

Organizational Readiness Factors on Performance Outcomes in Forensic Laboratories in Abu Dhabi: A proposed framework

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DOI: <https://doi.org/10.47772/IJRISS.2026.100700912>

Received: 30 July 2026; Accepted: 04 August 2026; Published: 15 August 2026

ABSTRACT

Forensic laboratories play a critical role in supporting criminal investigations, judicial proceedings, and public safety. The increasing adoption of advanced forensic technologies, digital evidence systems, artificial intelligence, and accreditation standards requires forensic laboratories to demonstrate a high level of organizational readiness. Despite substantial research on organizational readiness in healthcare and public-sector organizations, limited studies have examined readiness factors and their influence on performance outcomes within forensic laboratories, particularly in Abu Dhabi. This paper develops a conceptual framework that explains how organizational readiness factors influence laboratory performance outcomes. Unified Theory of Acceptance and Use of Technology (UTAUT) Theory and forensic readiness literature, the framework proposes that organizational readiness factors (technological infrastructure, human capital, organizational support, external collaborations, and regulatory environment) directly influence performance outcomes (accuracy, efficiency, speed, data management, and operational effectiveness) in forensic laboratories in Abu Dhabi. The proposed framework provides a foundation for future empirical research and practical guidance for forensic laboratory managers in Abu Dhabi.

Keywords: Organizational Readiness, Forensic Laboratories, Performance Outcomes, Abu Dhabi.

INTRODUCTION

Abu Dhabi, as a key emirate within the United Arab Emirates (UAE), has placed strong emphasis on leveraging advanced technologies to enhance public-sector performance, including forensic science (Al Shamsi, 2025). Significant government investment in digital infrastructure has supported nationwide smart city initiatives and broader digital transformation across public services (Mansoori et al., 2018). Within this strategic context, forensic laboratories in Abu Dhabi are increasingly integrating advanced technologies to strengthen operational capabilities and improve support for the criminal justice system.

Forensic laboratories play a critical role in the criminal justice system by ensuring the accuracy, timeliness, and reliability of forensic evidence (Al-Matrouk et al., 2026). Globally, increasing case complexity, growing evidence volumes, and heightened judicial scrutiny have placed significant pressure on forensic laboratories to improve their performance outcomes, particularly in terms of analytical accuracy, case turnaround time, data management, and operational effectiveness (Almessabi & Kamalrudin, 2022; Shwede et al., 2022). Despite substantial investments in advanced forensic technologies such as DNA sequencing, digital forensics, artificial intelligence (AI), and automated fingerprint identification systems, many forensic laboratories continue to experience performance-related challenges, including processing delays, underutilization of technology, and variability in analytical quality (Ghaleb et al., 2021; Almehairbi et al., 2022). This indicates that technology availability alone does not automatically translate into improved forensic performance.

Empirical evidence across public-sector and laboratory-based settings suggests that organizational readiness factors, including technological infrastructure, human capital, organizational support, external collaborations, and regulatory environment, play a decisive role in shaping the effectiveness of technology adoption and its

impact on organizational performance (Nasrollahi & Ramezani, 2020; Mansoori et al., 2018). However, most existing studies examine these relationships in sectors such as healthcare, manufacturing, and general public services, with limited attention given to the forensic laboratory context, where performance outcomes are directly linked to legal integrity and public trust (Almehairbi et al., 2022). As a result, there is insufficient empirical understanding of how organizational readiness conditions influence technology-enabled performance in forensic laboratories.

Although organizational readiness has been widely examined in healthcare and public administration, empirical evidence regarding forensic laboratories remains scarce. Therefore, understanding the readiness factors that contribute to laboratory performance is critical for improving forensic service delivery in Abu Dhabi. The primary objective of this study is to investigate how organizational readiness factors affect the performance of forensic laboratories in Abu Dhabi. As forensic laboratories increasingly adopt advanced technologies and face growing demands for accuracy, speed, and operational excellence, understanding the factors that enable organizational readiness becomes critical. The study is grounded in the premise that forensic laboratories that possess adequate technological resources, skilled personnel, strong organizational support, collaborative networks, and a favourable regulatory environment are more likely to achieve superior performance outcomes.

THEORETICAL LITERATURE AND HYPOTHESIS DEVELOPMENT

The application of Unified Theory of Acceptance and Use of Technology (UTAUT) to this study is justified by the need to examine not only the macro-level organizational readiness factors, as addressed (Hrzica et al., 2025). UTAUT enriches the theoretical foundation of this research by introducing a user-centered perspective, acknowledging that the perceptions, motivations, and experiences of end-users are pivotal to the success or failure of technological initiatives. This is particularly critical in forensic settings, where technology adoption is not merely a technical transition but a shift in professional practice, requiring behavioural alignment and institutional trust. Drawing on UTAUT, the framework assumes that once technology is adopted and utilized within a supportive organizational environment, it contributes to improved performance outcomes. Accordingly, performance outcomes are positioned as the dependent variable, reflecting the operational results expected from successful technology integration in forensic laboratories.

Organizational Readiness Factors

Organizational Readiness Factors refer to the conditions and capabilities that determine whether an organization is prepared to successfully implement and sustain change, transformation, or new initiatives (Weiner, 2020). While each factor technological infrastructure, human capital, organizational support, external collaborations, and the regulatory environment is critical in its own right, their collective influence often determines the success or failure of technology adoption initiatives. The synergistic effects of these factors underscore the need for a holistic approach to organizational readiness, where their interdependencies are fully considered and leveraged to maximize outcomes (Oikonomou et al., 2022).

The literature consistently identifies technological infrastructure as a fundamental enabler of technology adoption and organizational performance, particularly in technology-intensive environments. Studies across healthcare, manufacturing, public administration, and forensic science emphasize that infrastructure components such as hardware, software, communication networks, digital platforms, and cybersecurity systems collectively determine an organization's capacity to implement advanced technologies effectively (Croteau et al., 2001; Ahmed et al., 2019; Bruno et al., 2020). Within forensic laboratories, technological infrastructure is especially important because advanced forensic operations depend heavily on high-performance computational systems, integrated databases, secure digital environments, and specialized analytical technologies such as DNA sequencing platforms, digital forensics systems, and automated fingerprint identification systems (Ghaleb et al., 2021). Contextually, forensic laboratories in Abu Dhabi remain significantly underrepresented in technology adoption research despite their strategic importance and increasing technological dependence. Therefore, further empirical investigation is needed to examine how technological infrastructure shapes technology-enabled performance outcomes within forensic laboratories in Abu Dhabi.

Human capital refers to the collective skills, knowledge, experience, and abilities of an organization's workforce (Pasban & Nojede, 2016). It plays a critical role in determining the organization's ability to adopt and effectively utilize new technologies. In forensic laboratories, human capital includes the technical expertise of forensic scientists and IT specialists who are essential for integrating and operating advanced forensic tools (Nasrollahi & Ramezani, 2020). A highly skilled and well-trained workforce is more likely to embrace technology adoption and contribute to improved performance outcomes.

Organizational support encompasses the resources, commitment, and leadership provided by an organization to facilitate technology adoption (Sulaeman et al., 2026). This includes financial investment, strategic direction, and the promotion of a culture that encourages innovation and the use of new technologies. In forensic laboratories, strong organizational support is essential for ensuring the successful adoption of advanced forensic tools, as it fosters a conducive environment for change and provides the necessary resources for training and infrastructure (Mansoori et al., 2018).

External collaborations refer to the partnerships and interactions between an organization and external entities, such as technology providers, research institutions, and industry associations. These collaborations can provide access to the latest technological advancements, technical support, and opportunities for knowledge exchange. For forensic laboratories, engaging in external collaborations can facilitate the adoption of cutting-edge technologies and enhance the laboratory's overall capabilities (Almehairbi et al., 2022).

The regulatory environment includes the laws, regulations, and standards that govern an organization's operations, particularly regarding the adoption and use of new technologies. In forensic laboratories, the regulatory environment plays a crucial role in ensuring that the adoption of new technologies complies with legal and ethical standards, particularly in handling sensitive data and evidence. A supportive regulatory environment provides clear guidelines that encourage technological innovation, while a restrictive environment may hinder adoption efforts (Marcon et al., 2021).

Performance Outcomes

Performance outcomes are the measurable results that reflect the effectiveness of an organization's processes and operations. In forensic laboratories, performance outcomes are often assessed in terms of accuracy, efficiency, data management, and operational effectiveness (Shwedeh et al., 2022). The performance outcomes of forensic laboratories are critical indicators of their ability to fulfill their roles within the criminal justice system. These outcomes are multidimensional and include metrics such as accuracy, efficiency, speed, data management, and operational effectiveness (Hasani, 2024). Each metric is influenced by the adoption of advanced technologies and the level of organizational readiness. Understanding these factors is essential for improving forensic operations and ensuring the delivery of justice.

Accuracy in forensic laboratories refers to the precision and correctness of forensic analyses and conclusions. It is a critical performance metric, as accurate forensic results are essential for supporting criminal investigations and ensuring justice is served. The adoption of advanced forensic technologies can significantly enhance accuracy by reducing human error and improving the reliability of evidence analysis (Shwedeh et al., 2022).

Efficiency refers to the ability of an organization to perform tasks with optimal use of time, resources, and effort. In forensic laboratories, efficiency is often measured by the speed at which evidence is processed and analyzed. Technology adoption can enhance efficiency by automating repetitive tasks, streamlining workflows, and reducing the time required for forensic analyses, allowing laboratories to handle more cases in less time (Gaddam, 2019).

Data management involves the systematic handling, storage, and retrieval of data to ensure its accuracy, security, and accessibility (Freitas et al., 2026). In forensic laboratories, effective data management is crucial for maintaining the integrity of forensic evidence, complying with legal standards, and ensuring that data can be easily accessed when needed. The adoption of digital forensics platforms and data management systems can significantly improve how laboratories manage large volumes of evidence and data (Mansoori et al., 2018).

Operational effectiveness refers to the overall ability of an organization to achieve its objectives efficiently and effectively (Mondal et al., 2025). In forensic laboratories, operational effectiveness is determined by how well the laboratory manages its resources, personnel, and technologies to deliver high-quality forensic services. Technology adoption plays a key role in enhancing operational effectiveness by optimizing processes, improving coordination among departments, and ensuring that forensic analyses are conducted in a timely and reliable manner (Nasrollahi & Ramezani, 2020).

Hypothesis development

Hypothesis development is the process of formulating a clear, testable, and research-based prediction about the relationship between variables.

The Direct Impact of Organizational Readiness Factors on Performance Outcomes

Technological infrastructure forms the backbone of forensic laboratories, providing the necessary tools and systems for evidence analysis and management. Laboratories equipped with cutting-edge hardware, software, and secure networks can achieve higher levels of accuracy and operational efficiency. For instance, a laboratory with state-of-the-art DNA sequencing equipment can produce precise results more consistently, regardless of whether additional technologies are adopted. The presence of reliable infrastructure also minimizes disruptions in workflows and ensures that existing processes function smoothly, thus directly contributing to enhanced performance outcomes (Niguse et al., 2025).

Human capital is another pivotal component of organizational readiness that directly influences performance outcomes. Skilled forensic personnel bring the expertise required to carry out complex analyses, interpret results accurately, and ensure compliance with legal and ethical standards. Forensic laboratories with well-trained staff are better positioned to deliver timely and reliable results, as personnel can efficiently navigate challenges and maintain high-quality outputs. Moreover, the presence of a knowledgeable workforce enhances the laboratory's adaptability, enabling it to address operational demands and sustain high performance levels without relying solely on technology adoption (Duhamel et al., 2022).

Organizational support further amplifies the direct impact of readiness factors on performance outcomes. Leadership commitment to fostering a culture of excellence and innovation ensures that laboratories operate with clear strategic direction and adequate resources. Supportive leadership encourages staff engagement and motivation, which are critical for maintaining efficiency and accuracy in forensic processes. For example, a forensic laboratory with management that prioritizes continuous improvement and invests in regular staff training is likely to exhibit better operational effectiveness, even in the absence of new technology implementation (Marcon et al., 2021).

External collaborations also play a crucial role in directly influencing performance outcomes by facilitating access to expertise, resources, and best practices. Partnerships with research institutions, technology providers, and industry associations enable forensic laboratories to stay informed about emerging trends and methodologies. These collaborations enhance the laboratory's ability to deliver high-quality forensic services by fostering knowledge sharing and providing opportunities for professional development. For instance, joint training programs or shared resources with academic institutions can improve the accuracy and efficiency of forensic analyses, independent of technological advancements (Kaewsangon, 2024).

The regulatory environment provides a framework for maintaining consistency, reliability, and compliance in forensic laboratory operations. Clear legal and ethical guidelines help ensure that evidence is handled, analyzed, and stored according to standardized procedures, thereby upholding the integrity of forensic processes. Laboratories operating within supportive regulatory frameworks are more likely to demonstrate higher levels of accuracy and operational effectiveness, as compliance with regulations minimizes errors and enhances the credibility of forensic evidence. For instance, adherence to stringent data management protocols mandated by regulatory bodies ensures the secure handling of sensitive information, directly contributing to performance outcomes such as data security and operational reliability (Mouakket & Aboelmaged, 2021).

Empirical evidence supports the direct influence of organizational readiness factors on performance outcomes. For instance, Ghaleb et al. (2021) found that organizations with robust infrastructure and skilled personnel achieved better performance metrics, even in the absence of comprehensive technology adoption. Similarly, studies in healthcare and manufacturing sectors have demonstrated that strong organizational support and collaborative networks are associated with improved operational efficiency and accuracy, highlighting the universal applicability of this relationship (Ruangkanjanases et al., 2022).

In forensic laboratories, the direct impact of organizational readiness factors is particularly significant due to the complexity and sensitivity of forensic analyses. The integration of advanced methodologies and the ability to meet operational demands depend not only on technology adoption but also on the laboratory's foundational capabilities. For example, laboratories with strong organizational support and skilled staff can achieve timely and precise forensic analyses, ensuring the delivery of high-quality services that support criminal investigations and legal proceedings (Niguse et al., 2025). The interplay between organizational readiness factors and performance outcomes also extends to sustainability. Laboratories that prioritize resource optimization and continuous improvement initiatives can maintain high performance levels over time. For example, efficient workflows supported by robust infrastructure and well-trained personnel reduce operational bottlenecks, enhance case management, and improve overall service delivery. These outcomes directly contribute to the credibility and effectiveness of forensic laboratories, reinforcing their role in the criminal justice system (Marcon et al., 2021). Based on this understanding, the following hypothesis is proposed:

H1: Organizational readiness factors (technological infrastructure, human capital, organizational support, external collaborations, and regulatory environment) directly influence performance outcomes (accuracy, efficiency, speed, data management, and operational effectiveness) in forensic laboratories in Abu Dhabi.

The Proposed Framework

The conceptual framework for this study is examining the factors influencing technology adoption within organizations. In the context of forensic laboratories, the framework helps illustrate how various organizational readiness factors technological infrastructure, human capital, organizational support, external collaborations, and regulatory environment interact to subsequently affect performance outcomes (Ghaleb et al., 2021). The figure presents a conceptual framework that examines the relationship between Organizational Readiness Factors and Performance Outcomes in forensic laboratories in Abu Dhabi. The framework proposes that an organization's preparedness and capacity to support forensic operations directly influence laboratory performance. Specifically, the model suggests that organizational readiness factors serve as independent variables that collectively contribute to improved performance outcomes, represented by the hypothesis (H1).

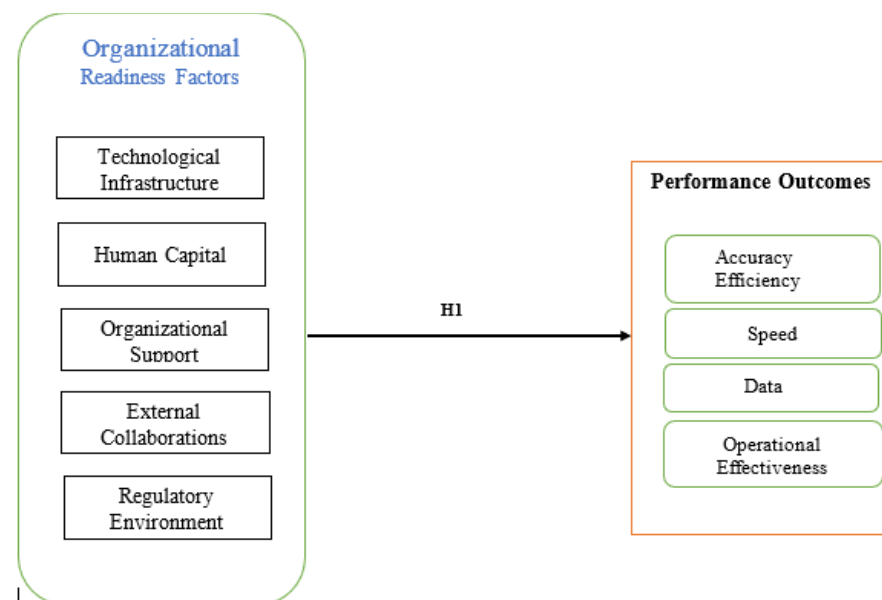


Figure 2. Conceptual Framework

DISCUSSION

The proposed framework highlights the critical role of organizational readiness factors in enhancing performance outcomes within forensic laboratories in Abu Dhabi. As forensic laboratories operate in highly specialized and technology-intensive environments, organizational readiness becomes a strategic requirement for achieving operational excellence, maintaining scientific integrity, and supporting the criminal justice system.

The framework suggests that organizational readiness is influenced by five key dimensions: technological infrastructure, human capital, organizational support, external collaborations, and the regulatory environment. These factors collectively contribute to the laboratory's ability to deliver accurate, timely, and reliable forensic services.

Technological infrastructure is expected to play a fundamental role in improving forensic laboratory performance. Modern forensic investigations increasingly depend on advanced analytical instruments, digital forensic platforms, laboratory information management systems, and artificial intelligence applications. Laboratories equipped with advanced technological resources are likely to process evidence more efficiently, reduce analytical errors, and improve service delivery. Consequently, technological readiness can significantly enhance operational efficiency and the quality of forensic outcomes.

Human capital represents another essential component of organizational readiness. The effectiveness of forensic laboratories depends largely on the expertise, skills, and competencies of forensic professionals. Highly trained personnel are better able to operate sophisticated technologies, apply scientific methodologies accurately, and adapt to emerging forensic techniques. Continuous professional development and specialized training programs therefore contribute directly to improved laboratory performance, particularly in terms of analytical accuracy and operational effectiveness.

Organizational support is also expected to influence performance outcomes positively. Leadership commitment, adequate resource allocation, effective communication, and employee empowerment create an environment that encourages innovation and continuous improvement. When management actively supports organizational initiatives and provides the necessary resources, employees are more likely to embrace change and contribute to organizational objectives. Such support can facilitate the successful implementation of new technologies and quality management systems, ultimately enhancing laboratory effectiveness.

External collaborations constitute an important readiness factor within the forensic context. Partnerships with law enforcement agencies, judicial authorities, academic institutions, and international forensic organizations provide opportunities for knowledge exchange, technical support, and access to best practices. These collaborative relationships can strengthen laboratory capabilities, improve investigative outcomes, and foster innovation. In Abu Dhabi, where government entities increasingly emphasize inter-agency cooperation, external collaborations may significantly contribute to organizational performance.

The regulatory environment further shapes organizational readiness by establishing standards, guidelines, and accreditation requirements that govern forensic operations. Compliance with international standards such as ISO/IEC 17025 promotes consistency, quality assurance, and accountability. A supportive regulatory framework encourages laboratories to adopt systematic quality management practices, thereby improving reliability, transparency, and stakeholder confidence in forensic results.

The proposed framework further suggests that improvements in organizational readiness factors lead to enhanced performance outcomes, including accuracy and efficiency, speed, data quality, and operational effectiveness. Accuracy and efficiency are particularly important in forensic laboratories because errors in forensic analysis may have significant legal consequences. Similarly, reducing case turnaround time contributes to more effective criminal investigations and judicial processes. High-quality data management ensures the integrity and admissibility of forensic evidence, while operational effectiveness reflects the laboratory's overall ability to achieve strategic objectives and satisfy stakeholder expectations.

CONCLUSION

This study proposed a conceptual framework to examine the relationship between organizational readiness factors and performance outcomes in forensic laboratories in Abu Dhabi. The framework was developed based on the premise that forensic laboratories operate in an increasingly complex environment characterized by rapid technological advancements, evolving regulatory requirements, and growing expectations for accuracy, efficiency, and service quality. To meet these challenges, forensic laboratories must possess a high level of organizational readiness that enables them to adapt effectively and sustain operational excellence.

The proposed framework identified five key organizational readiness factors—technological infrastructure, human capital, organizational support, external collaborations, and the regulatory environment—as critical determinants of laboratory performance. These factors are expected to contribute positively to performance outcomes, including accuracy and efficiency, speed of service delivery, data quality, and operational effectiveness. Drawing upon Organizational Readiness for UTAUT Theory, the study argues that organizations with adequate resources, capabilities, and institutional support are better positioned to implement change successfully and achieve superior performance outcomes.

The study contributes to the existing literature by extending the concept of organizational readiness to the forensic science domain, an area that has received limited scholarly attention. While previous research has primarily focused on organizational readiness in healthcare, education, and public administration, this study addresses an important gap by exploring readiness factors within forensic laboratories. The proposed framework therefore provides a theoretical foundation for understanding how organizational capabilities influence laboratory performance in a highly specialized and regulated environment.

Theoretical And Practical Implications

From a theoretical perspective, the framework supports the principles of Organizational Readiness for Change Theory, which argues that organizations with adequate resources, capabilities, and commitment are more likely to implement change successfully and achieve superior outcomes. In forensic laboratories, readiness factors provide the foundation for organizational adaptability, technological innovation, and continuous improvement. Therefore, organizational readiness can be viewed as a strategic capability that enables laboratories to respond effectively to evolving forensic and criminal justice demands.

From a practical standpoint, the study offers valuable implications for policymakers and forensic laboratory managers in Abu Dhabi. Investment in technological infrastructure, workforce development, leadership support, collaborative networks, and regulatory compliance can strengthen organizational readiness and improve laboratory performance. Given the increasing complexity of forensic investigations and the rapid advancement of forensic technologies, organizations that prioritize readiness are likely to achieve greater efficiency, reliability, and service quality.

In conclusion, the proposed framework provides a comprehensive explanation of how organizational readiness factors contribute to performance outcomes in forensic laboratories. By examining the influence of technological infrastructure, human capital, organizational support, external collaborations, and the regulatory environment, the study offers a foundation for future empirical research and practical strategies aimed at enhancing forensic laboratory effectiveness in Abu Dhabi.

Limitations Of the Proposed Framework

The proposed framework has several limitations that should be acknowledged. First, the framework is conceptual and does not provide empirical evidence to validate the proposed relationships between organisational readiness factors and performance outcomes in forensic laboratories. Although the framework proposes that organisational readiness may influence laboratory performance, the strength, direction, and significance of these relationships remain to be established through empirical testing. Future research should therefore operationalise the proposed constructs and test the framework using data collected from forensic laboratory personnel and, where possible, objective organisational performance indicators.

Second, the theoretical foundation of the framework relies primarily on the Unified Theory of Acceptance and Use of Technology (UTAUT) and forensic readiness literature. While these perspectives provide a useful foundation for explaining technology-related behaviour and organisational preparedness, they may not fully capture the organisational and institutional complexities associated with technological transformation in forensic laboratories. The framework could therefore be strengthened through the integration of complementary perspectives from organisational change, innovation management, and institutional theory. Such integration may provide a more comprehensive explanation of how leadership, organisational culture, institutional pressures, innovation capability, and change-management practices influence technology adoption and performance outcomes.

Third, the framework is specifically developed within the context of forensic laboratories in Abu Dhabi. This contextual focus allows the framework to reflect the technological, organisational, and institutional characteristics of the local forensic environment; however, it may restrict its applicability to laboratories operating under different legal systems, regulatory frameworks, technological infrastructures, resource conditions, and organisational structures. Consequently, the proposed relationships should not be assumed to apply universally without further validation.

RECOMMENDATIONS FOR FUTURE RESEARCH

Future research should empirically validate the proposed framework using quantitative or mixed-method research designs involving forensic laboratory personnel, laboratory managers, technology specialists, and other relevant stakeholders in Abu Dhabi. A quantitative approach could be used to test the hypothesised relationships among organisational readiness factors, technology adoption, and forensic laboratory performance, while a mixed-method approach could provide additional qualitative insights into the organisational and contextual factors that influence these relationships.

Researchers should also develop and validate measurement instruments for each dimension of organisational readiness. The measurement scales should demonstrate appropriate reliability and validity and should be tailored to the specific context of forensic laboratories. Establishing validated measures would enable researchers to determine the relative contribution of individual readiness dimensions and identify which factors have the strongest influence on laboratory performance outcomes. Structural equation modelling, including mediation analysis, could subsequently be used to assess both the direct and indirect relationships within the proposed framework.

The theoretical foundation of the framework should also be expanded beyond UTAUT and forensic readiness perspectives. Incorporating theories and concepts related to organisational change, technology governance, innovation adoption, and institutional effectiveness could provide a more comprehensive explanation of how forensic laboratories prepare for, implement, and sustain technological transformation. Such theoretical integration may help explain not only individual technology acceptance but also the organisational structures, governance mechanisms, leadership practices, innovation capabilities, and institutional conditions that determine successful technology adoption.

Future studies should additionally consider objective performance indicators alongside self-reported measures. Indicators such as case-processing time, analytical accuracy, productivity, resource utilisation, backlog reduction, quality-assurance performance, and technology utilisation rates could complement survey responses and reduce the potential influence of subjective perceptions and common method bias.

Finally, subsequent research should test the framework across different forensic laboratories and institutional contexts. Comparative and longitudinal studies would help determine whether the proposed relationships remain stable across different organisational and technological environments and whether improvements in organisational readiness and technology adoption produce sustained improvements in forensic laboratory performance over time.

ACKNOWLEDGEMENT

The authors would like to thank Sultan Idris Education University, Faculty of Management and Economics, for the direct and indirect contributions.

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