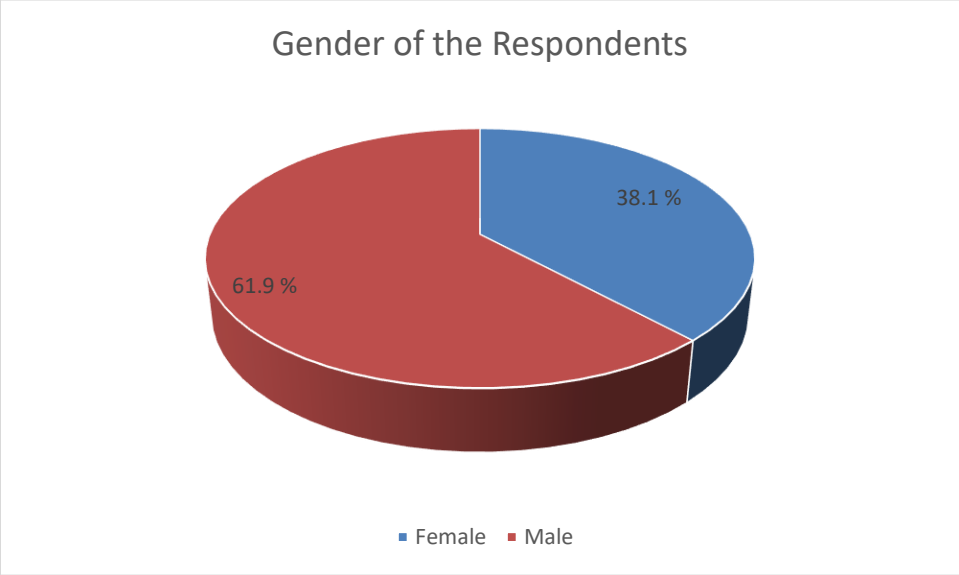

FIGURE 3:

Gender of the Respondents

The majority of the respondents in this study were male, accounting for 61.9% of the total sample, while female respondents comprised 38.1%. This indicates a significant gender disparity among the participants, with men forming a larger proportion of the workforce in the study context.

4.3.3 Level of Education

Figure 4 illustrates the highest level of education attained by the respondents.

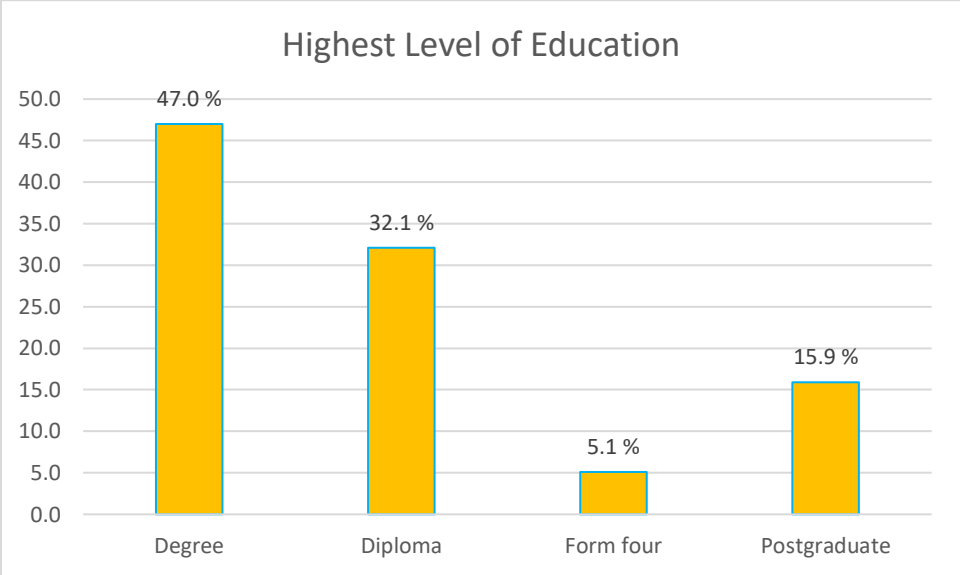

FIGURE 4:

Highest Level of Education

The majority, 47.0%, hold a degree, indicating that a significant portion of the workforce has attained higher education qualifications. A considerable proportion, 32.1%, possess a diploma, demonstrating a strong presence of mid-level professionals with specialized training. A smaller segment, 15.9%, has postgraduate qualifications, reflecting a group with advanced expertise and specialization in their respective fields. The lowest category, 5.1%, comprises respondents with only a Form Four (secondary school) qualification, suggesting limited participation of individuals without higher education. The findings indicate that the workforce is highly educated, with a majority having tertiary

education, which may contribute positively to service delivery and professional competence in the sector under study.

4.4 Descriptive Statistics

4.4.1 Technical Skills Training

Table 3 presents the descriptive statistics on the effect of technical skills training on service delivery in selected medical laboratories in Kenya. The table captures respondents' perceptions of various technical competencies, including database management, networking knowledge, professionalism, record-keeping, safety measures, and the ability to work under minimum supervision.

TABLE 3:

Descriptives for Technical Skills Training

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree	Mean	Std Dev.
Database management skills and competence	1.59%	7.62%	26.67%	42.86%	21.27%	3.75	0.93
Knowledge of networking	1.27%	6.98%	26.98%	31.75%	33.02%	3.88	0.99
Professionalism	3.49%	5.08%	30.48%	33.65%	27.30%	3.76	1.02
Competence in physical and electronic record keeping	2.22%	7.94%	23.81%	36.51%	29.52%	3.83	1.01
Safety and presentable measures in the lab	0.63%	2.86%	32.70%	35.56%	28.25%	3.88	0.88
Ability to work under minimum supervision	3.49%	5.08%	28.25%	35.56%	27.62%	3.79	1.02
Average						**3.82**	**0.98**

The findings indicate that a majority of the respondents (64.13%) agreed that they possess database management skills and competence, while 9.21% disagreed. A notable proportion (26.67%) remained neutral. The mean score for this skill was 3.75, with a standard deviation of 0.93, indicating a moderate level of agreement with some variation in responses.

Similarly, 64.77% of respondents agreed that they have knowledge of networking, whereas 8.25% expressed disagreement. 26.98% were uncertain. The mean score of 3.88 and a standard deviation of 0.99 suggest a relatively strong consensus with slight variations in opinion.

Regarding professionalism, 60.95% of respondents agreed that technical training enhanced their professionalism, while 8.57% disagreed. Meanwhile, 30.48% remained neutral. The mean score for this attribute was 3.76, with a standard deviation of 1.02, indicating a reasonable level of agreement with some dispersion in responses.

For competence in physical and electronic record-keeping, 65.13% of respondents either agreed that training has improved their record-keeping skills, whereas 10.16% disagreed. 23.81% remained neutral on this aspect. This attribute had a mean score of 3.83 and a standard deviation of 1.01, reflecting a moderate level of agreement with some variability.

When assessing safety and presentable measures in the lab, 63.81% of respondents agreed, while only 3.49% disagreed. 32.70% were neutral. The mean score of 3.88 and a standard deviation of 0.88 indicate a strong agreement with relatively low dispersion in responses.

Finally, the ability to work under minimum supervision was affirmed by 63.18% of respondents, while 8.57% disagreed. 28.25% remained neutral. The mean score was 3.79, with a standard deviation of 1.02, showing a moderate level of agreement with some variation among respondents.

On average, the overall mean score for technical skills training was 3.82, with a standard deviation of 0.98. This suggests that respondents generally agreed that technical training has positively influenced their service delivery in medical laboratories.

A majority of respondents indicated "Yes", affirming that technical skills training positively influences service delivery in medical laboratories.

A content analysis of on their responses revealed several key ways in which technical skills training enhances service delivery in medical laboratories. The major themes identified included improved accuracy in testing, efficiency in laboratory processes, compliance with quality standards, proficiency in equipment handling, and enhanced problem-solving abilities.

Respondents emphasized that technical training improved their precision in conducting diagnostic tests, reducing errors and ensuring reliable results. This accuracy was crucial in informing medical decisions and improving patient outcomes. Efficiency in laboratory workflows was also highlighted, as well-trained staff could complete tests faster without compromising quality, leading to reduced patient wait times.

Furthermore, technical skills training ensured compliance with quality control and safety regulations. Staff who received ongoing training were more likely to adhere to standard operating procedures, minimizing contamination risks and enhancing overall laboratory safety. Proficiency in handling laboratory equipment was another key benefit, as respondents reported being more confident in using advanced diagnostic tools, troubleshooting technical issues, and maintaining equipment functionality.

Additionally, respondents noted that technical training enhanced their ability to solve complex laboratory-related challenges independently. This problem-solving capability contributed to better adaptability when dealing with emerging diagnostic techniques, new medical conditions, or unexpected laboratory errors.

4.4.2 Soft Skills Training

Table 4 presents the descriptive statistics on the effect of soft skills training on service delivery in selected medical laboratories in Kenya. The table evaluates various soft skills, including motivation by leaders, adaptability, integrity, interpersonal interaction, teamwork, creative problem-solving, time management, and conflict management.

TABLE 4:

Descriptives for Soft Skills Training

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree	Mean	Std Dev.
Motivation of employees by the leaders	3.49%	9.84%	32.70%	30.16%	23.81%	3.61	1.06
Adaptability of new employees	3.81%	15.87%	24.76%	30.48%	25.08%	3.57	1.14
Integrity among senior and junior employees	3.49%	10.48%	32.06%	31.75%	22.22%	3.59	1.05
Interpersonal interaction	3.49%	6.98%	19.37%	43.81%	26.35%	3.83	1.01
Teamwork among all levels of employment	0.63%	11.11%	29.84%	34.29%	24.13%	3.70	0.98
Creative Problem-Solving	3.49%	8.89%	25.71%	38.41%	23.49%	3.70	1.04
Time Management	2.54%	11.75%	24.76%	35.24%	25.71%	3.70	1.06
Amicable conflict management	3.81%	10.48%	28.25%	32.38%	25.08%	3.64	1.08
Average						**3.67**	**1.05**

The results indicate that the majority of respondents (53.97%) agreed that motivation of employees by leaders is enhanced through soft skills training, while 13.33% disagreed. A considerable proportion (32.70%) remained neutral. The mean score for this aspect was 3.61, with a standard deviation of 1.06, indicating moderate agreement with some variation in responses.

For adaptability of new employees, a majority of respondents (55.16%) agreed that soft skills training improves adaptability, while 19.68% disagreed. 24.76% were neutral on

this matter. The mean score of 3.57 and a standard deviation of 1.14 suggest moderate agreement with slightly higher variation compared to other attributes.

Regarding integrity among senior and junior employees, the majority of respondents (53.97%) agreed that soft skills training promotes integrity, while 13.97% disagreed. Meanwhile, 32.06% were uncertain. The mean score was 3.59, with a standard deviation of 1.05, suggesting a moderate level of agreement with some variability in responses.

For interpersonal interaction, a significant majority (70.16%) agreed that soft skills training enhances their ability to interact effectively with colleagues, while 10.47% disagreed. 19.37% were neutral. The mean score of 3.83 and a standard deviation of 1.01 indicate strong agreement on the importance of interpersonal interaction, with relatively low variability in responses.

Similarly, a majority of respondents (58.42%) agreed that soft skills training promotes teamwork at all levels of employment, while 11.74% disagreed. 29.84% remained neutral. The mean score was 3.70, with a standard deviation of 0.98, suggesting strong agreement with low dispersion in responses.

For creative problem-solving, a majority (61.90%) agreed that soft skills training enhances their ability to solve problems creatively, while 12.38% disagreed. 25.71% remained neutral. The mean score was 3.70, with a standard deviation of 1.04, reflecting strong agreement with moderate variation in responses.

Regarding time management, a majority (61.05%) agreed that soft skills training improves their ability to manage time effectively, while 14.29% disagreed. 24.76% remained neutral. The mean score for time management was 3.70, with a standard deviation of 1.06, suggesting strong agreement with some variation in opinions.

For amicable conflict management, a majority (57.79%) agreed that soft skills training improves their ability to manage workplace conflicts effectively, while 14.29% disagreed. 28.25% remained neutral. The mean score was 3.64, with a standard deviation of 1.08, indicating moderate agreement with slightly more variation in responses compared to other factors.

On average, the overall mean score for soft skills training was 3.67, with a standard deviation of 1.05. This suggests that respondents generally agreed that soft skills training positively impacts service delivery in medical laboratories.

The majority of respondents indicated "Yes", confirming that soft skills training positively influences service delivery in medical laboratories.

Their responses identified several key ways in which soft skills training enhances service delivery. The emerging themes included improved communication with patients and colleagues, enhanced teamwork and collaboration, better conflict resolution, increased professionalism, and stronger patient satisfaction.

Respondents highlighted that effective communication skills helped laboratory staff explain procedures, address patient concerns, and provide clear instructions, reducing anxiety and improving patient experience. Additionally, soft skills training was said to

promote active listening, ensuring that laboratory professionals accurately understood patient queries and physician requests, minimizing misunderstandings and errors.

Teamwork and collaboration were also identified as critical outcomes of soft skills training. Respondents noted that a well-coordinated laboratory team enhanced workflow efficiency, reduced task duplication, and improved turnaround time for test results. Employees who had undergone soft skills training reported being more adaptable in cross-functional teams, leading to a smoother operational environment.

Another significant benefit was conflict resolution and stress management. Many respondents indicated that the training helped them handle workplace disagreements professionally, fostering a harmonious work environment. It also equipped them with strategies to manage work-related stress, reducing burnout and increasing overall productivity.

Professionalism and ethical conduct were also mentioned as essential outcomes of soft skills training. Respondents expressed that training on ethical decision-making, empathy, and emotional intelligence improved their ability to handle sensitive medical cases with discretion and care.

Lastly, patient satisfaction emerged as a major theme. Many respondents believed that soft skills training enhanced their ability to provide courteous, compassionate, and patient-centered services, ultimately leading to greater patient trust and confidence in laboratory procedures.

4.4.3 Digital Skills Training

Table 5 presents the descriptive statistics on the effect of digital skills training on service delivery in selected medical laboratories in Kenya. The table evaluates various digital competencies, including social media communication, information technology updates, laboratory data analytics, digital marketing, computer literacy, and online coordination.

TABLE 5:

Descriptives for Digital Skills Training

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree	Mean	Std Dev.
Social Media communication	2.22%	4.13%	15.87%	41.90%	35.87%	4.05	0.94
Information technology update	1.90%	2.22%	20.00%	36.83%	39.05%	4.09	0.92
Laboratory data analytics	2.22%	2.54%	29.52%	33.33%	32.38%	3.91	0.96
Digital Marketing and selling	3.49%	2.54%	16.19%	40.63%	37.14%	4.05	0.97
Computer literacy	0.00%	4.76%	33.33%	29.52%	32.38%	3.90	0.92
Mobile/online coordination for instance online appointments	2.54%	3.17%	18.41%	39.05%	36.83%	4.04	0.95
Average						**4.01**	**0.94**

The results indicate that the majority of respondents (77.77%) agreed that social media communication skills are improved through digital skills training, while 6.35% disagreed. 15.87% were neutral. The mean score for this skill was 4.05, with a standard deviation of 0.94, indicating a high level of agreement with minimal variation in responses.

Similarly, a majority of respondents (75.88%) agreed that information technology updates are effectively managed with digital skills training, while 4.12% disagreed. 20.00% were neutral on this matter. The mean score of 4.09 and a standard deviation of 0.92 suggest strong agreement with minimal dispersion in responses.

For laboratory data analytics, 65.71% of the respondents agreed that digital skills training enhances their ability to analyze laboratory data, while 4.76% disagreed. A significant 29.52% remained neutral. The mean score was 3.91, with a standard deviation of 0.96, indicating moderate agreement with slightly higher variability in responses compared to other factors.

Regarding digital marketing and selling, 77.77% of the respondents agreed that digital skills training has improved their proficiency in this area, while 6.03% disagreed. 16.19% were neutral. The mean score of 4.05 and a standard deviation of 0.97 reflect strong agreement with some variation in responses.

For computer literacy, a majority of respondents (61.90%) agreed that digital skills training has enhanced their computer literacy, while 4.76% disagreed. 33.33% were neutral, representing a significant portion of respondents who were undecided. The mean score was 3.90, with a standard deviation of 0.92, indicating moderate agreement with some variability in responses.

Lastly, for mobile and online coordination, 75.88% of the respondents agreed that digital skills training improves online coordination, such as handling online appointments, while 5.71% disagreed. 18.41% were neutral. The mean score was 4.04, with a standard deviation of 0.95, indicating strong agreement with minimal variation.

On average, the overall mean score for digital skills training was 4.01, with a standard deviation of 0.94. These results suggest that respondents generally agreed that digital skills training positively impacts service delivery in medical laboratories.

The majority of respondents indicated "Yes", affirming that digital skills training positively influences service delivery in medical laboratories.

Respondents revealed several key ways in which digital skills training enhances service delivery. The emerging themes included improved efficiency in data management, enhanced accuracy in laboratory procedures, faster turnaround time for test results, better integration of digital health systems, and improved patient record-keeping.

One of the most cited benefits was improved efficiency in data management. Respondents highlighted that training in laboratory information systems (LIS) enabled them to record, retrieve, and process patient test results more accurately and quickly. These reduced errors related to manual data entry and improved overall workflow in laboratories.

Another major theme was enhanced accuracy in laboratory procedures. Respondents noted that digital skills training helped them operate automated laboratory equipment, perform complex diagnostic tests, and analyze results with greater precision. The ability to utilize digital tools such as microscopes with digital imaging and automated analyzers significantly reduced human errors and increased the reliability of test results.

Faster turnaround time for test results was also a recurring theme. Many respondents explained that digital skills training allowed them to utilize digital tools more effectively, reducing the time required for conducting, processing, and reporting tests. This contributed to improved patient care, quicker diagnosis, and timely medical interventions.

Integration of digital health systems and interoperability was another notable aspect. Respondents indicated that digital training helped them navigate electronic health records (EHRs), telemedicine platforms, and online patient management systems, ensuring seamless coordination between laboratory services and other healthcare departments. This integration improved communication between laboratory professionals and physicians, reducing delays in decision-making and enhancing patient outcomes.

Additionally, improved patient record-keeping and data security emerged as critical benefits. Respondents emphasized that digital skills training equipped them with knowledge on data privacy protocols, cybersecurity measures, and compliance with medical data regulations. This ensured that patient information remained secure while enabling authorized personnel to access critical health data efficiently.

4.4.4 Cognitive Skills Training

Table 6 presents the descriptive statistics on the effect of cognitive skills training on service delivery in selected medical laboratories in Kenya. The table evaluates various cognitive competencies, including sustained attention, working under pressure, undivided attention, long-term working memory, logic and reasoning, and processing and decision-making speed.

TABLE 6:

Descriptives for Cognitive Skills Training

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree	Mean	Std Dev.
Sustained attention	4.76%	2.86%	22.54%	33.65%	36.19%	3.94	1.06
Working under pressure	3.81%	6.67%	15.87%	25.71%	47.94%	4.07	1.12
Undivided attention	7.30%	8.25%	30.48%	35.87%	18.10%	3.49	1.10
Long-term working memory in the laboratory	4.44%	1.90%	20.00%	39.68%	33.97%	3.97	1.01
Logic and reasoning	0.00%	11.11%	23.81%	35.56%	29.52%	3.83	0.98
Processing and decision-making speed	3.81%	3.81%	18.41%	33.97%	40.00%	4.03	1.04
Average						**3.89**	**1.05**

The results indicate that a majority of respondents (69.84%) agreed that sustained attention is enhanced through cognitive skills training, while 7.62% disagreed. 22.54% were neutral. The mean score for this skill was 3.94, with a standard deviation of 1.06, indicating a high level of agreement with minimal variation in responses.

Similarly, a majority of respondents (73.65%) agreed that cognitive skills training enhances their ability to work under pressure, while 10.48% disagreed. 15.87% were neutral. The mean score of 4.07 and a standard deviation of 1.12 suggest strong agreement with slightly higher variation compared to other attributes.

For undivided attention, a majority of respondents (53.97%) agreed, while 15.55% disagreed. A notable 30.48% remained neutral. The mean score was 3.49, with a standard deviation of 1.10, indicating moderate agreement with a relatively higher proportion of neutral responses.

Regarding long-term working memory in the laboratory, a majority of respondents (73.95%) agreed that cognitive skills training improves their memory retention in laboratory work, while 6.34% disagreed. 20.00% were neutral. The mean score of 3.97 and a standard deviation of 1.01 reflect strong agreement with minimal variation in responses.

For logic and reasoning, a majority of respondents (64.88%) agreed that cognitive skills training improves their logical reasoning ability, while 11.11% disagreed. 23.81% were neutral. The mean score was 3.83, with a standard deviation of 0.98, indicating strong agreement with relatively low dispersion in responses.

Lastly, for processing and decision-making speed, a majority of respondents (73.97%) agreed that cognitive skills training enhances their ability to make decisions quickly, while 7.62% disagreed. 18.41% were neutral. The mean score was 4.03, with a standard deviation of 1.04, indicating strong agreement with minimal variation.

On average, the overall mean score for cognitive skills training was 3.89, with a standard deviation of 1.05. These results suggest that respondents generally agreed that cognitive skills training positively impacts service delivery in medical laboratories.

The majority of respondents answered "Yes", indicating that cognitive skills training plays a crucial role in enhancing service delivery in medical laboratories.

Their responses revealed several key ways in which cognitive skills training enhances service delivery in medical laboratories. The main themes identified include improved problem-solving abilities, enhanced decision-making, better attention to detail,

increased adaptability to complex laboratory procedures, and improved multitasking capabilities.

One of the most commonly cited benefits was improved problem-solving abilities. Respondents noted that cognitive training helped them analyze test results critically, troubleshoot technical errors, and address laboratory challenges more efficiently. This ability was particularly valuable in situations where they encountered unexpected test anomalies or equipment malfunctions.

Enhanced decision-making also emerged as a significant theme. Respondents indicated that cognitive skills training enabled them to make accurate and timely decisions regarding sample handling, test prioritization, and patient diagnosis. This ensured that critical cases were addressed promptly, leading to better patient outcomes and reduced errors in laboratory processes.

Better attention to detail was another key finding. Many respondents emphasized that cognitive skills training helped them maintain high levels of accuracy when conducting diagnostic tests, interpreting results, and verifying laboratory data. Given the high-stakes nature of medical laboratory work, enhanced attention to detail reduced the risk of misdiagnoses and increased the reliability of test outcomes.

Additionally, increased adaptability to complex laboratory procedures was frequently mentioned. Cognitive training helped laboratory professionals stay updated with new diagnostic technologies, evolving laboratory techniques, and advancements in medical research. This adaptability was essential in ensuring that laboratory personnel could efficiently integrate new procedures into their daily workflow.

Improved multitasking capabilities also stood out as a significant advantage. Many respondents noted that cognitive skills training equipped them with the ability to manage multiple laboratory tasks simultaneously, such as processing samples, analyzing results, and documenting findings without compromising accuracy. This contributed to greater efficiency in handling high patient loads, especially during peak hours.

4.4.5 Service Delivery

Table 7 presents the descriptive statistics on service delivery in selected medical laboratories in Kenya. The table evaluates various aspects of service delivery, including professionalism, compliance with health standards, responsiveness, bed capacity, delays in service delivery, and waiting time.

TABLE 7:

Descriptives for Service Delivery

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree	Mean	Std Dev.
The services are delivered professionally	2.22%	3.81%	23.49%	48.57%	21.90%	3.84	0.89
Services offered meet health standards of the Ministry of Health	3.17%	6.03%	23.17%	38.41%	29.21%	3.84	1.01
The responsiveness is prompt and on time	3.49%	6.03%	30.48%	33.65%	26.35%	3.73	1.03
The bed capacity is sufficient for admission of more patients	2.86%	1.27%	28.89%	42.22%	24.76%	3.85	0.91
There are no delays in the delivery of services to patients	0.00%	6.35%	30.16%	34.60%	28.89%	3.86	0.91

Waiting time is reduced significantly	3.49%	5.71%	28.57%	36.51%	25.71%	3.75	1.01
Average						**3.81**	**0.96**

The results indicate that the majority of respondents (70.47%) agreed that services are delivered professionally, while 6.03% disagreed. 23.49% were neutral. The mean score for this aspect was 3.84, with a standard deviation of 0.89, indicating a strong level of agreement with minimal variation in responses.

Similarly, a majority of respondents (67.62%) agreed that services offered meet the health standards of the Ministry of Health, while 9.20% disagreed. 23.17% remained neutral. The mean score of 3.84 and a standard deviation of 1.01 suggest strong agreement with some variation in responses.

For prompt and timely responsiveness, a majority of respondents (59.90%) agreed, while 9.52% disagreed. A notable 30.48% remained neutral. The mean score was 3.73, with a standard deviation of 1.03, indicating moderate agreement with slightly higher variability in responses compared to other service delivery aspects.

Regarding bed capacity for admitting more patients, a majority of respondents (66.98%) agreed, while 4.13% disagreed. 28.89% were neutral. The mean score of 3.85 and a standard deviation of 0.91 reflect strong agreement with minimal variation in responses.

For delays in service delivery, a majority of respondents (63.49%) agreed that there are no delays, while 6.35% disagreed. 30.16% were neutral. The mean score was 3.86, with

a standard deviation of 0.91, indicating a strong level of agreement with minimal variability.

Lastly, regarding waiting time reduction, a majority of respondents (61.22%) agreed that waiting time has significantly reduced, while 9.20% disagreed. 28.57% remained neutral. The mean score was 3.75, with a standard deviation of 1.01, indicating a strong level of agreement with slight variability.

On average, the overall mean score for service delivery was 3.81, with a standard deviation of 0.96. These results suggest that respondents generally agreed that service delivery in the selected medical laboratories meets professional standards and efficiency expectations.

A content analysis of the open-ended responses revealed several key areas for improving service delivery in medical laboratories, including enhanced staff training, improved workflow efficiency, better equipment maintenance, integration of digital health systems, and patient-centered service approaches.

Enhanced staff training was a predominant theme, with respondents emphasizing the need for continuous professional development programs to enhance both technical and soft skills. Many suggested that frequent workshops and on-the-job training would improve staff competency, enhance efficiency in conducting laboratory procedures, and ensure compliance with evolving medical standards.

Another major theme was improving workflow efficiency. Many respondents cited challenges such as delays in sample processing, long patient wait times, and slow

turnaround times for test results. Suggestions included better scheduling of laboratory procedures, adoption of automated diagnostic systems, and optimizing task delegation among laboratory personnel to minimize bottlenecks and reduce service delivery delays.

Regular equipment maintenance and procurement of modern laboratory technology were also highlighted as essential improvements. Respondents noted that outdated or malfunctioning equipment contributes to delays and inaccuracies in test results. They recommended that laboratories should adopt modern diagnostic tools, ensure routine equipment servicing, and provide laboratory staff with hands-on training in handling advanced medical technologies.

The integration of digital health systems was another key theme. Respondents emphasized that enhanced digital record-keeping, the use of laboratory information systems (LIS), and seamless integration with electronic health records (EHRs) would improve communication between laboratories and other healthcare departments. This would enable faster access to patient data, minimize errors in test result reporting, and enhance overall healthcare coordination.

Patient-centered service approaches were also identified as a priority for improvement. Many respondents suggested that laboratories should adopt patient-friendly service models by reducing long queues, providing clear communication on test procedures and expected wait times, and implementing feedback mechanisms to address patient concerns. Additionally, some highlighted the need for extended laboratory operating hours to accommodate patients with tight schedules.

4.5 Diagnostic Tests

4.5.1 Normality Test

TABLE 8:

Tests of Normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Technical skills training	.064	315	.074	.968	315	.070
Soft skills training	.071	315	.201	.962	315	.089
Digital skills training	.109	315	.220	.913	315	.065
Cognitive skills training	.120	315	.200	.938	315	.062
Service Delivery	.080	315	.200	.942	315	.078

The results of the normality tests, using both Kolmogorov-Smirnov and Shapiro-Wilk tests, indicate that all variables; technical skills training, soft skills training, digital skills training, cognitive skills training, and service delivery do not significantly deviate from a normal distribution. This is evidenced by the p-values (Sig.) for all variables being greater than the common significance level of 0.05 in both tests, with values ranging from 0.062 to 0.220 for Kolmogorov-Smirnov and 0.065 to 0.089 for Shapiro-Wilk. Since the null hypothesis of normality is not rejected for any of the variables, it can be concluded that the data are approximately normally distributed. This satisfies the normality assumption required for parametric statistical analyses such as regression modeling.

4.5.2 Linearity Test

The scatter plots in Figures 5 to 8 below assessed the linearity between service delivery and four types of training: technical, soft, digital, and cognitive skills training. All four plots demonstrate a positive linear relationship, as indicated by the upward trend and positive regression slopes. The coefficients of determination (R^2) range from 0.263 for cognitive skills training to around 0.60 for technical and digital skills training, confirming a stronger linear association for technical and digital skills, moderate for soft skills, and weaker for cognitive skills. These results indicate that the assumption of linearity holds for all training variables, justifying the use of linear regression analysis in further examining their effects on service delivery

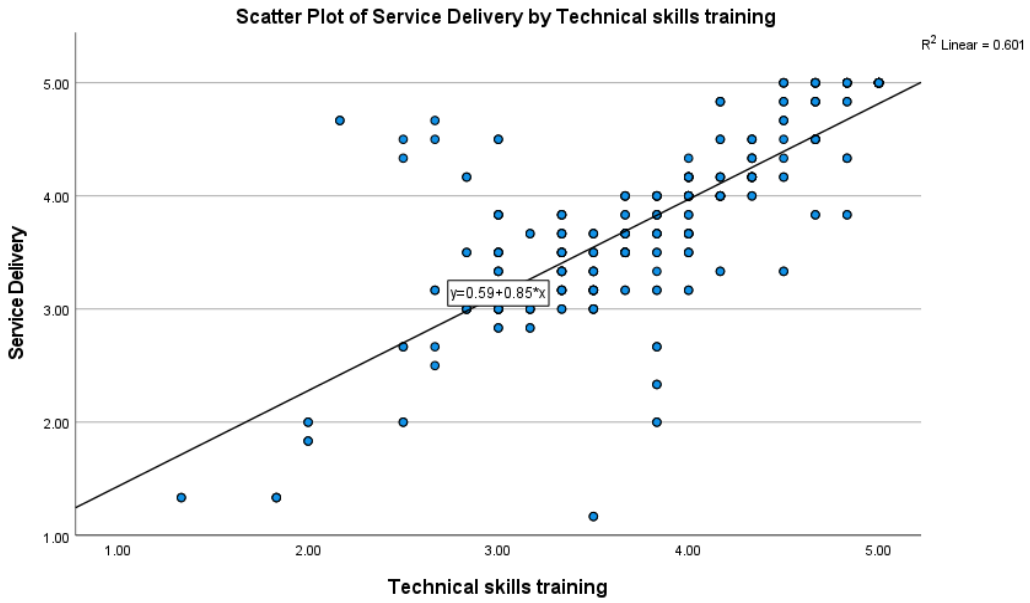

FIGURE 5:

Linearity Test for Technical Skills Training

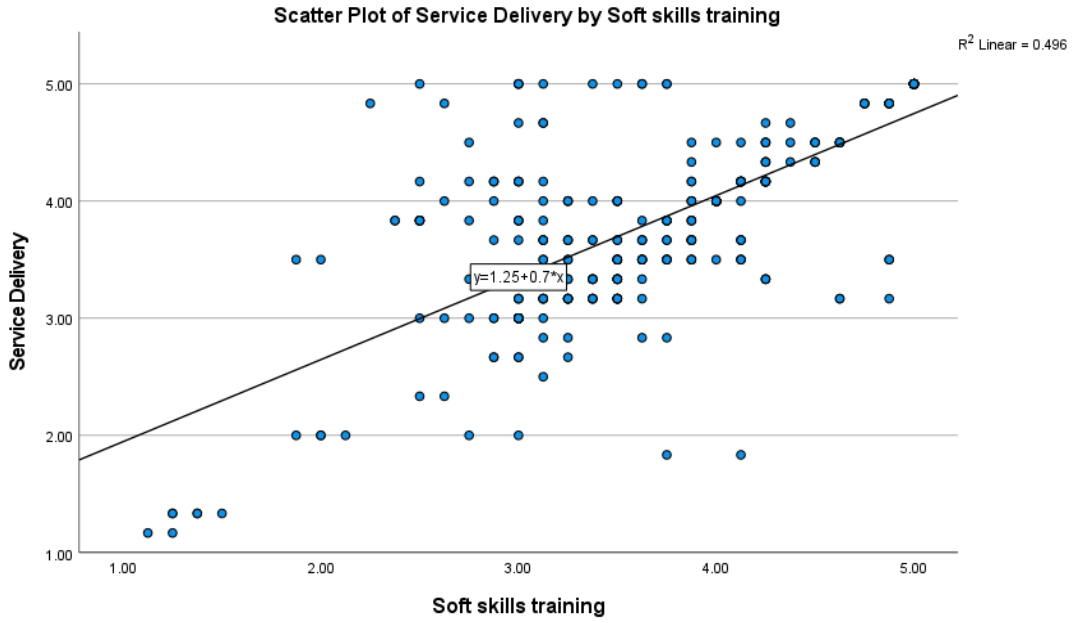

FIGURE 6:

Linearity Test for Soft Skills Training

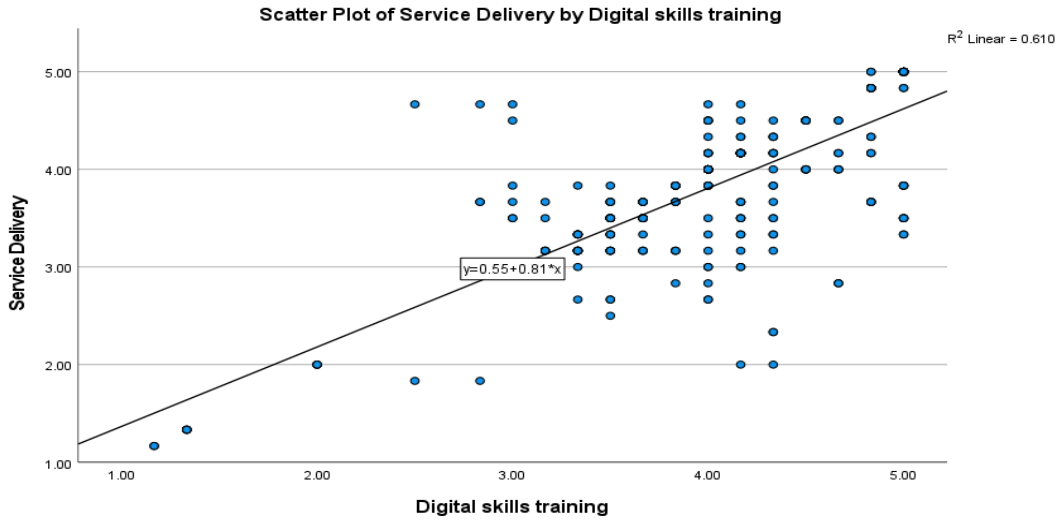

FIGURE 7:

Linearity Test for Digital Skills Training

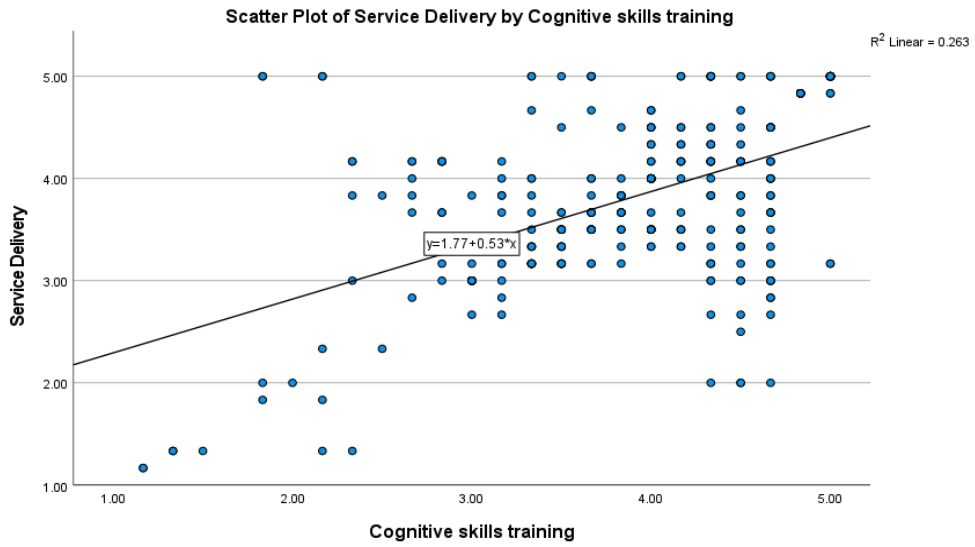

FIGURE 8:

Linearity Test for Cognitive Skills Training

4.5.3 Autocorrelation Test

TABLE 9:

Autocorrelation Results

Model	Durbin-Watson	Threshold
1	2.058	1.5 -2.5

A Durbin Watson of 2.058 indicated that there was no autocorrelation since this value was within the threshold of 1.5 to 2.5.

4.5.4 Homoscedasticity Test

TABLE 10:

Heteroscedasticity Test

Breusch-Pagan test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Performance
chi2 (1) = 111.001
Prob > chi2 = 0.4178

The Breusch-Pagan test for heteroskedasticity presented in Table 10 assesses whether the variance of the residuals in the regression model is constant (homoscedasticity) or varies (heteroscedasticity). The null hypothesis (Ho) assumes constant variance. The test statistic (chi-square) value is 111.001 with a p-value of 0.4178. Since the p-value is greater than the common significance level of 0.05, we fail to reject the null hypothesis. This indicates that there is no significant evidence of heteroscedasticity in the model, and the assumption of constant variance (homoscedasticity) holds. Therefore, the regression results can be considered reliable without the need for adjustments related to heteroscedasticity.

4.5.5 Multicollinearity Test

TABLE 11:

Multicollinearity

Variables	**Tolerance**	**VIF**
Technical skills training	0.366	2.733
Soft skills training	0.537	1.863
Digital skills training	0.337	2.964
Cognitive skills training	0.764	1.308
Average	**0.501**	**2.217**

The results in Table 11 present average variance inflation factors results which were established to be 2.217 which is less than 10 and tolerance of more than 0.2 (0.501). Thus, according to (Miles, 2014) indicates that the problem of multicollinearity was minimized.

4.6 Correlation Analysis

Table 12 presents the correlation analysis results, examining the relationship between training variables (technical skills, soft skills, digital skills, and cognitive skills) and service delivery in selected medical laboratories in Kenya.

TABLE 12:

Correlation Results

		Technical skills training	Soft skills training	Digital skills training	Cognitive skills training	Service Delivery
Technical skills training	Pearson Correlation	1	.618**	.781**	.395**	.775**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	315	315	315	315	315
Soft skills training	Pearson Correlation	.618**	1	.640**	.421**	.704**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	315	315	315	315	315
Digital skills training	Pearson Correlation	.781**	.640**	1	.454**	.781**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	315	315	315	315	315
Cognitive skills training	Pearson Correlation	.395**	.421**	.454**	1	.513**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	315	315	315	315	315
Service Delivery	Pearson Correlation	.775**	.704**	.781**	.513**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	315	315	315	315	315

The results indicate that technical skills training has a strong positive correlation ($r = 0.775$, $p = 0.000$) with service delivery. This suggests that an increase in technical skills training is associated with improved service delivery. The statistically significant

correlation implies that equipping laboratory staff with technical expertise enhances efficiency and professionalism in service delivery. These findings align with Habon et al. (2019), who found that extensive training programs significantly enhanced employees' ability to perform their job roles and increased productivity. Similarly, Tanui and Kwasira (2019) established that staff training at Moi Teaching and Referral Hospital significantly improved service quality and record management, reinforcing the importance of technical training in service provision.

Similarly, soft skills training shows a strong positive correlation ($r = 0.704$, $p = 0.000$) with service delivery. This indicates that enhancing soft skills such as communication, teamwork, and adaptability leads to better service delivery outcomes. The significant relationship highlights the role of interpersonal skills in improving patient care and operational efficiency. This finding is consistent with Ibrahim, Boerhannoeddin, and Bakare (2017), who demonstrated that soft skills acquisition significantly enhances employee performance. Their study recommended structured training methodologies to improve knowledge retention and skill application.

For digital skills training, the correlation with service delivery is also strong ($r = 0.781$, $p = 0.000$). This finding suggests that improving digital competencies, such as IT updates, laboratory data analytics, and online coordination, significantly contributes to enhanced service delivery. The strong correlation emphasizes the growing importance of digital proficiency in modern medical laboratory operations. These results are supported by Slovensky, Malvey, and Neigel (2017), who proposed an mHealth training framework to address gaps in clinical digital training. Their study confirmed that digital skills training improves healthcare efficiency, aligning with the present study's findings.

Cognitive skills training exhibits a moderate positive correlation (r = 0.513, p = 0.000) with service delivery. This indicates that while cognitive skills such as decision-making, memory retention, and logic are important, their impact on service delivery is not as strong as technical, soft, or digital skills. However, the significant correlation still suggests that cognitive training plays a role in enhancing efficiency and accuracy in laboratory services. These findings align with Turi, Sorooshian, and Javed (2019), who found that cognitive factors significantly contribute to organizational development.

4.7 Regression Analysis

Table 13 presents the model summary for the regression analysis examining the relationship between training variables (technical, soft, digital, and cognitive skills) and service delivery in selected medical laboratories in Kenya.

TABLE 13:

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.859a	0.738	0.735	0.43023

The R Square (R^2) value is 0.738, indicating that 73.8% of the variation in service delivery is explained by the combined effect of technical, soft, digital, and cognitive skills training. This suggests that training plays a significant role in influencing service delivery outcomes. The remaining 26.2% of the variation in service delivery is attributed to other factors not included in the model. These findings align with Nama et al. (2022), who found that training programs positively affect employee performance and service delivery in a

South African municipality. Their study emphasized that targeted coaching and mentoring programs significantly enhance service efficiency.

Table 14 presents the ANOVA results for the regression model examining the effect of training variables on service delivery in selected medical laboratories in Kenya.

TABLE 14:

ANOVA

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Regression	161.882	4	40.47	218.65	.000b
Residual	57.379	310	0.19		
Total	219.262	314			

The F-statistic value is 218.65, indicating that the regression model is highly significant. A high F-statistic suggests that the independent variables (technical, soft, digital, and cognitive skills training) jointly explain a significant proportion of the variation in service delivery. Since the significance value ($p = 0.000$) is less than 0.05, it confirms that the model is statistically significant, meaning that the predictor variables contribute meaningfully to explaining service delivery performance. This aligns with Hakim, Laelawati, and Mardiana (2022), who found that digital skills, technological innovation, and entrepreneurial orientation significantly contribute to small and medium enterprises' performance. Their study also emphasized that digital transformation requires continuous skills enhancement. These findings further support the role of structured training in service improvement.

Table 15 below presents the regression coefficients for the relationship between different training dimensions (technical, soft, digital, and cognitive skills training) and

service delivery in selected medical laboratories in Kenya. The unstandardized coefficients (B values) indicate the magnitude and direction of the effect of each independent variable on service delivery.

TABLE 15:

Regression Coefficients

	Unstandardized Coefficients		**Standardized Coefficients**	**t**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	-0.285	0.147		-1.94	0.053
Technical skills training	0.364	0.052	0.33	6.94	0.000
Soft skills training	0.247	0.039	0.25	6.26	0.000
Digital skills training	0.310	0.052	0.30	5.95	0.000
Cognitive skills training	0.145	0.034	0.141	4.245	0.000

The regression results indicate that technical skills training has a significant positive effect on service delivery (B = 0.364, p = 0.000). This suggests that a unit increase in technical skills training leads to a 0.364 increase in service delivery performance, making it the strongest predictor of service delivery among the four training components. These findings align with Adebola (2020), who found a strong relationship between vocational training and service delivery among technical college teachers. The study emphasized that collaborative technical training enhances service quality, reinforcing the current study's findings.

Soft skills training also has a positive and significant effect on service delivery (B = 0.247, p = 0.000), indicating that a unit increase in soft skills training improves service

delivery by 0.247. This highlights the importance of interpersonal skills, teamwork, and communication in enhancing service efficiency. Ubfal et al. (2022) found similar results, demonstrating that soft skills training improves business outcomes, particularly in decision-making and resilience among entrepreneurs.

Similarly, digital skills training has a strong positive impact on service delivery (B = 0.310, p = 0.000), implying that a unit increase in digital skills training leads to a 0.310 increase in service delivery performance. This underscores the significance of digital proficiency, such as IT updates and data analytics, in improving efficiency in medical laboratory operations. These findings align with Lopes, Sargento, and Farto (2023), who highlighted the need for digital skills training to enhance public sector digital transformation.

Finally, cognitive skills training has a significant but relatively lower effect on service delivery (B = 0.145, p = 0.000). This means that a unit increase in cognitive skills training results in a 0.145 improvement in service delivery. While cognitive skills like decision-making and reasoning contribute positively, their impact is not as strong as technical, soft, or digital skills. These findings align with Stanford (2022), who found that cognitive training significantly enhances learning abilities in young children, supporting the importance of cognitive development in improving service efficiency.

Y= -0.285 + 0.364 Technical skills training + 0.247 Soft skills training + 0.310 Digital skills training + 0.145 Cognitive skills training.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the study's key findings, conclusions drawn from the results, and recommendations for enhancing service delivery in medical laboratories. The findings are summarized under the study's key objectives, including the effects of technical, soft, digital, and cognitive skills training on service delivery. The chapter also outlines recommendations for improving training programs and suggests areas for further research.

5.2 Summary of Findings

5.2.1 Technical Skills Training and Service Delivery

The findings of this study revealed that technical skills training has a significant and positive impact on service delivery in medical laboratories. This result is in line with Social Learning Theory (Bandura, 1971), which posits that learning through professional practice and structured training leads to improved performance. The positive correlation between technical skills training and service delivery highlights that laboratory professionals who undergo continuous technical development are more proficient, accurate, and efficient in performing their duties. This is further supported by the Technology Acceptance Model (TAM), which emphasizes how the use of technology, in this case, laboratory equipment and database systems, improves operational efficiency (Davis, 1989). Regression analysis confirmed that technical skills training is the strongest

predictor of service delivery, emphasizing the need for continuous professional development to ensure the competency of laboratory personnel.

5.2.2 Soft Skills Training and Service Delivery

The study established that soft skills training significantly influences service delivery in medical laboratories. This is in line with Social Learning Theory. The importance of interpersonal communication, teamwork, and emotional intelligence was evident in this study, supporting Bandura's idea that effective communication and social interactions within the workplace enhance overall performance. The positive correlation between soft skills training and service delivery further emphasizes the importance of emotional and social competencies in healthcare settings. The regression analysis confirmed that soft skills, particularly communication and teamwork, have a notable impact on service outcomes, enhancing patient satisfaction and fostering a collaborative work environment. This finding complements existing literature on the need for soft skills in healthcare, including Ajzen and Fishbein's (1980) Theory of Reasoned Action, which suggests that attitudes and behavior, influenced by soft skills, affect outcomes in service-oriented professions.

5.2.3 Digital Skills Training and Service Delivery

The study found that digital skills training plays a critical role in enhancing service delivery. This aligns with the Technology Acceptance Model (TAM), which indicates that the adoption of technology, such as laboratory information systems and electronic health records, significantly impacts the efficiency and effectiveness of healthcare delivery (Davis, 1989). The positive correlation between digital skills and service delivery shows

that laboratory professionals proficient in digital tools are more efficient in managing data, reducing turnaround times, and improving patient care. These results support the growing body of literature advocating for continuous training in digital skills, which is also aligned with Venkatesh and Davis's (2000) extension of TAM, emphasizing the importance of perceived ease of use and perceived usefulness of technology in improving service outcomes.

5.2.4 Cognitive Skills Training and Service Delivery

The study findings demonstrated that cognitive skills training plays a significant role in enhancing service delivery in medical laboratories, though its impact was slightly lower than that of technical, soft, and digital skills training. While the impact of cognitive skills training was found to be less significant than other forms of training, the study demonstrated that it plays a crucial role in enhancing decision-making, problem-solving, and analytical thinking. This finding is aligned with Social Learning Theory, which underscores that cognitive development through training enhances the ability to process information and make sound judgments. The regression results confirmed that cognitive training positively influences service delivery, especially in terms of accuracy and precision in laboratory procedures. These results support the argument that cognitive skills training is vital for improving laboratory professionals' analytical and critical thinking abilities, enabling them to navigate complex diagnostic scenarios effectively.

5.2.5 Overall Effect of Training on Service Delivery

The overall findings of the study demonstrated that training in technical, soft, digital, and cognitive skills collectively plays a crucial role in improving service delivery in medical laboratories. The model summary showed that the training variables accounted for a significant proportion of the variation in service delivery, with an R Square value of 0.738, indicating that 73.8% of the changes in service delivery performance were explained by training. The ANOVA results confirmed the statistical significance of the regression model, further reinforcing the importance of training in service delivery improvement. The study findings emphasized that a well-rounded training approach, incorporating technical, soft, digital, and cognitive skills, is essential for optimizing performance, ensuring accuracy in laboratory procedures, and enhancing patient satisfaction.

5.3 Conclusions

Based on the study findings, it can be concluded that training in technical, soft, digital, and cognitive skills significantly enhances service delivery in medical laboratories. Among these, technical and digital skills training emerged as the most influential factors, demonstrating the importance of technological proficiency and technical expertise in ensuring efficiency and accuracy in laboratory operations. Soft skills training was also found to be critical in fostering effective communication, teamwork, and professionalism, which contribute to improved patient interactions and organizational efficiency. Cognitive skills training, while having a comparatively lower impact, remains essential in enhancing critical thinking and decision-making among laboratory professionals.

The study concludes that investment in continuous training and professional development programs is vital for sustaining high-quality service delivery in medical laboratories. Institutions should prioritize structured training initiatives that address the evolving needs of laboratory professionals, equipping them with the necessary skills to handle modern laboratory technologies, communicate effectively, and make informed decisions. Additionally, integrating digital literacy into training programs will further enhance the efficiency of laboratory services, ensuring timely and accurate diagnostic results.

5.4 Recommendations

Based on the findings, it is recommended that medical laboratories implement structured policies mandating continuous professional development for laboratory staff. Technical training should focus on competencies such as database management, equipment handling, and safety protocols. Given the resource constraints in Kenya, these training programs should be designed to be cost-effective, potentially utilizing digital platforms to reduce costs.

Soft skills training, including communication, teamwork, and conflict resolution, should be integrated into regular professional development. Mentorship programs can also be established to guide new staff, helping them improve interpersonal skills and professional etiquette, fostering a culture of collaboration and enhancing service quality within the laboratory.

Investment in digital skills training is essential, particularly for adopting digital laboratory management systems, data analytics tools, and electronic medical records. Cybersecurity and data protection should be prioritized to safeguard patient records. Additionally, providing financial incentives for laboratories that successfully implement digital training could encourage widespread adoption of these skills, despite potential budget limitations.

Cognitive skills development, including critical thinking and decision-making, should be included in laboratory training programs. It is important for laboratory accreditation bodies to assess cognitive competencies during certification to ensure that laboratory personnel are equipped to handle complex diagnostic tasks effectively and efficiently.

A national training framework should be developed to standardize training across both public and private medical laboratories. This framework should ensure continuous professional development and be supported by government funding, particularly for emerging technologies and modern laboratory practices. Training should be accessible, aligning with Kenya's resource constraints while ensuring quality and relevance.

Training programs should consider Kenya’s financial and logistical constraints, focusing on impactful areas such as digital and soft skills training, which will deliver immediate benefits. Collaborating with international partners may provide additional resources and technical expertise to strengthen training efforts in medical laboratories across the country.

5.5 Recommendations for Further Research

Based on the findings, further research should examine the long-term impact of training programs on service delivery performance in medical laboratories. Studies should assess how continuous learning influences laboratory efficiency and patient outcomes over extended periods. Longitudinal research will provide insights into the sustainability of training benefits and identify areas that require periodic updates to maintain relevance.

Future studies should explore the role of emerging technologies, such as artificial intelligence (AI) and machine learning, in enhancing laboratory training and service delivery. Research should evaluate how AI-powered diagnostic tools, automated laboratory management systems, and virtual training simulations can improve technical and digital competencies among laboratory professionals. Understanding the integration of these technologies will help in designing future-ready training programs that align with advancements in medical diagnostics.

Comparative research should be conducted to assess the effectiveness of training programs in public versus private medical laboratories. Such studies would provide valuable insights into best practices, challenges, and areas for improvement in each sector. Findings from comparative analyses could inform policy decisions and lead to the adoption of training models that maximize efficiency across different healthcare settings.

Further investigation is needed into the impact of organizational culture and leadership on training effectiveness. Research should analyze how institutional policies, management support, and workplace culture influence the adoption and success of training initiatives. Understanding these dynamics will help in developing strategies to foster a learning-oriented work environment that enhances professional growth and service quality.

Finally, future research should explore patient perspectives on service delivery improvements resulting from laboratory training programs. Studies should assess whether enhanced training directly translates to increased patient satisfaction, reduced turnaround times, and improved diagnostic accuracy. Findings from such research could provide additional justification for continued investment in training programs, demonstrating the broader impact of workforce development on healthcare quality.

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APPENDICES

Appendix I: Letter of Introduction

Dear (Respondent)

RE: VOLUNTARY PARTICIPATION IN DATA COLLECTION

In my latest thesis project on "Effects of Training on Service Delivery in Selected Medical Laboratories in Kenya," I as a postgraduate student is mandated to carry out a field survey to obtain a Master's degree in Business Administration (Human Resource Management) at KCA University. To complete the questionnaire, you were randomly selected to answer the questions herein. The information supplied is used for academic purposes only and is handled as confidentially as possible. You are very appreciated for your participation.

Yours Faithfully,

Emma Adhiambo Onyango

Appendix II: Questionnaire

Part A: Respondents Information

1. **Name**…….

2. **Age of the respondent**

   20 to 25years [ ] 26 to 30 years [ ] 31 to 35 years [ ]

   36 to 40 years [ ] 41 to 45 years [ ] 46 to 50 years [ ]

   Above 50 years [ ]

3. **Gender**

   Male 〔 〕 Female 〔 〕

4. **What is your highest level of education?**

   Postgraduate 〔 〕 Degree 〔 〕 Diploma 〔 〕 Form four 〔 〕

Part B: Service Delivery

5. Indicate your level of agreement with following statements relating to the delivery of services at the medical laboratories in Nairobi County. Tick your answer in the box provided. **Note: 5=Strongly Agree 4=Agree 3=Not Sure 2=Disagree, 1=Strongly Disagree**

Service Delivery	**1**	**2**	**3**	**4**	**5**
The services are delivered professionally					
Services offered meet health standards of the Ministry of Health					
The responsiveness is prompt and on time					
The bed capacity is sufficient for admission of more patients					
There are no delays in the delivery of services to patients					
Waiting time is reduced significantly					

6. How else does cognitive skills training influence the delivery of services at the medical laboratories in Nairobi County?

.....

.....

Part C: Technical skills training

7. Does technical skills training influence the delivery of services at the medical laboratories in Nairobi County?

   Yes ( ) No ( )

8. Indicate your level of agreement with following statements relating to the technical skills training and delivery of services at the medical laboratories in Nairobi County. Tick your answer in the box provided. **Note: 1= Great extent 2= Moderate extent 3=No extent**

Technical skills training	**1**	**2**	**3**
Database management skills and competence			
Knowledge of networking			
Professionalism			
Competence in physical and electronic record keeping			
Safety and presentable measures in the lab			
Ability to work under minimum supervision			

9. How else does technical skills training influence the delivery of services at the medical laboratories in Nairobi County?

.....

.....

Part D: Soft skills training

10. Does soft skills training influence the delivery of services at the medical laboratories in Nairobi County?

    Yes ( ) No ( )

11. Indicate your level of agreement with following statements relating to soft skills training and delivery of services at the medical laboratories in Nairobi County. Tick your answer in the box provided. **Note: 1= Great extent 2= Moderate extent 3=No extent**

Soft skills training	**1**	**2**	**3**
Motivation of employees by the leaders			
Adaptability of new employees			
Integrity among senior and junior employees			
Interpersonal interaction			
Teamwork among all levels of employment			
Creative Problem-Solving			
Time Management			
Amicable conflict management			

12. How else does soft skills training influence the delivery of services at the medical laboratories in Nairobi County?

.....

.....

Part E: Digital skills training

13. Does digital skills training influence the delivery of services at the medical laboratories in Nairobi County?

    Yes ( ) No ( )

14. Indicate your level of agreement with following statements relating to digital skills training and the delivery of services at the medical laboratories in Nairobi County. Tick your answer in the box provided. **Note: 1= Great extent 2= Moderate extent 3=No extent**

Digital skills training	**1**	**2**	**3**
Social Media communication			
Information technology update			
Laboratory data analytics			
Digital Marketing and selling			
Computer literacy			
Mobile/online coordination for instance online appointments			

15. How else does digital skills training influence the delivery of services at the medical laboratories in Nairobi County?

.....

.....

Part F: Cognitive skills training

16. Does cognitive skills training influence the delivery of services at the medical laboratories in Nairobi County?

Yes ( ) No ( )

17. Indicate your level of agreement with following statements relating to cognitive skills training and the delivery of services at the medical laboratories in Nairobi County. Tick your answer in the box provided. **Note: 1= Great extent 2= Moderate extent 3=No extent**

Cognitive skills training	**1**	**2**	**3**
Sustained attention			

Working under pressure			
Undivided attention			
Long-term working memory in the laboratory			
Logic and reasoning			
Processing and decision-making speed			

18. How else does cognitive skills training influence the delivery of services at the medical laboratories in Nairobi County?

.....

.....

Thank you for your cooperation

Appendix III: Work Plan

Month /Activity	1st Month	1st Month	2nd Month	2nd Month	3rd Month	4th Month
Proposal Writing						
Corrections						
Data Collection						
Data Analysis						
Project Writing						
Submission of Project						

Appendix IV: Budget

Item	**Cost (KShs)**
Traveling expenses (inclusive of research assistants)	15,000.00
Printing and Photocopying of proposal	15,000.00
Binding of proposal	10,000.00
Data analysis	30,000.00
Printing and Photocopying of Project	10,000.00
Contingencies	10,000.00
Total	**60,000.00**

Appendix V: NACOSTI Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **816640**

Date of Issue: **15/May/2025**

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This is to Certify that Ms.. Emma Onyango of KCA University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: EFFECTS OF TRAINING ON SERVICE DELIVERY IN SELECTED MEDICAL LABORATORIES IN KENYA for the period ending : 15/May/2026.

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2. The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way;
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    ii. Adversely affect the lives of Kenyans
    iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).
    iv. Result in exploitation of intellectual property rights of communities in Kenya
    v. Adversely affect the environment
    vi. Adversely affect the rights of communities
    vii. Endanger public safety and national cohesion
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15. Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a report of its findings to the Commission for necessary action.

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