



Technology integration and employee performance in the Ghanaian health sector

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Abstract

The integration of technology in health service delivery is increasingly recognised as a crucial factor in enhancing employee performance, particularly in developing economies. This study examines the relationship between technological adoption in healthcare settings and its impact on employee performance. The study employed a quantitative approach, an explanatory research design and gathered data via structured questionnaires from 294 health workers at the various health facilities located in Ghana. In addition, the stratified random sampling technique was employed. The data was then processed via IBM SPSS (v.26) and SmartPLS3 software. The study found that the level of technology integration partially mediated the relationship between the nature of technology integration and employee performance. Level of technology integration partially mediated the relationship between the nature of technology integration and the benefits associated with technology integration. It was therefore recommended that the management of health facilities in Ghana should improve the degree of technological integration in health service delivery as a top priority.

Introduction

The rapid advancement of digital technologies has transformed healthcare service delivery, significantly impacting employee performance, particularly in developing economies. The adoption of electronic health records (EHRs), telemedicine, artificial intelligence (AI), and mobile health (mHealth) applications has improved efficiency, accuracy, and accessibility in healthcare systems (Adepoju et al., 2021). These technologies enhance clinical decision-making, streamline administrative tasks, and facilitate remote healthcare services, reducing the workload on healthcare professionals and improving overall service quality. However, despite these advancements, there remain critical gaps in understanding how different

types of technology influence employee productivity, how varying natures and levels of technological integration adoption impact workforce efficiency, and the associated benefits and challenges of digital transformation in resource-limited settings (WHO, 2022).

Healthcare institutions in developing economies employ various forms of technology to enhance service delivery. Health Information Systems (HIS) play a fundamental role in managing patient data, improving coordination, and enabling real-time access to medical records (Bertani et al., 2022). Telemedicine platforms have bridged the gap between healthcare providers and patients in remote areas, ensuring better access to medical services (Ojo et al., 2021). Furthermore, AI-driven diagnostics have improved disease detection and treatment outcomes, reducing the burden on healthcare professionals and allowing for early intervention (Alami et al., 2020). However, the effectiveness of these technologies depends on institutional readiness, healthcare workers' adaptability, and the availability of necessary resources (Kuunibe et al., 2023).

The extent to which technology is integrated into healthcare systems directly influences employee performance. Digital Health Technologies (DHTs) contribute to enhanced decision-making, reduced administrative burdens, and improved collaboration among healthcare professionals (Adeloye et al., 2021). Research indicates that healthcare workers in technologically advanced facilities report higher job satisfaction and better workflow management than those in low-tech environments (Chigudu et al., 2022). Nevertheless, disparities in technology adoption persist, with rural healthcare centres often lacking the necessary infrastructure and training for effective implementation (Kimaro & Twaakyondo, 2020). Additionally, resistance to change among healthcare staff remains a significant barrier, slowing the seamless integration of digital solutions (Adeleke et al., 2021).

The integration of technology in healthcare presents both benefits and challenges. Improved data management through HIS enhances patient record accuracy, reducing medical errors and improving patient care (WHO, 2025). mHealth applications facilitate remote monitoring, enabling healthcare workers to track patient progress without frequent hospital visits (Adeniyi et al., 2023). Additionally, AI-driven diagnostics expedite disease detection, allowing for timely interventions and improving overall health outcomes (Adepoju et al., 2023). However, several challenges hinder the full potential of technology in healthcare. Financial constraints in developing economies limit the procurement and maintenance of advanced health technologies (Ojo et al., 2021). Poor infrastructure, including unreliable electricity and internet connectivity, disrupts the effective use of digital tools (Bertani et al., 2022). Moreover, inadequate training and digital literacy among healthcare workers contribute to resistance and low adoption rates (Kuunibe et al., 2023). Data security concerns also pose a significant risk, as healthcare institutions must protect sensitive patient information from cyber threats (Alami et al., 2020).

Nevertheless, the findings from existing research on technology integration and employee performance are still inconclusive, as Klemenc-Ketis et al. (2023) argued that integrating data analytics into healthcare practices allows for evidence-based decision-making, which subsequently improves outcomes. Employees can leverage real-time data to optimize care delivery, access more accurate information for patient management, and contribute to quality improvement initiatives, positively affecting their performance. However, Kuo and Fuchs (2020) posit that integration of technology in healthcare facilities has often led to a decline in face-to-face interactions among healthcare professionals, which can negatively impact teamwork and collaboration. Studies have shown that over-reliance on electronic communication can create misunderstandings and a lack of personal connection among team members (Klemenc-Ketis et al., 2023). Addressing these challenges through increased investment, capacity building, and policy support will be essential in leveraging technology to improve healthcare outcomes. In addition, academic research on these variables using an integrated model is limited, especially in the context of developing economies. Existing studies on technology integration (Ahmad & Singh, 2024; Renaldo, 2022; Ifinedo &

Kankaanranta, 2021; Awad, 2020; Kumar et al., 2020; Madaki, Hasan et al., 2020) have all been limited to the developed economies, creating a contextual gap to be filled. Additionally, it is difficult to find mediation analysis in the existing studies, creating a conceptual gap to be filled. In view of this research deficiency, it is necessary to explore the benefits of technology integration (BTI), challenges of technology integration (CTI), level of technology integration (LTI), nature of technology integration (NTI), and employee performance in a resource-constrained economy.

Literature Review

Theoretical review of the socio-technical theory

This study was guided by the socio-technical theory. According to Socio-technical theory (STT), social and technological systems must work in harmony for technology to be successfully implemented within businesses. In order to achieve optimal performance, this theory—which was first developed by Eric Trist and his colleagues at the Tavistock Institute in the 1950s—emphasises that both the technical (tools, technologies, and processes) and the social (people, culture, and organisational structure) aspects must be taken into account (Trist, 1981; Mumford, 2006). This theory offers a useful framework for comprehending the challenges associated with technology integration and its effect on worker performance in the context of the health sector in developing nations. Healthcare systems in many developing nations confront numerous obstacles, such as a lack of funding, poor infrastructure, and staff members with differing degrees of technical literacy (Awad, 2020). The socio-technical theory emphasises how crucial it is to modify technology to suit the local environment, making sure that it complies with accepted customs and meets particular requirements. A study by Alhassan et al. (2021), for instance, showed that healthcare institutions that allowed staff members to participate in the selection and deployment of electronic health records (EHRs) saw improved performance outcomes and greater acceptance rates. Successful technology integration requires a sense of ownership and commitment, which businesses may cultivate by involving healthcare staff in the decision-making process.

Furthermore, the social aspects of STT highlight how important leadership support and company culture are in promoting technology adoption. According to research by Nisar et al. (2021), employee engagement with new technologies can be improved by an organisational culture that is supportive and marked by open communication and collaboration. On the other hand, a lack of training and reluctance to change might impede the integration process and result in less-than-ideal performance (Mokhtar et al., 2020). Therefore, optimising the advantages of technical improvements in healthcare settings requires addressing the social variables surrounding technology integration. The socio-technical viewpoint also highlights the necessity of ongoing technology assessment and modification to maintain its efficacy across time. According to Zeng et al. (2021), frequent input from healthcare professionals can help guide the necessary modifications to technological systems, guaranteeing that they continue to be applicable and efficient in satisfying the changing needs of both staff and patients. This iterative process is consistent with STT's tenets, which emphasise that technology should be seen as a component of a larger socio-technical system rather than as an isolated entity.

The theory relates to the various variables of the study in that, in terms of benefits of technological integration (BTI), the socio-technical theory argues that the advantages of technological integration are influenced by how the technology is incorporated into the social and organisational context, as well as by its technical capabilities (Ahmad & Singh, 2024). The advantages of technological integration—such as increased production, efficiency, and employee satisfaction—are more likely to materialise when the technical and social systems are in harmony. For challenges with Technological Integration (CTI), the socio-technical theory again is of the view that integrating technology can also lead to problems, including user rejection, resistance to change, and interruptions to customary work procedures. By considering the requirements and worries of the workers impacted by the technological advancements, these issues—

which result from the mismatch between the technical and social systems—can be resolved (Renaldo, 2022). Level of Technological Integration (LTI) is also supported by the socio-technical theory. That is, the equilibrium between the social and technical systems should dictate the degree of technological integration. Depending on the particular organisational and societal conditions, a high degree of technology integration might be desirable in some situations while a lesser level might be more appropriate in others.

In terms of the Nature of Technological Integration (NTI), the socio-technical theory also relates in that, from basic automation to more intricate, integrated systems, the socio-technical theory highlights the significance of the nature of technological integration. To guarantee the successful and efficient use of technology, the nature of technological integration should be in line with the social and organisational context. Lastly, the relevance of employee performance (EP) to the socio-technical theory is that the interaction between the technological and social systems has an impact on employee performance (Ifinedo & Kankaanranta, 2021). Employees are more likely to be interested, motivated, and productive when the technological and social systems are in harmony, which improves performance results. The socio-technical theory offers a comprehensive viewpoint on technology integration in businesses, emphasising the significance of considering both the technical and social elements that affect technological integration success. By using this theory, businesses can better comprehend and handle the difficulties that arise with integrating technology, as well as take advantage of the advantages to enhance worker productivity and organisational results (Awad, 2020).

Some criticism has been levelled against the socio-technical theory, and one of these is that it is context-driven. That is the particular context in which the socio-technical theory is used has a significant impact on it. Due to variations in organisational culture, structure, and other elements, what functions well in one organisation might not be as effective in another. Another criticism of the theory is about measurement difficulties. That is, a socio-technical system's success or failure can be attributed to a number of factors, including organisational culture, employee satisfaction, and the alignment of the technical and social systems (Madaki, Hasan et al., 2020). Despite the drawbacks of the theory, it was used for this study because it poses several advantages over other existing theories. The socio-technical theory adopts a more comprehensive approach by considering the interaction between the technical and social aspects of a system, in contrast to alternative theories like the Technology Acceptance Model (TAM), the Technology-Organisation-Environment (TOE) framework, and the Task-Technology Fit (TTF) theory (Kumar et al., 2020). Also, the socio-technical theory places a greater emphasis on the social factors, such as organisational culture, employee attitudes, and how technology affects work practices, whereas TAM, TOE, and TTF mainly concentrate on the technical and organisational elements that affect technology adoption and use. Also, the socio-technical theory acknowledges that the interaction between the social and technical systems is a dynamic, continuous process that calls for constant optimisation and modification (Awad, 2020). This dynamic viewpoint is better in line with the reality of contemporary organisations, which are always changing and adjusting to new social and technical developments. Finally, because it may be used in a variety of organisational settings and technology systems, the socio-technical theory is more adaptable than other theories. This adaptability makes it possible to analyse the variables that affect the success or failure of technological integration in a more detailed and context-specific manner (Awad, 2020).

To sum up, socio-technical theory provides a thorough framework for comprehending the dynamics of technology integration in emerging nations' health sectors. Healthcare companies can foster more conducive conditions for technology adoption by considering both the technical and social factors. This will ultimately increase employee performance and the quality of healthcare services provided. In order to create methods that successfully address the particular difficulties faced by healthcare systems in developing environments, future research should keep examining how these factors interact.

Conceptual review and hypotheses development

Technology integration and employee performance

Technology integration in healthcare refers to the systematic integration of digital processes, systems, and tools within healthcare service delivery to improve performance, accuracy, and overall performance. This integration is particularly important in developing economies with a scarcity of resources, ineffective process administration, and the unavailability of health information. The integration of digital devices within health institutions can improve workflow management, reduce clerical burden, and enhance task effectiveness. However, poor or poorly coordinated integration can introduce redundancies, aggregate workload, and contribute to health practitioners' resistance.

The socio-technical theory helps us understand the importance of digital adoption in healthcare. In developing economies, the integration of digital health practice is susceptible to factors such as facilities' preparedness, financial constraints, and employees' digital skill levels. Low integration can be due to poor employee preparation, poor data management, or fear of operating new digital devices (Ifinedo & Kankaanranta, 2021). Integrated technology can increase employees' productivity by reducing workload tension, eliminating differences, and maximising resource utilisation. For example, automation of clerical tasks and AI-based decision-making can save time and optimise treatment. However, challenges such as poor internet coverage, limited resources, change resistance, cybersecurity issues, patient file safety, and compliance issues can hinder integration. Technology integration in healthcare is crucial for correctness, efficiency, and effective service delivery, especially in developing economies. Addressing infrastructure, financial constraints, workforce skill upgradation, and data protection is essential for achieving the benefits of technology integration and enhancing employee productivity.

Employee performance is a crucial factor in organisational success, particularly in service-oriented areas like healthcare. It impacts task productivity, decision-making accuracy, technology adaptability, service excellence, and patient satisfaction. Productive healthcare employees enhance service levels, reduce errors, and maximise productivity, contributing to sustainable healthcare facilities, especially in developing economies with manpower shortages and resource availability challenges. Employees perform better when there are clear, specific, and challenging goals that translate organisational goals.

Key determinants of employee performance in healthcare facilities include job stress, workload, training, and technology integration. In developing economies, job demands can lead to burnout, increased medical errors, and poor patient care. Digital health software, such as EHR, telemedicine, and automated appointment planning, can enhance productivity but can also lead to frustration and workflow inefficiencies. Quantitative and non-quantitative measures of employee performance are essential in healthcare, with numerical measures like attendance, treatment correctness, and compliance determining performance. However, measuring performance is problematic in developing economies due to the lack of a defined framework and digital-based software. Workforce performance is linked to healthcare service outcomes, with well-performing healthcare employees yielding better recovery outcomes, lower hospital admissions, and operational effectiveness. However, poor performance can result from workspace ineffectiveness, staffing levels, training, and digital resource availability. Investments in workforce training, workspace conditions, and resource utilisation can improve performance and job dissatisfaction.

Hypotheses development

Benefits associated with technology integration and employee performance

The use of technology in healthcare enhances professional collaboration and communication, which boosts teamwork and performance. Telemedicine platforms and electronic health records (EHRs) make information sharing easy and minimise mistakes and misunderstandings. Healthcare workers can concentrate on patient care by automating administrative duties, which increases productivity. Clinical decision-making is improved by real-time data access, which also boosts staff confidence and patient

outcomes. By offering chances for skill improvement in online training courses and simulation-based settings, technology integration also promotes lifelong learning and professional growth. The competency levels of healthcare personnel are raised by this continuous education, which improves their performance and flexibility in a field that is changing quickly (Awad, 2020).

There are still a lot of unanswered questions about the connection between employee performance and technology integration in the health sector, especially when it comes to developing nations. The majority of current research focuses on industrialised nations, whose healthcare and technology infrastructures differ significantly from those in developing nations (Renaldo, 2022; Kumar et al., 2020). Empirical research examining the long-term effects of technology adoption on employee job performance in terms of delivering tasks better and faster, or job satisfaction, and labour motivation in emerging nations is lacking (Madaki, Ahmad & Singh, 2024). Filling up these gaps will yield insightful information and advance a more thorough comprehension of how technology might be used to improve worker performance in a variety of healthcare settings. Based on this operational and conceptual framework, this study developed the following hypothesis:

H1: *Benefits associated with technology integration significantly influence employee performance in the Ghanaian health sector*

Challenges associated with technology integration and employee performance

Several obstacles that have a big impact on worker performance arise when technology is integrated into the health sector in developing nations. Insufficient technological infrastructure is a significant problem that frequently prevents new systems from being implemented successfully. The hardware, software, and internet connectivity needed for effective technological integration are lacking in many healthcare facilities in these areas (Hasan et al., 2020). In addition to delaying the adoption of necessary technologies, this shortcoming irritates healthcare professionals who are keen to use contemporary tools to enhance their performance. Furthermore, healthcare workers may feel unprepared to use new technology efficiently if they do not receive the necessary training and support, which can result in resistance to change (Ahad et al., 2018). This resistance may eventually lower the standard of patient care and have a detrimental effect on job satisfaction. Employee performance may be impacted by obstacles to technology adoption, such as mistrust of digital systems or worries about data protection (Loqo, 2017).

That notwithstanding, Higgins (2019) and Johnson and Miller (2017) found that because some employees might be resilient and adaptable, difficulties with technology integration could have little effect on their performance. While personnel concentrate on core competencies to carry out their duties, support mechanisms like training and help desks assist in addressing integration challenges, which may also reduce the effect of challenges with technology on their performance. Collaboration is encouraged by a healthy workplace culture, and transitions are made easier by implementing technology gradually. However, there is a lack of empirical studies on how challenges with technology integration influence employee performance in Ghana like Ghana. Additionally, it is also not clear whether the same challenges in the developed economies associated with technology integration can also influence employee performance in a developing economy like Ghana. For this reason, the study hypothesised that:

H2: *Challenges associated with technology integration significantly influence employee performance in the Ghanaian health sector*

Level of technology integration and benefits associated with technology

The degree of technology integration in developing nations' health sectors is a key factor in exploring the advantages of that integration. Healthcare facilities see notable gains in operational effectiveness and patient care quality as they implement cutting-edge technologies, such as Electronic Health Records (EHRs), telemedicine, and mobile health applications (Davies & West, 2013). Caverly et al (2008), for

example, discovered that hospitals with greater degrees of technological integration reported improved communication amongst medical staff, which resulted in better-coordinated patient care and fewer medical errors. According to this correlation, healthcare professionals can use technology to enhance their performance as it becomes more integrated, which will ultimately improve patient outcomes and organisational efficacy (Yee & Oh, 2012). Nevertheless, despite the obvious benefits, there are significant gaps in the literature about the precise level of technology integration in the health sector of the Ghanaian economy. It is not clear whether technology integration in the health sector of a developing country like Ghana is at the basic integration level, intermediate integration level or at the advanced integration level. Relying on this conceptual and theoretical foundation, the study proposes the following hypothesis:

H3: *The level of technology integration significantly influences the benefits associated with technology integration in the Ghanaian health sector*

Level of technology integration and employee performance

Employee performance and the degree of technological integration in healthcare settings are strongly correlated, especially in developing nations (Kumi, 2024). Greater levels of integration frequently result in more effective and efficient day-to-day operations, freeing up healthcare workers to concentrate more on patient care rather than administrative duties. According to research by Krishnan et al. (2025), organisations that integrate cutting-edge technology, like telehealth services and Electronic Health Records (EHRs), report better staff communication and workflow. Delivering high-quality healthcare services requires teamwork and collaboration, which are fostered by increased communication. According to Khan et al. (2021), employees' performance indicators, including treatment outcomes and patient satisfaction, tend to improve dramatically as they become more proficient in using integrated technology.

Though technology integration has a relationship with employee performance, could there be differences in the performance of employees based on whether the level of technology integration is at basic integration, intermediate integration or advanced integration? This is not clear in existing literature, and further empirical studies are required, especially from a developing economy perspective, to provide more answers to how the various levels of technology integration relate to employee performance. For legislators and hospital administrators looking to enhance health outcomes through efficient technology adoption, filling in these gaps can yield insightful information. On the basis of the above discussion, we proposed the following hypothesis:

H4: *Level of technology integration significantly influences employee performance in the Ghanaian health sector*

The nature of technology integration and the challenges associated with it

The nature of technology integration in healthcare refers to the methods and approaches adopted for integrating technology into the health landscape (Hidayat & Firmanti, 2024). Nature of technology integration could be organisational, where the technology integration is either influencing the strategic, tactical or operational level of health institutions. The nature of the integration could also relate to whether the integration is just a technical consideration focusing on hardware and software development or a human dimension paying attention to the end users (Mehdaoui, 2024). The level of challenges associated with technology integration could differ based on the nature of integration. The challenges with technology integration could be more pronounced if it focuses more on the technical considerations without paying attention to the end users or human dimensions. Alternatively, challenges with technology integration could also be easily and better addressed if the nature of technology integration is strategically influenced rather than just tactically and operationally focused. Though existing studies (Hidayat & Firmanti, 2024; Theodorio, Waghid & Wambua, 2024) have found a relationship between the nature of technology integration and the degree of the effect, depending on whether the nature of the integration is technical or human. Strategic, tactical, or operational is missing in the literature. It is for this reason that this study hypothesised that:

H5: *The nature of technology integration significantly influences the challenges associated with technology integration in the Ghanaian health sector.*

The nature of technology integration and employee performance

The nature of technology integration, whether technical or human, operational, tactical or strategic, could also influence employee performance differently (Hidayat & Firmanti, 2024). Technology integration across the strategic, tactical and operational levels could provide a better employee performance due to the commitment from all levels of the organisation than integration at only either the strategic or operational level (Khan et al., 2021). In the same vein, technology integration that considers both the technical and human perspectives could influence employee performance better than only one of them (Awad, 2020). This is because both hardware and software, as well as the concerns of the end users, are important considerations in using technology to enhance employee performance in an organisation. Despite this relevance, it is very difficult to find in the existing literature empirical findings on how the specific nature of technology integration by organisation impacts employee performance, especially from the developing economy perspective. It is for this reason that this study hypothesised that:

H6: *The nature of technology integration significantly influences employee performance in the Ghanaian health sector*

Nature and level of technology integration

The nature and levels of technology integration have been separately linked to employee performance, as adduced for other hypotheses of the study (Quintos, 2024; Khan et al., 2021), but the same cannot be said for the intra-relationship between the level and nature of technology integration from a developing economy perspective. Integrating technology in the health sector across the strategic, tactical and operational levels, health institutions could still differ in terms of levels, such as basic integration, intermediate integration or advanced integration. It is possible that at the strategic level, technology could improve HR strategy by using AI and sophisticated analytics to match talent acquisition and workforce planning with long-term corporate objectives. In order to ensure effective execution of strategic initiatives, HR practices could also, at the tactical level, be deployed through systems that simplify procedures like employee engagement and onboarding. At the operational level, technologies could again free up HR professionals to concentrate on more strategic duties by automating repetitive HR operations like payroll and attendance monitoring. The organisation's overall success could ultimately be supported by the responsive and engaged workforce that is fostered by this alignment at all levels.

Meanwhile, it is difficult to find from the existing literature any empirical findings on how the levels of technology integration, such as basic integration, intermediate integration or advanced integration, are really impacted by the nature of technology, as to whether deployed at strategic, tactical or operational levels. There is also a dearth of literature on how the basic integration, intermediate integration or advanced integration relate with either the nature of technology integration, which was technical (software and hardware) focused or anchored on end users (human-focused). For this reason, the study hypothesised that:

H7: *The nature of technology integration significantly influences the level of technology integration in the Ghanaian health sector*

The mediating role of Level and benefits of technology integration on the nature of technology integration and employee performance

There is no doubt that technology integration comes with several advantages to both employees and organisations or health institutions (Jaya & Susyla, 2024). Increased technological integration frequently results in notable gains in overall health outcomes, patient care quality, and operational efficiency. Furthermore, healthcare professionals are better able to access and exchange vital patient data as integration levels rise, which results in prompt interventions and higher patient satisfaction (Rahman et al.,

2024). These benefits associated with technology integration can, however, vary depending on whether the technology integration is at a basic, intermediate or advanced stage of integration. It is possible that as health institutions scale up their technology integration from the basic level to the advanced level, more benefits could be harnessed as compared to remaining at the basic level (Zou et al. 2025). Employees could also deliver on their mandates and tasks better and faster with advanced technological integration as compared to the basic level of integration. How this intricate relationship could further play a combined mediation role between the nature of technology integration and employee performance is very absent in the existing literature (Zou et al. 2025, Rahman et al., 2024, Jaya, & Susyla, 2024). Without exploring how the extent and depth of level of technology integration relates to benefits like patient engagement, employee productivity, and long-term health improvements, creates gap in the literature that needs to be filled. Based on this theoretical and operational foundation, the study proposes the following hypotheses:

H8: *The level of technology integration and the benefits associated with technology integration had a combined mediating effect on the relationship between the nature of technology integration and employee performance in the Ghanaian health sector*

The mediating role of benefits on the relationship between the level of technology integration and employee performance

The direct relationship between benefits of technology integration with level of technology integration (Awad, 2020); and between benefits and employee performance (Davies & West, 2013), as well as between levels of integration and employee performance (Kumi, 2024), have all been discussed as very important for research as can be seen from hypotheses one, three and four. What is now lacking is the mediation role or the indirect effect that the benefits associated with technology integration could have on the earlier direct relationship established, and that is the concern of this section. That is to find out if the existing direct relationship could be impacted positively or negatively by the presence of benefits as a mediating variable. This means that there could be setting levels for technology integration that could be affected positively or negatively when related to employee performance. Healthcare companies looking to maximise technology integration tactics to boost worker productivity and better general health outcomes in developing nations can find great insights from an understanding of these dynamics. Based on this theoretical and operational foundation, the study proposes the following hypothesis:

H9: *Benefits associated with technology integration significantly mediated the relationship between the level of technology integration and employee performance in the Ghanaian health sector.*

The mediating role of the level of technology integration

The direct relationship between the nature of technology integration in the health sector and the performance of health workers has been argued for hypothesis six as very important for research based on what was found by Hidayat and Firmanti (2024). An important gap in the existing literature has to do with the mediating role of level of technology integration on the direct relationship between the nature of technology integration and the benefits of technology integration, and the nature of technology integration and employee performance (Wu, Kao & Sambamurthy, 2016). Though the level of technology integration may differ based on the size of the health facility leading to different outcomes for different health facilities (Mbugua & Namada, 2019), it is not clear how the basic, intermediate and advanced level of technology integration could enhance technology integration that is more focused on technical (software and hardware) or end users across the strategic, tactical and operation levels of organisational management (Chakraborty et al, 2024). In order to close these gaps, future research should examine how integration levels mediate in a variety of technological contexts, considering how various technological features and methods can result in differing degrees of benefits and ensuing impacts on worker performance. For

healthcare businesses looking to maximise their technological initiatives for better results, this knowledge is essential. Relying upon this conceptual and operational foundation, the study develops the following hypotheses:

H10: *Level of technology integration significantly mediated the relationship between the nature of technology integration and the benefits associated with technology integration in the Ghanaian health sector.*

H11: *Level of technology integration significantly mediated the relationship between the nature of technology integration and employee performance in the Ghanaian health sector*

The mediating role of challenges with technology integration

The relationship between the type of technology integration and employee performance in emerging economies' health sectors can be somewhat mediated by the difficulties involved in integrating it. The complexity of systems, the degree of usability, and the extent of employee training are all aspects of the nature of technology integration (Khan et al., 2021; Alhassan et al., 2021). Employees may get frustrated and less productive when healthcare organisations use technologies that are hard to integrate or need a lot of training, which can impair their performance as a whole (Awad, 2020). Inadequate training and support, for example, might result in low adoption rates and low employee morale, which can eventually affect the quality of patient care (Nisar et al., 2021). This implies that the degree to which the nature of technology improves employee performance may be mediated by the difficulties encountered during the integration process. Even though these difficulties are acknowledged, little is known about how they mediate the relationship between employee performance and technology integration. Investigating the relationship between the type of technology integration, the difficulties faced, and their combined impact on worker performance can close these gaps. Relying on this conceptual and operational foundation, the study develops the following hypothesis:

H12: *Challenges with technology integration significantly mediated the relationship between nature of technology integration and employee performance in the Ghanaian health sector*

Based on the review conducted so far, a conceptual framework was carved to guide the study, as presented in Figure 1. The framework highlighted the direct and indirect relationships between the variables of the study. The straight-line arrows indicated a direct relationship, and the broken line arrows in different colours also indicated the indirect relationship between the variables of the study.

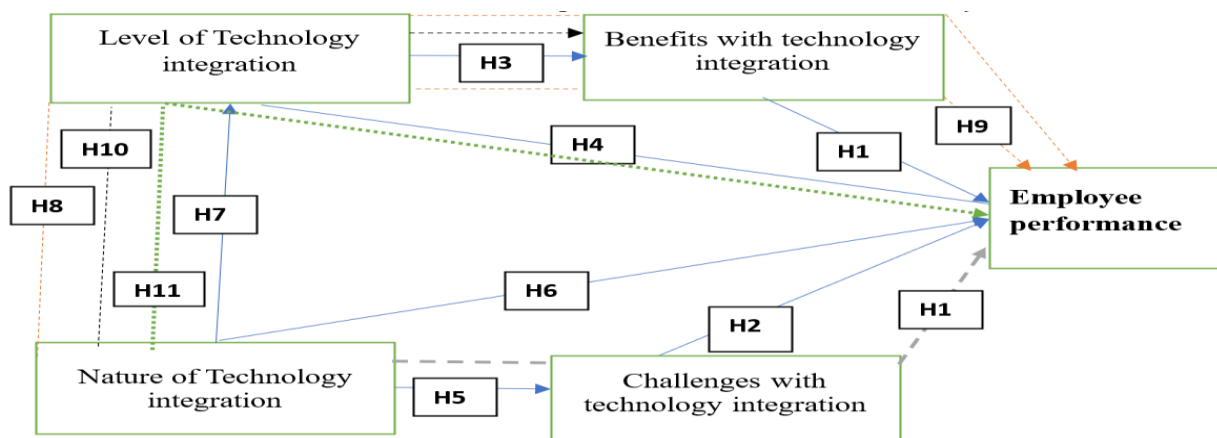


Figure 1: Conceptual framework of the study

- Represent a direct relationship
- in different colours represent an indirect relationship

Though "nature of technological integration" and "level of technological integration" are not well-established constructions with a long theoretical history, their inclusion in this study as variables can

nonetheless be justified. The "nature of technological integration" describes the particular traits, attributes, and kinds of technology that are being incorporated into the company. This is a crucial factor to consider because the technology's characteristics might affect how it affects social and organisational systems. The "level of technological integration" describes how much technology is included in the workflows, procedures, and general operations of the company. This is also an important consideration because the degree of integration might influence how much of a socio-technical impact there is. The socio-technical theory highlights the significance of taking organisational systems' technical and social dimensions into account. This theoretical viewpoint is directly related to the type and degree of technological integration. This offers a more thorough and nuanced knowledge of how the socio-technical interaction affects organisational outcomes, such as employee performance and the advantages and difficulties of technological integration, by including these ideas in this research.

The underlying ideas that these terms represent are extremely significant to the practical realities of technological integration in companies, even though they may not be frequently utilised in the literature now in publication. This study has the chance to further the socio-technical theory's conceptual development and improvement by including these terms in your research. The "nature" and "level" of technological integration can be established as significant concepts within this theoretical framework with the aid of your research. Future studies and real-world applications of the theory may benefit from a more thorough and nuanced understanding of the socio-technical dynamics that result from this. Thus, even though the terms "nature of technological integration" and "level of technological integration" may not have a long theoretical history, their conceptual relevance, theoretical foundation, empirical relevance, and potential for conceptual development within the socio-technical theory can all be used to justify and incorporate them into this study.

Methods

The positivist philosophy's quantitative methodology served as the foundation for this investigation. Since this study modelled the link between dependent and independent variables, an explanatory research design was chosen. Data was gathered from a sample of 294 public health workers out of 1277 health workers in seven healthcare facilities located in the Volta Region of Ghana, West Africa. The study sample of 294 respondents was determined with power analysis, using the formula:

$$n = \frac{(Z_{\alpha/2} + Z_{\beta})^2 \cdot \sigma^2}{\delta^2} \quad (1)$$

where the necessary sample size is n . The z score that corresponds to the intended significance level ($\alpha/2$) is $Z_{\alpha/2}$. The z score that corresponds to the necessary statistical power ($1-\beta$) is called Z . The result variable's standard deviation is denoted by σ . Assuming the following, δ is the expected effect size (the difference between the two groups or conditions). The level of significance (α) = 0.005, the power of statistics ($1-\beta$) = 0.80, and the standard deviation (σ) = 12 (derived from a pilot study or earlier research). Anticipated effect size (δ) = 5 (derived from prior research or a preliminary investigation). First, the z -scores for statistical power and significance level were determined. $Z_{\alpha/2} = Z_{0.0025} = 2.807$ (obtained using a calculator or z -table). $Z_{\beta} = Z_{0.20} = 0.842$ (found using a calculator or z -table). Step 2: Plugging the values into the formula to calculate the sample, $n = \frac{(2.807 + 0.842)^2 \cdot 12^2}{5^2}$

This simplifies to: $n = \frac{(3.649)^2 \cdot 144}{25} = n = \frac{13.30 \cdot 144}{25}$ and finally $n = 13.30 \cdot 5.76 = 76.61$ required power threshold. Thus, the sample size of 294 ($n = 294.37$) (rounded up to 294) was enough. Therefore, to achieve a significance level of 0.005 and a statistical power of 0.80, the study used a sample size of 294 health workers. The 294 respondents comprised male and female nurses and medical doctors working in the seven health facilities. Before presenting the measurement model, the common method bias (CMB) of the responses was checked. This technique is typically employed to establish or rule out the existence of self-reported biases that may compromise the validity of the results (Podsakoff et al., 2012). In PLS-SEM, the

CMB is determined by relying on collinearity statistics, specifically the Variance Inflation Factor (VIF) scores. It is recommended that the scores of VIF of the indicators should range from 0 to 5.0 (Becker et al., 2015).

The study employed the stratified random sampling technique. Data for the study were gathered using a structured questionnaire measured on a five-point scale, with 1 denoting very low agreement, 2 for low agreement, 3 for moderate agreement, 4 for high agreement, and 5 for very high agreement. Since the study intended for each responder to take a position by agreeing to a level on the scale, it did not employ uncertain or neutral as part of the scale. The instrument was adopted from Awad (2020) but was modified to suit the contextual differences of Ghana. The two sections of the questionnaire focused on the demographic characteristics and items for the hypotheses guiding the study. The instrument's validity and reliability were examined, and every variable had a value higher than the required minimum of 0.70 (Segbenya & Anokye, 2022) as captured in Appendix B. Every ethical consideration was considered, including respondents' free consent, anonymity, and the ability to withdraw even if the participant had started the process. PLS-SEM, or partial least squares-structural equation modelling, was employed to analyse the study's guiding hypotheses. The Department of Business Programmes, College of Distance Education, provided the ethical clearance for the first author of the paper on behalf of the Institutional Review Board of the University of Cape Coast.

Results and findings

The results of this study are presented in two folds. That is the demographic or biodata and the results for the specific hypotheses guiding the study. The biodata is needed to aid the audience of this research to know the demographic characteristics of the respondents in order to better appreciate the results and contextualise them. The biodata of the respondents who took part in this study are presented in Table 1 and the results revealed that the majority of the respondents were female workers (55.1%), were 21-30 years of age (44.9%) and 31-40 years (44.9%) and were not married (59.9%) who were health workers at the various health facilities located in Ghana used for this study.

Table 1: Demographic Characteristics of Respondents

Demographic characteristics	No	%
Gender		
Male	132	44.9
Female	162	55.1
Total	294	100.0
Age		
20 and below	4	1.4
21-30	132	44.9
31-40	132	44.9
41 and above	26	8.8
Total	294	100.0
Marital status		
Not married	176	59.9
Married without kids	16	5.4
married with kids	100	34.0
divorced/separated	2	0.7
Total	294	100.0

Source: Field survey (2024)

Preliminary analysis

The main results of the study on the main hypotheses are preceded by some initial analysis to evaluate the quality of the PLS-SEM model used for the analysis. The individual items' loading can be seen from Appendix A, which shows that all the items loaded very well and met the necessary threshold of 0.70. Construct Reliability and Validity was the first initial analysis conducted, and the results, as shown in Table 2, revealed results for four indices across the various dimensions of technology integration and employee performance in health delivery in Ghana. The various dimensions of technology integration used in this study and presented in Table 2 were the benefits of technology integration (BTI), challenges of technology integration (CTI), level of technology integration (LTI), nature of technology integration (NTI), and employee performance. The four indices for determining the construct validity were Cronbach's Alpha, rho_A, Composite Reliability, and Average Variance Extracted (AVE). The results revealed that values obtained for the first three indices were between 0.818 and 0.949 for Cronbach's Alpha, 0.835 and 0.951 for rho_A, and 0.918 and 0.958 for Composite Reliability. The results for the first three indices were all above the minimum threshold of 0.70 recommended by Hair (2017) and Segbenya et al (2024). The results for the last indicated (Average Variance Extracted) also recorded values of 0.643 and 0.766, which were also above the 0.50 minimum threshold established for this study as recommended by Segbenya et al (2022).

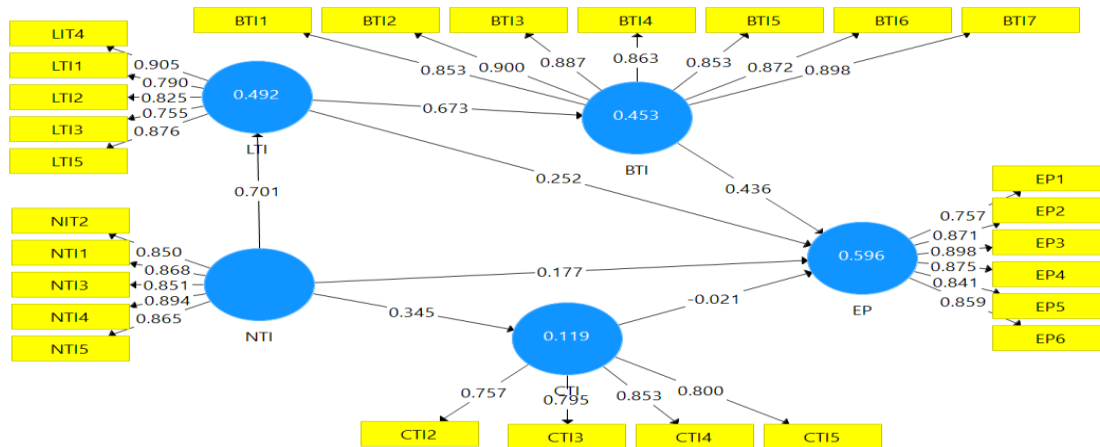


Figure 2 : Algorithm results

Source: Field survey (2024)

Table 2: Construct Reliability and Validity				
	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
BTI	0.949	0.951	0.958	0.766
CTI	0.818	0.835	0.878	0.643
EP	0.923	0.925	0.940	0.725
LTI	0.888	0.905	0.918	0.692
NTI	0.916	0.917	0.937	0.750

Source: Field survey (2024)

Discriminant Validity was the second preliminary analysis, and the results are presented in Table 3. The two indices used for this analysis were the Fornell-Larcker Criterion and Heterotrait-Monotrait Ratio (HTMT). The first part of the results represents the Fornell-Larcker Criterion, and the second part also represents the HTMT. The results, as presented in Table 3, revealed that all values obtained were below the

maximum thresholds of .850 for both indices, and that means that discriminant validity was attained for the PLS-SEM used for the analysis.

Table 3:Discriminant Validity Fornell-Larcker Criterion					
	BTI	CTI	EP	LTI	NTI
BTI	0.875				
CTI	0.496	0.802			
EP	0.728	0.347	0.851		
LTI	0.673	0.360	0.662	0.832	
NTI	0.746	0.345	0.672	0.701	0.866
Heterotrait-Monotrait Ratio (HTMT)					
	BTI	CTI	EP	LTI	NTI
BTI	0				
CTI	0.548	0			
EP	0.774	0.389	0		
LTI	0.718	0.410	0.718	0	
NTI	0.796	0.384	0.727	0.764	0

Source: Field survey (2024)

The fourth initial analysis also examined the Collinearity Statistics (VIF) of the PLS-SEM, and the results are denoted by the VIF values as presented in Table 4. The results show that all the values obtained were below the maximum threshold of 3.30 (according to Segbenya et al., 2023), suggesting that the study model (PLS-SEM) reported no multicollinearity among the various variables of the study.

Table 4: Inner VIF Values					
	BTI	CTI	EP	LTI	NTI
BTI			2.857		
CTI			1.334		
EP					
LTI	1.000		2.195		
NTI		1.000	2.711	1.000	

Source: Field survey (2024)

Analysis of the main hypotheses

The first part of the main analysis for the hypotheses was to present the results for the overall contributions of the variables of the study to the explanation of the variances in the dependent variables of the study. The overall contribution of all the variables of the study, denoted by the R-square presented in Table 5, means that the PLS-SEM predicted about 45 percent variance in BTI, 12 percent variance in CTI, 60 percent variance in EP, and 49 percent variance in LTI. The f-square also further revealed that the level of the effect of the path relations was both minimal, moderate and high.

Table 5: R Square					
			R Square	R Square Adjusted	
BTI			0.453	0.451	
CTI			0.119	0.116	
EP			0.596	0.591	
LTI			0.492	0.490	
f Square					
	BTI	CTI	EP	LTI	NTI
BTI			0.165		
CTI			0.001		
EP					
LTI	0.829		0.072		
NTI		0.135	0.029	0.968	

Source: Field survey (2024)

The results of the main hypotheses testing are also presented in Table 6. The results are divided into direct and indirect path relationship analysis, and it is clear that there was one non-significant and five significant direct path relationships. Furthermore, in terms of the indirect relationship, it is clear that there were four significant and one non-significant indirect relationship. Thus, in all two hypotheses were rejected and ten hypotheses were accepted because of the significant and non-significant relationships.

Table 6: Path Coefficients								
	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values	Confidence intervals		Remarks
Hypotheses						2.5%	97.5%	
1. BTI -> EP	0.436	0.439	0.071	6.131	0.000	0.296	0.578	Accepted
2.CTI -> EP	-0.021	-0.015	0.047	0.455	0.649	-	0.071	Rejected
						0.106		
3.LTI -> BTI	0.673	0.674	0.044	15.291	0.000	0.585	0.755	Accepted
4.LTI -> EP	0.252	0.252	0.085	2.961	0.003	0.080	0.409	Accepted
5.NTI -> CTI	0.345	0.355	0.059	5.821	0.000	0.242	0.473	Accepted
6.NTI -> EP	0.177	0.172	0.077	2.306	0.022	0.021	0.335	Accepted
7.NTI -> LTI	0.701	0.704	0.038	18.383	0.000	0.626	0.774	Accepted

Source: Field survey (2024)

Specifically, the hypothesis recorded that benefits of technological integration (BTI) related significantly to employee performance at ($\beta = 0.436$, $t = 6.131$, $P = 0.000$). The second hypothesis also recorded a non-significant relationship between challenges with technological integration (CTI) and employee performance (EP) at ($\beta = -0.021$, $t = 0.455$, $P = 0.649$). Furthermore, there was a significant relationship between the level of technological integration (LTI) and the benefits of technological integration (BTI) at ($\beta = 0.673$, $t = 15.291$, $P = 0.000$) for hypothesis three and employee performance at ($\beta = 0.252$, $t = 2.961$, $P = 0.003$) for hypothesis four. Additionally, hypotheses five and six respectively recorded a significant relationship between the nature of technology integration (NTI) and challenges with technological integration (CTI) at ($\beta = 0.345$, $t = 5.821$, $P = 0.000$) and employee performance (EP) at ($\beta = 0.177$, $t = 2.306$, $P = 0.022$). The last direct

hypothesis (Hypothesis seven) also recorded that the nature of technology integration (NTI) and level of technology integration (LTI) were significantly related at ($\beta = 0.701$, $t = 18.383$, $P=0.000$).

The results for the indirect hypotheses where the mediating power of some variables was established are also presented in Table 7. Hypothesis eight shows that both the level of technological integration (LTI) and the benefits of technological integration (BTI) together significantly mediated the relationship between the nature of technology (NTI) and employee performance ($\beta = 0.206$, $t = 4.469$, $P=0.000$). Also, the relationship between the level of technological integration (LTI) and employee performance was significantly mediated by benefits of technological integration (BTI) at ($\beta = 0.294$, $t = 5.198$, $P=0.000$) for hypothesis nine. Hypothesis 10 also recorded that the level of technological integration (LTI) significantly mediated the relationship between the nature of technology integration (NTI) and the benefits of technological integration (BTI) at ($\beta = 0.472$, $t = 9.402$, $P=0.000$). Level of technological integration (LTI) significantly mediated the relationship between nature of technology integration (NTI) and employee performance for hypothesis eleven at (BTI) at ($\beta = 0.177$, $t = 2.994$, $P=0.003$). The final hypothesis of the study (hypothesis twelve) also recorded that challenge with technology integration (CTI) had a non-significantly mediated the relationship between the nature of technology integration (NTI) and employee performance at (BTI) at ($\beta = -0.007$, $t = 0.440$, $P=0.660$).

To distinguish between the three types of mediation, namely full, partial, and no mediation, scholars argue that both the direct and indirect paths should meet specific criteria. For full mediation, the direct path must be non-significant, while the indirect path should be significant. For partial mediation, both the direct and indirect paths should be significant, whereas in no mediation, neither the direct nor the indirect paths are significant. The decision regarding partial mediation is based on the procedure outlined by Nitzi et al. (2016), who stated that partial mediation is established when both the direct and indirect paths linking the two constructs are significant. Thus, both partial and no mediation were recorded for this study, as shown in Table 7.

	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values	Confidence intervals		Type of mediation	Remarks
						2.5%	97.5%		
8. NTI -> LTI -> BTI -> EP	0.206	0.210	0.046	4.469	0.000	0.131	0.307	Partial mediation	Accepted
9. LTI -> BTI -> EP	0.294	0.297	0.056	5.198	0.000	0.200	0.411	Partial mediation	Accepted
10. NTI -> LTI -> BTI	0.472	0.475	0.050	9.402	0.000	0.384	0.567	Partial mediation	Accepted
11. NTI -> LTI -> EP	0.177	0.176	0.059	2.994	0.003	0.057	0.286	Partial mediation	Accepted
12. NTI -> CTI -> EP	-0.007	-0.005	0.017	0.440	0.660	-0.036	0.027	No mediation	Rejected

Source: Field survey (2024)

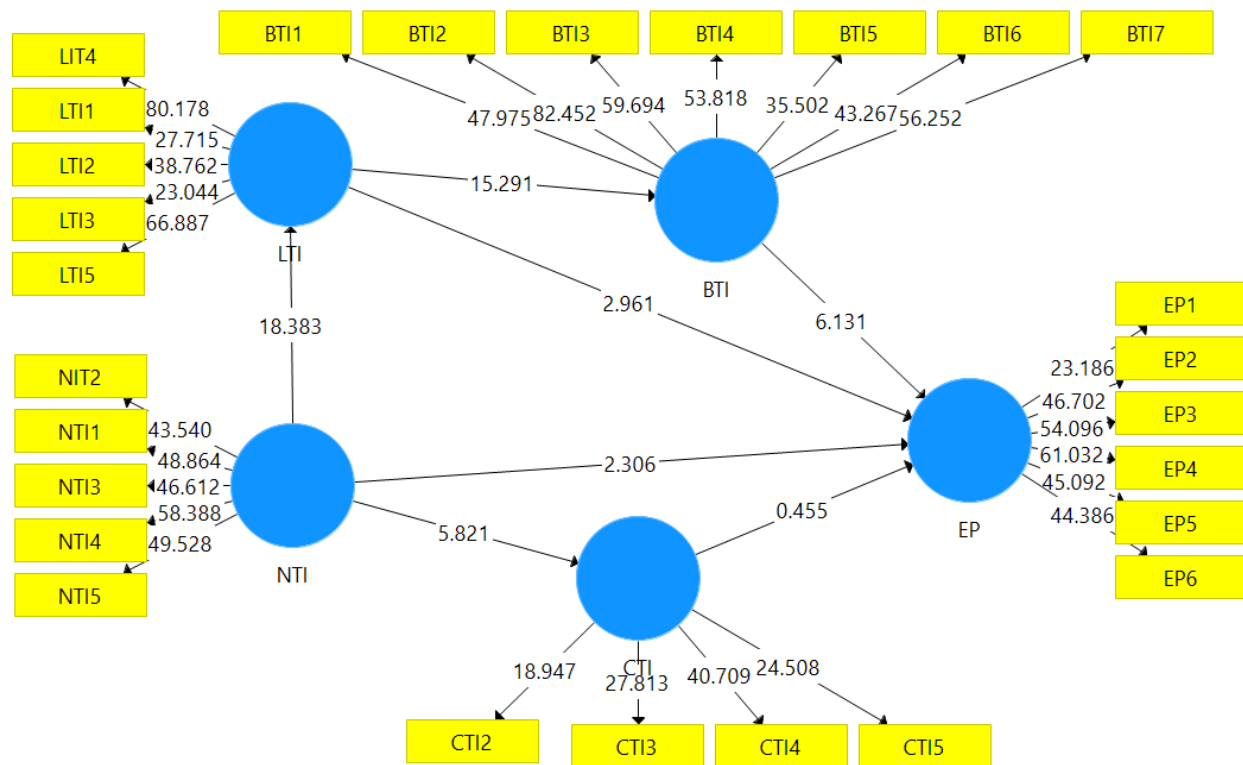


Figure 3 Bootstrapping results

Source: Field survey (2024)

Discussion of the results

The results for hypothesis one, that there was a significant relationship between benefits associated with technology integration (BTI) and employee performance in the health sector, means that any increase in the technology integration into the work schedules of health workers' service delivery will lead to an increase in employee performance in the health sector. This means that technology integration in health services delivery or telehealth has impacted the timeliness of delivering health services, the precision of patient diagnoses, increased patient satisfaction, and enhanced the possibility of reducing medical errors among health workers in developing economies. The results further mean that technology integration not only brings benefits to employees in the health sector but also has the propensity to further enhance their performance in terms of task performance, minimising errors associated with their work schedule delivery, among others. The results agree with the findings of Alshammari and Alenezi (2023) that technology integration leads to enhancing employee performance. The disparity between these findings and the findings of the previous studies is related to contextual differences. While the earlier studies are limited to IT, business and education sectors, this study adds to the existing knowledge by showing that technology integration benefits and enhances employee performance in the health sector as well.

The findings for hypothesis two that challenges with technology integration does not significantly influence employee performance in the health sector means that employee performance in the health sector does not share its potency with challenges with technology integration. That means that there are several other factors other than challenges that could significantly influence employee performance among

employees in the health sector. Thus, an increment in challenges associated with technology integration is not adequate to significantly influence employee performance in the health sector. The results suggest that the challenges with technology integration faced by workers in the health sector were not strong enough to significantly influence the performance of employees. The non-significant relation recorded could be explained by the assertion held by Higgins (2019) and Johnson and Miller (2017) that, because some employees might be resilient and adaptable, difficulties with technology integration could have little effect on their performance. Also, support mechanisms like training and help desks assist in addressing integration challenges, which may also reduce the effect of challenges with technology on employees' performance. As much as there was a non-significant relationship established for hypothesis two, it adds to the existing knowledge that employee performance in the health sector is not significantly influenced by challenges with technology integration. The findings disagree with the findings of Alshammari and Alenezi (2023), Amer, Ayed, Malak and Bashtawy (2023); le Roux, Bimerew and Chipps (2024) that there is a significant relationship between challenges with technology integration and employee performance.

The findings of hypothesis three also established that the level of technology integration significantly influences the benefits associated with technology integration in the health sector, which can also be explained further. The results mean that any change in the levels of technology integration will seriously determine the level and type of benefits to be derived. The results mean that technology integration is at various levels, such as foundational, intermediate and advanced levels, used for delivering healthcare services in developing economies. The results mean that health facilities that are operating at the foundational level of technology integration could have minimal benefits associated with technology integration as compared to facilities with advanced levels of technology integration for delivering their health services. Thus, the findings of Ifinedo and Karkaanranta (2021) suggest that harnessing the benefits of technology integration will be highly influenced by the level of technology integration.

The findings for hypothesis four, that the level of technology integration significantly influences employee performance in the health sector, can also be explained further. The results mean that the level of technology integration not only influences the benefits of technology integration but also influences employee performance in the health sector. That means that any change in the level of technology integration will lead to an increase in employee performance. The results further suggest that employees with a foundational level of technology integration could be performing at a lower level of their task delivery as compared to employees at an advanced level of technology integration in the health sector. The results, therefore, agree with the findings of (Amer et al., 2023; Le- Roux, Bimerew and Chipps, 2024). who also found that technology integration enhances the performance of employees in Ghana.

Hypotheses five and six established that the nature of technology integration significantly influenced challenges with technology integration and employee performance in the health sector. The findings suggest that the nature of technology integration in health services delivery in Ghana not only influences challenges faced with the use of the technology but also has an effectual relationship with employee performance. Thus, employers desirous of enhancing employee performance and reducing challenges associated with technology integration should pay attention to the nature of the technology deployed for health services delivery. That means that some technological platforms for health services delivery, such as telemedicine and eHealth, among others, come with different levels of challenges and the right type for the right health facility could pose acceptable and manageable levels of challenges for workers at such health facilities. The findings for hypothesis six also further mean that the same nature of

technology integration has the potential to determine whether employees will perform better by ensuring a high level of patient satisfaction with health service delivery in the developing economy. The findings for the two hypotheses, therefore, agree with the findings of Alshammari and Alenezi (2023) and Harerimana and Mtshali (2019) that the nature of technology is significantly related to employee performance and challenges associated with technology integration.

The findings for the last hypothesis for the direct path relations (hypothesis seven), that the nature of technology integration significantly influenced the level of technology integration, suggest that health facilities' decision to integrate technology into their activities will be influenced by the nature of technology available to such health facilities. The results mean that some health facilities in developing economies might not integrate technology into their health service delivery if the available technology is not affordable and user-friendly or compatible with the health services delivery at such facilities. Also, the level of competencies of the health workers at such facilities could also be part of the nature of technology integration, in that staff with higher levels of competence for the use of technology for health services delivery could influence the early adoption of the same by their health facilities. The findings, therefore, agree with the findings of Khashan, Alasker, Ghonim and Elstouhy (2025) and Tavares, Goulão and Oliveira (2018) that the nature of technology integration seriously influences the level of technology integration in health service delivery.

Hypothesis eight, which happened to be the first indirect path relations, confirmed that both the level of technology integration and benefits associated with technology integration collectively and significantly mediated the relationship between the nature of technology integration and employee performance in the health sector of a developing economy. The results mean that both the nature of technology integration and employee performance had their potency enhanced with the presence of the right level of technology integration and the benefits associated with technology integration. Comparing the t-values of the presence of the mediating values to their absence captured under hypothesis six revealed that the former recorded a higher t-value, confirming the relevance of the presence of the level of technology integration and benefits associated with technology integration as mediating variables. The findings of this study have contributed to the existing knowledge by providing the potency of the mediating variables since earlier findings by Varriale, Cammarano, Michelino and Caputo (2025) and Alshammari and Alenezi (2023) could only establish a direct relationship between the nature of technology integration and employee performance in sectors other than the health sector of a developing economy.

Meanwhile, the individual mediating power of benefits associated with technology integration on the relationship between the level of technology integration and employee performance is also captured in hypothesis nine. The results, as compared to hypothesis four, mean that when the mediating variable of benefits associated with technology integration was introduced, the significance level increased, or the relationship between the two variables became better, as compared to the absence of it. The results further validate the potency of the mediating role of benefits associated with technology integration in the delivery of health services in developing economies. Thus, employers seeking to influence the relationship between the level of technological integration and employee performance could pay attention to how to use the benefits associated with technology integration to enhance the relationship. The results, therefore, add to the existing findings of Alshammari and Alenezi (2023) and Varriale et al. (2025), who also established the direct relationship between the level of technology integration and employee performance. This study,

however, added to the existing knowledge of the mediating effect of benefits associated with technology integration on the relationship between the two variables in the health sector of Ghana.

Another individual mediating power was recorded for the role of the level of technology integration on the relationship between the nature of technology integration and the benefits of technology integration for hypothesis ten. The results mean that management attempts to enhance the relationship between the nature of technology integration and the benefits associated with it could achieve that by paying much attention to the level of technology integration. Thus, the nature of technology integration and the benefits associated with it for health facilities in Ghana will largely depend on whether these facilities are operating at the foundational, intermediate or advanced level of technology integration for their health service delivery. Though earlier studies like Alshammari and Alenezi (2023), Khashan et al. (2025), and Tavares, Goulão & Oliveira (2018) found a direct significant relationship between the nature of technology integration and benefits associated with technology integration, this study added to the existing knowledge that the level of technology integration significantly mediated the relationship between the two variables.

Findings for hypothesis eleven of the study further revealed that the relationship between the nature of technology integration and employee performance was significantly mediated by the level of technology integration adopted by health facilities in Ghana. The results mean that both the nature of technology integration and employee performance in the health sector shared their predictive potency with the level of technology integration. That is, the foundational, intermediate or advanced level of technology integration by a health facility will significantly influence employee performance in the health sector. Thus, employers desirous of enhancing the relationship between the nature of technology integration and employee performance in the health sector could use the various levels of technology integration to achieve that. This finding of the study is a contribution to the existing knowledge and literature. That is previous studies have found a direct relationship between the nature of technology integration and employee performance. However, this study added that the level of technology integration mediated the relationship between the two variables significantly.

Challenges associated with technology integration in health service delivery in Ghana were, however, found to have a non-significant mediated relationship between the nature of technology integration and employee performance for hypothesis twelve. The results mean that the relationship between employee performance and the nature of technology does not depend on the challenges encountered with its integration being significant. Thus, challenges with technology integration are not mediators and do not have the predictive power to influence the relationship between the nature of technology integration and employee performance. The non-significant mediating effect was found for challenges with technology integration on the relationship between the nature of technology integration and employee performance, which is a contribution to the existing knowledge. This is because existing studies by Varriale et al. (2025) only established a significant relationship between the nature of technology integration and employee performance in the health sector of Ghana.

Practical implications of the findings of the study

The findings of this study have several practical implications. The first practical implication of the findings of the study is that technology integration is at various levels (foundational, intermediate and advanced levels) for health service delivery in Ghana. This means that the adoption of technology for health service delivery in Ghana differs from one health facility to another. Closely associated with this are the benefits

and challenges associated with technology integration. The level of technology integration, therefore, determines the kind of benefits and challenges faced by the various health facilities in the developing economies. This means that health facilities desiring to benefit most and reduce the challenges with technology integration in health service delivery will need both competent human resources and adequate financial resources to migrate to the advanced level of technology integration in health service delivery. The last practical implication of the findings of the study is that technology integration improves employee performance in the health sector. This means that health facility managers need to train health workers on how to use such technologies to deliver on their work schedules. This will further demand continuous training on various technologies available and equipping these workers with the skills to manipulate new technologies for health services delivery at the various health facilities in a developing economy.

Theoretical implications of the findings of the study

The theoretical implications of the findings of this study are also diverse. The first theoretical implication of the findings of this study in relation to the socio-technical theory adopted for this study is that social and technological systems must work in harmony for technology to be successfully implemented for delivering health services in a developing economy. The outcome of this study further confirmed that tools, technologies, and processes, as well as people, culture, and organisational structure, must be respected in ensuring a successful technological integration for health services delivery in a developing economy. The findings of this study therefore confirmed and supported the relevance of the socio-technical theory for the health sector in a developing economy.

Conclusion and recommendation

This study examined technology integration in health services delivery and employee performance in a developing economy. The study found that there was a significant relationship between benefits associated with technology integration (BTI) and employee performance in the health sector. It was also established that the level of technology integration significantly influences the benefits associated with technology integration and employee performance in the health sector.

Furthermore, it was established that the nature of technology integration significantly influenced challenges with technology integration and employee performance in the health sector, as well as the level of technology integration. In terms of the mediation effect, the study found that the level of technology integration significantly mediated the relationship between the nature of technology integration and employee performance, as well as the benefits associated with technology integration. The study further found that the level of technology integration and the benefit of technology integration had a combined significant effect on the nature of technology integration and employee performance. Lastly, it was found that benefits associated with technology integration also significantly mediated the relationship between the level of technology integration and employee performance in the health sector.

The conclusions of the study require specific steps to be taken by managers of health facilities and workers in the health sector to harness the full benefits associated with technology integration in the health sector. It was therefore recommended that the management of health facilities in a developing economy should improve the degree of technological integration in health service delivery as a top priority. Adopting telemedicine options, electronic health records, and sophisticated health information systems can help achieve this. Organisations must invest in these areas since a higher degree of technological integration has been linked to better employee performance and more advantages.

It is essential to concentrate on personnel training and development initiatives in addition to incorporating technology. Staff will be skilled in using new technology through extensive training activities. Employees may have difficulties due to the nature of technological integration, so it is important

to prioritise ongoing professional development. Giving them the tools they need will improve their performance overall and lessen these difficulties. Additionally, the advantages of technological integration should be routinely observed and assessed by health institutions. Putting in place performance metrics and feedback systems will give important information about how technology affects worker performance. Organisations can maximise their return on technology investment by customising their technology solutions to better suit the demands of their workforce by being aware of these particular advantages. Finally, it's critical to use focused techniques to solve the difficulties associated with technological integration. Employees will benefit, and overall performance will be improved by recognising these obstacles and creating strategic plans to overcome them. Health organisations can put solutions in place that promote a more favourable working environment by comprehending the nature of these difficulties. In conclusion, health organisations can greatly increase employee performance and ultimately attain improved health outcomes in the setting of a developing economy by strengthening technology integration, investing in training, assessing benefits, and resolving obstacles.

Suggestion of further studies

This study was limited to technology integration in health service delivery in a developing economy. Another major limitation of this study was that the R^2 value recorded for challenges associated with technology integration was about 12 percent suggesting that other variables or factors not considered in this study explain about 88 percent variance in explaining challenges associated with technology integration in the health sector. Further studies could also consider the integration of technology in delivering services in other sectors such as education, trading, and public services, among others. Further studies could also compare the technology integration among developed and developing economies, as well as several sectors in such economies. This study was also limited to a quantitative approach from the positivist approach, and further studies could adopt the mixed method to explore the feelings of users of technology for health service delivery in a developing economy.

Declaration of Interest

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Appendix A : Outer Loadings

	BTI	CTI	EP	LTI	NTI
BTI1	0.853				
BTI2	0.900				
BTI3	0.887				
BTI4	0.863				
BTI5	0.853				
BTI6	0.872				
BTI7	0.898				
CTI1		0.703			
CTI2		0.775			
CTI3		0.778			
CTI4		0.841			
CTI5		0.801			
EP1			0.757		
EP2			0.871		
EP3			0.898		
EP4			0.875		
EP5			0.841		
EP6			0.859		
LIT4				0.905	
LTI1				0.790	
LTI2				0.825	
LTI3				0.755	
LTI5				0.876	
NIT2					0.850
NTI1					0.868
NTI3					0.851
NTI4					0.894
NTI5					0.865

Appendix B : Pre-test Results

	Variable	Cronbach's Alpha	No of Items
1	Technology integration in health services	.947	22
2	Level of Technology Integration	.888	5
3	Types of Technology Integration	.916	5
4	Benefits of Technology integration in health services	.949	7
5	Challenges to Technology integration in health services	.834	5
6	Employee performance	.924	6
7	All variables	.958	28

Source: Field data (2023)

Appendix C: Questionnaire

UNIVERSITY OF CAPE COAST
COLLEGE OF DISTANCE EDUCATION
QUESTIONNAIRE ON THE EFFECT OF INFORMATION TECHNOLOGY ON EMPLOYEE
PERFORMANCE IN THE PUBLIC HOSPITALS IN THE VOLTA REGION

Dear Respondent,

This questionnaire is intended to solicit information on the “*effect of information technology on employee performance in the public hospitals in the Volta Region*”. It would be very much appreciated if you could provide your candid impression about each item as to how it relates to you. Every piece of information you provide will be kept strictly confidential and will be used solely for academic purposes.

PART A: DEMOGRAPHIC CHARACTERISTICS

Instruction: Please tick the appropriate option as it applies to you.

1. Gender: Male ☐ Female ☐
2. Age: 20 and below ☐ 21-30 ☐
31-40 ☐ 41 and above ☐
3. Marital status: Not married ☐ Married without kids ☐
Married with Kids ☐ Divorced/ Separated ☐

PART B: LEVEL AND TYPES OF TECHNOLOGY INTEGRATION IN HEALTHCARE SERVICES

Instruction: Please, indicate your level of agreement with the statements below on a scale of 1 to 5, with 1 representing low agreement (LA) while 5 representing strong agreement (SA).

1. When utilizing healthcare technology systems, I frequently run into technical problems.
2. Healthcare personnel are not receiving enough training on new technologies.
3. A growth in technological use heightens privacy concerns about patient data.
4. One major obstacle to the use of technology in healthcare is its cost of implementation and upkeep.
5. Personally, I think that technology can occasionally make it more difficult to communicate with healthcare providers in person.

Level of technology integration in healthcare services		1	2	3	4	5
LTI1	Digital tools are successfully used by the healthcare services I use to interact and communicate with patients.					
LTI2	My healthcare provider's practice regularly uses electronic health records (EHR).					
LTI3	In my experience, telemedicine services are easily accessible and efficiently employed in healthcare settings.					
LTI4	My hospital's staff members have received the necessary training to use technology to provide patient care.					
LTI5	In my experience, technology is employed to improve the effectiveness and calibre of treatment given.					
Nature of technology integration in healthcare services						
NTI1	Healthcare services incorporate technology into their daily operations in a seamless manner.					
NTI2	Technology in healthcare improves the patient experience as a whole.					
NTI3	Healthcare professionals actively look for new technologies to incorporate into their workflow.					
NTI4	Healthcare services incorporate technology in a way that is specific to each patient's needs.					
NTI5	Technology's effects on healthcare outcomes are routinely evaluated and tracked.					
Benefits associated with technology integration in healthcare services						
BTI1	In my experience with healthcare, technology integration has increased the precision of patient diagnoses.					
BTI2	The speed at which healthcare services are delivered has increased with the usage of technology.					
BTI3	Patient satisfaction with healthcare services has grown as a result of technology integration.					
BTI4	In my opinion, the possibility of medical errors in my care has decreased thanks to technology.					
BTI5	I now find it easier to obtain healthcare because telehealth options are available.					
BTI6	Improved contact between patients and healthcare providers has been made possible by technology.					
BTI7	In general, technology integration has improved the standard of treatment I obtain in medical facilities.					
Challenges associated with technology integration in healthcare services						
CTI1	When utilizing healthcare technology systems, I frequently run into technical problems.					
CTI2	Healthcare personnel are not receiving enough training on new technologies.					

CTI3	A growth in technological use heightens privacy concerns about patient data.
CTI4	One major obstacle to the use of technology in healthcare is its cost of implementation and upkeep.
CTI5	Personally, I think that technology can occasionally make it more difficult to communicate with healthcare providers in person.

PART B: EMPLOYEE PERFORMANCE AND TECHNOLOGY INTEGRATION IN HEALTHCARE SERVICES

Instruction: Please, indicate your level of agreement with the statements below on a scale of 1 to 5, with 1 representing low agreement (LA) while 5 representing strong agreement (SA).

	Employee performance	1	2	3	4	5
EP1	Workers at this facility routinely reach or surpass their performance goals.					
EP2	Employees display a high degree of professionalism when interacting with coworkers and patients.					
EP3	Workers efficiently cooperate with each other to deliver high-quality medical care.					
EP4	The possibilities for training and development offered have a favourable impact on worker performance.					
EP5	Workers take the initiative to recognize and address issues that come up at work.					
EP6	In my opinion, patient happiness at this institution is greatly influenced by personnel performance.					
	Effect of technology integration in healthcare services on employee performance					
ETIE1	Using technology has increased my productivity in finishing daily tasks.					
ETIE2	Having electronic health records has improved my ability to obtain patient data rapidly.					
ETIE3	Members of the healthcare team can now communicate more effectively thanks to technological technologies.					
ETIE4	Because I use technology at work, I feel more capable of making wise decisions.					
ETIE5	The new technology training I received has improved my performance at work.					
ETIE6	My time spent on administrative duties has decreased as a result of technology integration, giving me more time to devote to patient care.					
ETIE7	Technology, in my opinion, has helped me become a more effective patient workload manager.					
ETIE8	Using telemedicine has increased my ability to treat patients.					
ETIE9	Technology, in my opinion, makes it easier for me to keep organised and handle my obligations.					

ETIE10 All things considered, technology integration has greatly improved my performance as a healthcare worker.

GOOGLE LINK FOR QUESTIONNAIRE <https://forms.gle/57uRtoZBATMctskMA>