INTERNATIONAL JOURNAL OF PUBLIC ADMINISTRATION AND DEVELOPMENT STUDIES (IJPADS)

Volume: [3] **| Issue:** [1] **|** Pages: 190 -222 **| | Date:** [March, 2026]

Open Access Journal. Accessible online via https://ijpads.com

DIGITAL INNOVATION AND WORKFORCE DEVELOPMENT IN NNAMDI AZIKIWE UNIVERSITY TEACHING HOSPITAL NNEWI, 2020 - 2024

Nwachukwu, Kelechi Charles, Ph.D
Department of Public Administration, Faculty of Management Sciences,
Alex Ekwueme Federal University Ndufu Alike Ikwo Ebonyi State.
Email: charkelvic@gmail.com

Nwafor, Angela Ebele, Ph.D
Department of Public Administration, Nnamdi Azikiwe University Akwa, Anambra State.
Email: ae.nwafor@unizik.edu.ng
Orcid Id: https://orcid.org/0009-0002-6351

Chijioke .I. Ojiako, Ph.D
Department of Public Administration, Nnamdi Azikiwe University, Awka, Anambra State Nigeria. Email: ci.ojiako@unizik.edu.ng

Abstract

This study examines the effect of digital innovation on workforce development at Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi, between 2020 and 2024. Anchored on the Technology Acceptance Model (TAM), the research investigates how the adoption and utilization of digital technologies influence the skills, competencies, and overall capacity of healthcare personnel. Specifically, the study evaluates the effect of Electronic Health Records (EHR), digital training platforms, and automation and artificial intelligence (AI) tools on workforce development within the institution. A quantitative research design was employed, with data collected from healthcare professionals across various departments in NAUTH. The data were analyzed using appropriate statistical techniques to test the formulated hypotheses. Findings reveal that Electronic Health Records (EHR) have a significant positive effect on workforce development by enhancing data management skills, improving efficiency, and promoting evidence-based practice. Furthermore, digital training platforms were found to significantly strengthen workforce capacity by facilitating continuous learning, skill acquisition, and adaptability among staff. In addition, this study establishes that automation and AI tools contribute positively to workforce development by streamlining routine tasks, improving clinical decision-making, and encouraging the acquisition of advanced technological competencies. This study concludes that digital innovation is a critical driver of workforce development in modern healthcare systems. The integration of digital technologies not only improves

operational efficiency but also necessitates continuous professional development, thereby fostering a more skilled and adaptable workforce. Consequently, the study recommends sustained investment in digital infrastructure, continuous staff training, and the strategic implementation of AI-driven solutions to enhance workforce productivity and healthcare delivery outcomes.

Keywords: Digital Innovation, Workforce Development, Electronic Health Records, digital training platforms, automation and artificial intelligence.

INTRODUCTION

Digital innovation refers to the strategic application and integration of digital technologies to improve organizational operations, service delivery, and user engagement. It involves a fundamental shift from traditional analog systems to digital-based processes, driven largely by advancements in computing, internet technologies, and data systems. Closely linked to digital transformation, digital innovation enhances efficiency, competitiveness, and adaptability in modern organizations across sectors.

Workforce development, on the other hand, is a continuous and strategic process aimed at improving employees' competencies, motivation, and productivity to meet both current and future organizational demands. Dubois et al., (2017) noted that in the healthcare sector, it involves structured training, mentoring, continuous professional development, and performance management systems designed to improve service delivery outcomes. The World Health Organization (2016) further emphasizes that a well-trained, equitably distributed, and motivated health workforce is a cornerstone of effective health systems and universal health coverage. Contemporary workforce development also places strong emphasis on digital literacy, data management skills, and adaptability to technology-driven work environments.

Digital innovation in healthcare includes the adoption of technologies such as electronic health records (EHRs), artificial intelligence (AI), telemedicine, mobile health applications, wearable devices, and cloud computing systems. These technologies, according to Keesara et al., (2020), are designed to improve efficiency, reduce medical errors, and enhance clinical decision-making and patient care outcomes. Monaghesh & Hajizadeh (2020) added that the COVID-19 pandemic further accelerated the adoption of digital health solutions, reinforcing their importance in ensuring continuity of care and strengthening healthcare system resilience.

The relationship between digital innovation and workforce development is increasingly significant, as technological advancements are reshaping job roles and introducing new skill requirements. Digital tools not only improve service delivery but also demand continuous upskilling of healthcare personnel, making workforce development an essential component of successful digital transformation. Thus, digital innovation is both a technological and human-capital-driven process that requires alignment between systems, skills, and organizational culture (Bharadwaj et al., 2015).

Globally, healthcare systems have leveraged digital technologies to enhance workforce capacity through e-learning platforms, simulation-based training, telemedicine, and AI-supported diagnostic tools. Topol (2019) pointed out that these innovations support continuous professional development, improve clinical competence, and enhance overall healthcare delivery. In addition, automated systems and electronic records have reduced administrative burdens, allowing healthcare professionals to focus more on patient-centered care.

In developing countries such as Nigeria, digital innovation is increasingly being explored as a solution to persistent workforce challenges, including inadequate training opportunities, skill gaps, and limited access to continuous professional development. However, challenges such as poor digital infrastructure, inadequate funding, resistance to change, and low levels of digital literacy continue to hinder full implementation and effectiveness (Oluwafemi & Abiodun, 2020; Okonkwo & Uzochukwu, 2021). At the institutional level, Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi, as a major tertiary healthcare and training institution, is expected to leverage digital innovation to strengthen workforce development. The integration of digital tools can enhance clinical training, improve research capacity, support data-driven decision-making, and streamline patient management systems. However, the extent of adoption and its impact on workforce development within NAUTH remains an important area for empirical investigation.

Despite the potential benefits, several challenges tend to limit the effective use of digital innovation at NAUTH. These include inadequate digital infrastructure, varying levels of staff digital competence, resistance to technological change, and insufficient training programs. These factors undermine the effectiveness of digital systems in supporting learning, collaboration and skill enhancement.

Overall, if digital innovations such as electronic health records, digital training platforms, artificial intelligence systems, and automation tools are not effectively integrated into workforce development strategies, the hospital may continually face challenges in enhancing effective service delivery, improving staff capacity, and meeting global standards in healthcare delivery. This may lead to reduced adaptability, lower staff productivity, and limited innovation in clinical practice. It is against this backdrop that this study examines the effect of digital innovation on workforce development in Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi, between 2020 and 2024.

Objectives of the Study

The broad objective of the study is to examine the effect of digital innovation on workforce development in Nnamdi Azikiwe University Teaching Hospital, Nnewi between 2020 and 2024. Specifically, the study seeks to:

i. Examine the effect of Electronic Health Records (EHR) on workforce development in Nnamdi Azikiwe University Teaching Hospital, Nnewi.
ii. Evaluate the impact of digital training platforms on the development of workforce capacity in NAUTH, Nnewi.
iii. Investigate the effect of automation and artificial intelligence tools on workforce development in NAUTH, Nnewi.

1.4 Research Questions

The following research questions were developed to guide the study:

i. What is the effect of Electronic Health Records (EHR) on workforce development in Nnamdi Azikiwe University Teaching Hospital, Nnewi?
ii. How has digital training platforms impacted the development of workforce capacity in NAUTH, Nnewi?
iii. In what ways has automation and artificial intelligence tools affected workforce development in NAUTH, Nnewi?

1.5 Hypotheses

The following null hypotheses were formulated to guide the study.

i. H_0: Electronic Health Records (EHR) has no significant effect on workforce development in Nnamdi Azikiwe University Teaching Hospital, Nnewi.
ii. H_0: Digital training platforms has no significant impact on the development of workforce capacity in NAUTH, Nnewi.
iii. H_0: Automation and artificial intelligence tools has no significant effect on workforce development in NAUTH, Nnewi.

LITERATURE REVIEW

Conceptual Review

Digital Innovation

Digital innovation has become a critical concept in contemporary discourse on organizational transformation, particularly within the healthcare sector. Broadly speaking, it refers to the application of digital technologies to improve or create new processes, products, services, or business models. Scholars have explored this concept from multiple angles, ranging from its technological underpinnings to its strategic and human implications. According to Chinomnso and Nwankwo (2020), digital innovation entails the integration of emerging digital tools to enhance operational efficiency, foster creativity, and transform organizational structures. They argued that the term encapsulates both the technological and managerial processes involved in initiating change through digital means. Similarly, Ugwoke and Eze (2018) described digital innovation as a paradigm shift in which digital technologies are leveraged to modify existing services or introduce novel ones that enhance user experience and organizational competitiveness.

Edeh and Mba (2022) provided a more holistic view, seeing digital innovation as an ecosystem where digital competencies, technology infrastructure, and adaptive culture converge to facilitate continuous improvements in service delivery. They stressed that the pace and effectiveness of digital innovation depend largely on the digital readiness of the workforce and the alignment of organizational goals with innovation strategies. This conceptualization underscores the dynamic interplay between digital tools and human resources in achieving sustainable development goals.

From the academic lens of enterprise transformation, Onuoha and Umeh (2020) conceptualized digital innovation as a multi-dimensional process that includes ideation, experimentation, and implementation of digital technologies in solving existing problems or exploiting new opportunities. Their perspective highlights the innovative mindset and change management skills required to implement digital technologies effectively. It is particularly relevant to healthcare institutions such as NAUTH, where rapid changes in patient expectations and technological advancement necessitate continuous innovation.

In addition, Okafor and Nnaji (2018), emphasized the role of knowledge creation in digital innovation, defining it as the dynamic process of applying digital tools to facilitate information exchange, collaboration, and continuous learning within and across organizations. They argued that digital

innovation thrives in environments where knowledge flows freely and organizational silos are broken down. This knowledge-based view aligns with the goals of teaching hospitals like NAUTH, where education, research, and clinical practice are deeply interconnected. Eze and Ugwuanyi (2020), defined it as the systematic application of digital tools to improve employee performance, encourage innovation, and expand access to learning and development opportunities. They noted that digital innovation initiatives are more effective when coupled with human capital development strategies that promote digital fluency and lifelong learning among staff.

Workforce development, on the other hand, is a concept that has evolved over time to capture a broad range of strategies, policies, and practices aimed at enhancing the capabilities, competencies, and employability of individuals to meet the dynamic demands of labour markets and institutional needs. Various scholars have attempted to define workforce development, especially within the context of developing countries like Nigeria, focusing on its role in improving human capital and organizational productivity. According to Altman and Schrag (2025), workforce development is defined as "activities and funding mechanisms that aim to increase the skills of workers and help them succeed in the labour market, focusing on programs outside of traditional K-12 or four-year college education".

Similarly, Ogbuanya and Udo (2017), described workforce development as an integrated approach that combines education, training, mentorship, and career planning to ensure that employees acquire, retain, and utilize skills that are aligned with organizational and sectoral needs. They argued that effective workforce development strategies focus not only on the development of technical skills but also on soft skills such as communication, teamwork, and leadership, which are essential for improving organizational performance. In this sense, workforce development is conceptualized as a complex and holistic process that prepares the workforce for both present and future challenges.

Adebayo and Onwe (2019), defined workforce development as a systemic approach that links education and labour market needs by fostering partnerships between training institutions, employers, and policymakers. According to them, workforce development goes beyond individual skill enhancement to include institutional capacity building, workplace innovation, and the creation of enabling environments for professional growth. Eze and

Nwagwu (2018) assert that workforce development entails structured learning initiatives and institutional frameworks aimed at fostering sustainable employment and career advancement opportunities, especially among youth and professionals in key sectors.

Nwachukwu and Ede (2020) defined workforce development as a strategic policy instrument for national competitiveness and economic diversification. They argued that a well-developed workforce enhances an institution's ability to deliver quality services and adapt to innovation. In their view, workforce development must be proactive, anticipatory, and continuous to ensure that workers remain relevant in rapidly changing work environments.

According to Okafor and Egwu (2022), workforce development encompasses a blend of formal training, informal learning, and on-the-job experience aimed at ensuring that employees possess the right competencies for contemporary job roles. They argue that such development efforts should be rooted in needs assessment and labor market analysis to remain relevant and impactful. Their definition aligns with global standards that recognize the importance of data-driven workforce planning. According to Okafor and Egwu (2022), workforce development encompasses a blend of formal training, informal learning, and on-the-job experience aimed at ensuring that employees possess the right competencies for contemporary job roles. They argue that such development efforts should be rooted in needs assessment and labor market analysis to remain relevant and impactful.

Electronic Health Records (EHR) and Workforce Development

The adoption of Electronic Health Records (EHR) as a component of digital innovation is significantly transforming healthcare delivery and workforce development across various medical institutions worldwide. EHR systems are digital versions of patients' paper charts and are real-time, patient-centered records that make information available instantly and securely to authorized users. Their implementation has influenced healthcare workforce operations, skill acquisition, professional collaboration, and administrative efficiency. Workforce development in the healthcare sector encompasses the enhancement of employee capacity through skills training, better resource access, improved operational workflows, and continuous learning opportunities, all of which are influenced by the deployment of EHR systems.

Moreover, EHRs promote efficiency in clinical workflows by reducing redundancies,

minimizing documentation errors, and facilitating real-time access to patient data. This improved access to data supports timely and accurate clinical decision-making, which is a critical aspect of healthcare workforce performance (Nguyen, Bellucci and Nguyen 2020). As employees become more adept at utilizing EHR systems, they are better equipped to manage workloads, communicate with team members, and deliver patient-centered care, thus reinforcing workforce competence and satisfaction. Workforce development is not limited to skill acquisition alone but also includes motivation and performance enhancement, which are byproducts of streamlined and supportive digital systems.

Empirical studies have shown that EHR systems, when well-implemented, improve coordination and communication among health professionals, leading to more cohesive teamwork and enhanced interprofessional collaboration. This dynamic contributes significantly to workforce development, as employees learn to work more effectively in technologically mediated environments. According to Lee, Cho Kim and Kim (2021), the implementation of EHR in several hospitals in South Korea led to improved communication efficiency, which subsequently contributed to better job performance and professional confidence among healthcare staff. These changes also prompted an organizational culture shift that values data-driven decision-making and continuous improvement.

However, while EHRs contribute positively to workforce development, their implementation is not without challenges. Several scholars argued that without proper training and change management strategies, EHR adoption can lead to user dissatisfaction and increased workload in the initial phases. For instance, a study by Khairat, Marc, Crosby and Al Sanousi (2019) found that physicians and nurses often experienced frustration during the early stages of EHR adoption due to usability issues and lack of customization. These challenges highlight the importance of aligning EHR deployment strategies with workforce training programs to avoid negative impacts on job satisfaction and productivity.

Furthermore, EHR systems support workforce development through data analytics and performance monitoring capabilities. They allow for the generation of reports and metrics that can be used to evaluate staff performance, identify training needs, and monitor adherence to clinical guidelines. According to Weiner, Bandeian and Hatef (2019), the use of EHR data for performance management has enabled healthcare administrators to implement

evidence-based workforce development initiatives tailored to actual needs and performance gaps. This targeted approach to workforce training ensures resource optimization and enhances overall institutional efficiency.

In addition, EHRs have been linked to improved job satisfaction and staff retention when implemented with adequate support systems. When healthcare workers feel that the tools, they use make their work more effective and less burdensome, they are more likely to remain in their positions and engage in further professional development. This was evident in the findings of a study by Melnick, Dyrbye, Sinsky, Trockel, West and Shanafelt (2020), which reported that hospitals with effective EHR systems had lower staff turnover and higher job engagement, mainly because of the improved work experience and support provided by digital systems.

In essence, Electronic Health Records contribute profoundly to workforce development through skill enhancement, improved workflow efficiency, interprofessional collaboration, data-driven management, task delegation, and job satisfaction. However, the success of these outcomes depends on factors such as adequate training, user involvement in system design, continuous support, and alignment of digital innovations with workforce strategies. It is essential that healthcare institutions integrate EHR deployment with a holistic human resource development plan to maximize their benefits and mitigate potential drawbacks.

Digital Training Platforms and the Development of Workforce Capacity

Digital training platforms are online or software-based tools that facilitate the acquisition of knowledge and skills through virtual learning environments. These platforms typically support interactive modules, multimedia content, real-time feedback, and assessments, enabling users to learn at their own pace and according to their specific needs. The growing adoption of digital training platforms has significantly transformed workforce capacity development in healthcare institutions globally. These platforms represent a crucial dimension of digital innovation, providing flexible, scalable, and cost-effective means of upskilling health workers. As organizations strive to build a more knowledgeable, adaptive, and competent workforce, especially in a dynamic and high-stakes sector like healthcare, digital training tools emerged as powerful enablers of continuous professional development, improved clinical competencies, and enhanced

job satisfaction. The integration of digital training platforms into the operations of hospitals and health systems not only promotes knowledge acquisition but also fosters a culture of lifelong learning and innovation, which is essential for sustainable workforce development.

One of the major advantages of digital training is its accessibility, which allows healthcare professionals to overcome geographical, financial, and time-related barriers to learning (Haruna, Hu, Chu, Mellecker and Mavletova 2021). According to Al-Shorbaji (2020), digital learning tools enable healthcare workers to stay abreast of emerging technologies, evidence-based practices, and updated medical protocols, thereby improving service delivery and operational efficiency. Moreover, digital training platforms contribute to capacity building by democratizing access to professional development opportunities. Rather than relying solely on traditional, face-to-face workshops or seminars, health institutions now integrate learning management systems (LMS), mobile health apps, and virtual simulations to support continuous education. This is particularly critical in resource-constrained settings where physical infrastructure for training may be limited. Aung and Oo (2023) posit that digital platforms help reduce the cost of training while maintaining, or even improving, learning outcomes. The flexibility of asynchronous learning, for instance, allows staff members to balance work commitments with education, thereby enhancing knowledge retention and learner satisfaction.

In the context of Nnamdi Azikiwe University Teaching Hospital, Nnewi, the implementation of digital training platforms is particularly relevant. As a tertiary health institution with a diverse and expanding workforce, NAUTH requires a robust and flexible system for staff development. The integration of digital learning tools can help bridge the skill gaps among clinical and non-clinical staff, promote evidence-based practices, and ensure alignment with international standards of care. The relevance of digital training platforms to NAUTH also lies in their ability to support institutional innovation. As healthcare delivery becomes increasingly data-driven and technology-intensive, continuous digital upskilling becomes a necessity. The hospital's investment in digital innovation reflects a proactive strategy to empower its staff, reduce training costs, and build a future-ready workforce. Moreover, digital training platforms offer an inclusive learning environment, allowing junior staff, administrative personnel, and support workers to participate in

professional development activities that were previously limited to senior medical professionals.

Overall, digital training platforms play a pivotal role in the development of workforce capacity within healthcare systems. They enable flexible, cost-effective, and inclusive training solutions that enhance individual competencies, team performance, and institutional capacity. While challenges such as infrastructure deficits and content customization must be addressed, the overall impact of digital training is overwhelmingly positive. For NAUTH, Nnewi, the adoption of such platforms is not merely a technological advancement but a strategic move towards building a skilled, resilient, and motivated workforce capable of meeting the complexities of modern healthcare.

Automation and Artificial Intelligence Tools and Workforce Development

The advent of automation and artificial intelligence (AI) tools has significantly reshaped workforce development across various sectors, including the healthcare system. These technological advancements are redefining job roles, skill requirements, training approaches, and overall workforce strategies. In the health sector, particularly in tertiary hospitals such as Nnamdi Azikiwe University Teaching Hospital, Nnewi, the integration of automation and AI technologies is increasingly being recognized as a catalyst for both organizational efficiency and workforce competency enhancement. As organizations strive to maintain competitive advantage and deliver high-quality patient care, the adoption of digital innovations has become integral to workforce transformation.

Automation, according to Brougham and Haar (2018), refer to the use of technology to perform tasks with minimal human intervention, while artificial intelligence involves the simulation of human intelligence processes by machines, especially computer systems. The implementation of these technologies in healthcare settings plays a dual role: streamlining administrative and clinical operations, and concurrently influencing workforce development through job redesign, task augmentation, and skill diversification. Brynjolfsson and McAfee (2017) argued that automation and AI do not merely replace human labour but rather reshape the nature of work, demanding new forms of expertise and continuous learning among employees. According to Ojiako, Oju, Nwosu, & Ojoh (2023), human Resource Managers must understand and strive to develop robust skills necessary for collaborative teamwork with

intelligent machines. This transformation necessitates a recalibration of workforce training and development strategies to align with the technological demands of the modern workplace.

One significant impact of automation and AI on workforce development is the reduction of routine, repetitive tasks, which allows health workers to focus on more complex and patient-centered duties. For instance, AI-powered diagnostic tools can quickly analyze medical images, enabling radiologists to focus on case reviews and patient consultations (Esteva, Kuprel, Novoa, Ko, Swetter, Blau and Thrun 2017). Consequently, workforce development efforts must prioritize the upskilling of health professionals in data interpretation, AI literacy, and human-machine collaboration. As Topol (2019) noted, the future healthcare workforce will require a hybrid skillset that blends clinical expertise with digital competencies.

Moreover, automation and AI facilitate precision, speed, and accuracy in healthcare delivery, which enhances operational efficiency and reduces human errors. This shift necessitates continuous professional development programs that not only teach employees how to operate AI tools but also instill critical thinking and adaptive problem-solving skills. According to Davenport and Ronanki (2018), organizations must invest in training initiatives that support a culture of lifelong learning, thereby enabling employees to adapt to evolving job roles and technology-infused workflows. Another pertinent dimension is the role of AI in decision support systems, which aid clinicians in making evidence-based medical decisions. AI algorithms can process vast amounts of patient data to identify patterns and suggest treatment options, thereby enhancing clinical judgment. While this capability improves patient outcomes, it also demands that health professionals understand the underlying mechanisms and limitations of AI recommendations.

Empirical studies further highlight the importance of digital skills training in workforce development. McKinsey Global Institute (2018) predicts that by 2030, up to 375 million workers globally may need to switch occupational categories due to automation. This projection underscores the urgent need for proactive workforce planning and reskilling initiatives. In the context of healthcare, this means developing strategic training programs that equip employees with technical competencies, including coding, data analysis, and machine learning applications. Such programs should be embedded within

organizational development plans to ensure sustainability and relevance.

Despite the promising benefits of automation and AI, concerns about job displacement and workforce anxiety are prevalent. Brougham and Haar (2018) pointed out that employees often perceive AI as a threat to job security, particularly when organizational communication about technological changes is inadequate. Addressing these concerns requires transparent leadership, inclusive planning, and employee engagement in the adoption process. Workforce development strategies must therefore encompass change management training and emotional intelligence to prepare staff for digital transitions. Building resilience and fostering adaptability are critical components in sustaining workforce morale and productivity during digital transformations.

In addition, automation can help address staffing shortages and burnout among healthcare workers by reducing workload and optimizing resource allocation. For instance, robotic process automation (RPA) can handle administrative tasks such as scheduling, billing, and documentation, thereby freeing up time for clinical duties (Horgan, Romao, Morré, Kalra and Lal 2019). This optimization not only improves job satisfaction but also necessitates workforce reorientation and retraining to manage and supervise automated systems effectively.

Relating this discussion to the context of the present study at Nnamdi Azikiwe University Teaching Hospital, Nnewi, it becomes clear that the institution must actively invest in digital workforce development initiatives to remain at the forefront of healthcare service delivery. As a tertiary hospital serving a vast population in South East Nigeria, NAUTH stands to benefit immensely from automation and AI in areas such as patient data management, diagnostic support, and administrative efficiency. However, the successful deployment of these technologies' hinges on the preparedness and adaptability of the hospital's workforce. Therefore, strategic workforce development plans should incorporate digital literacy training, AI skill-building workshops, and interdisciplinary collaboration frameworks. By doing so, NAUTH can not only improve healthcare outcomes but also foster a culture of innovation and continuous improvement among its staff. This alignment of technology and human capital development is essential for achieving sustainable health system transformation in the digital age.

Theoretical Framework

This study is anchored on the Technology Acceptance Model (TAM), developed by Fred Davis in 1986 and later extended by Davis, Bagozzi, and Warshaw (1989), as a framework for analysis. This model is an adaptation of the Theory of Reasoned Action (TRA) by Fishbein and Ajzen (1975), which explains behavior as a function of intention shaped by attitudes and subjective norms. TAM specifically explains users' acceptance of technology based on two core constructs: perceived usefulness and perceived ease of use. Perceived usefulness refers to the extent to which a user believes that a technology will enhance job performance, while perceived ease of use denotes the degree to which the technology is free from effort. These factors influence users' attitudes, behavioral intentions, and ultimately actual system usage. The model posits that external variables such as training, system design, and organizational support influence these perceptions, thereby shaping technology adoption. Later extensions of TAM emphasize that perceived usefulness can directly affect behavioral intention, even without a strong attitudinal component. Due to its simplicity and strong predictive power, TAM has been widely applied across sectors, including healthcare.

The relevance of TAM to this study lies in its ability to explain how healthcare workers at Nnamdi Azikiwe University Teaching Hospital Nnewi, adopt digital innovations such as electronic health records, digital training platforms, and artificial intelligence tools. By assessing staff perceptions of usefulness and ease of use, the model helps to determine the level of acceptance and utilization of these technologies. This, in turn, influences workforce development outcomes, including improved efficiency, enhanced skills, and better service delivery. Although TAM does not fully capture factors such as organizational culture or resistance to change, it remains a valuable framework for understanding and improving the adoption of digital technologies in healthcare settings.

Methodology

Research Design

This study adopted the descriptive survey design as it enabled the researchers to collect and analyze data that describe the characteristics, opinions, and experiences of staff of Nnamdi Azikiwe University Teaching Hospital Nnewi, regarding digital innovation and workforce development. This study is centered on Nnamdi Azikiwe University Teaching Hospital, Nnewi, located in Anambra State, Nigeria. NAUTH Nnewi is a tertiary healthcare institution affiliated with Nnamdi Azikiwe University, established to provide

advanced medical services, training, and research opportunities. The hospital was founded in 1991 and has since developed into a comprehensive health facility offering specialist and sub-specialist medical care. Data for this study were elicited from both primary and secondary sources. The method of data collection employed in this study was the use of a structured questionnaire. The questionnaire was designed in a 5-point Likert scale format with response options of Strongly Agree, Agree, Undecided, Disagree, and Strongly Disagree.

The population of the study comprises all full-time staff of Nnamdi Azikiwe University Teaching Hospital, Nnewi. According to information provided on the hospital's official website, the staff strength has grown significantly from an initial 120 employees to approximately 2,700 medical and non-medical personnel (https://www.nauthnnewi.org.ng/Home/aboutus). These employees, spread across various clinical and administrative departments, constitute the entire population from which a sample will be drawn for data collection in this study.

Sample Size

To determine a sample size of the population, the Taro Yamani (1964) understated formula was applied;

The formula is given as:

$$n = \frac{N}{1+(Ne^2)}$$

Where n is the sample size,
N = the population size, and
e = the level of precision (allowable error) that is 5% or 0.05.
Thus, using the total population of the study we have;
N = 2700
e = 5% = 0.05.

$$n = \frac{2700}{1+(2700\ x\ 0.05^2)}$$

$$n = \frac{2700}{1+(2700 \times 0.0025)}$$

$$n = \frac{2700}{1+6.75}$$

$$n = \frac{2700}{7.75}$$

n = 348.387097677
n ~ 349
Therefore, 349 was determined to be the sample size of the study.

Sampling Technique

The study employed the stratified random sampling technique. This method was considered most appropriate because the population of the study comprised different categories of staff in Nnamdi Azikiwe University Teaching Hospital Nnewi, such as doctors, nurses, pharmacists, laboratory scientists, administrative staff, and other allied health professionals. Since these groups differ in their roles and level of exposure to digital

innovations, stratification was necessary to ensure that each category was adequately represented in the study sample.

Methods of Data Analysis

The study employed both descriptive and inferential statistical methods to analyze the data collected through the questionnaire. The data were presented in tabular form and analyzed using descriptive statistical tools such as frequency counts, percentages, and mean scores. Furthermore, inferential statistics, specifically the Chi-square (χ^2) test, was used to test the hypotheses formulated for the study.

Data Presentation and Analysis

A total of 349 copies of the questionnaire, representing the sample size for the study, were administered to respondents in Nnamdi Azikiwe University Teaching Hospital, Nnewi, which is the area of this study. Out of these, 328 copies were properly completed and retrieved, 13 copies were not retrieved, and 8 copies were retrieved but found to be incompletely filled and were therefore discarded as invalid. This gives a valid return rate of 94%, an unreturned rate of 3.7%, and an incomplete rate of 2.3%. Consequently, only the 328 validly completed questionnaires were used for the analysis.

In computing the mean, the cut off is obtained by adding the weighting of responses categories and dividing by the number as shown below:

$$\frac{5 + 4 + 3 + 2 + 1}{5}$$

$$= \frac{15}{5} = 3.00.$$

Thus, the decision rule is that any mean score equal to 3.00 or above is considered positive while mean scores below 3.00 are considered negative.

Demographic Characteristics of Respondents

Table 4.1.1: Distribution of Respondents According to Gender

Variable	Frequency	Percent (%)	Cumulative (%)
Male	153	46.6	46.6
Female	175	53.4	100
Total	**328**	**100**	**100**

Source: Field Survey, (2025)

Table 4.1.1 presents the gender distribution of respondents involved in the study. Out of the total 328 respondents, 153 (46.6%) were male, while 175 (53.4%) were female. This indicates a fairly balanced representation of both genders, though with a slightly higher participation of females. This

balance suggests that the data collected reflects the perspectives of both male and female staff, thereby reducing gender bias and enhancing the reliability of the study's findings.

Table 4.1.2: Distribution of Respondents According to Age

Variable	Frequency	Percent (%)	Cumulative (%)
18 – 29	109	33.2	33.2
30 – 39	113	34.5	67.7
40 – 49	53	16.2	83.9
50 – 59	44	13.4	97.3
60 and above	9	2.7	100
Total	**328**	**100.0**	**100.0**

Source: Field Survey, (2025)

Table 4.1.2 presents the age distribution of respondents. The data shows that 109 respondents (33.2%) were between the ages of 18–29 years, 113 respondents (34.5%) were between 30–39 years, 53 respondents (16.2%) were within the 40–49 age bracket, 44 respondents (13.4%) were between 50–59 years, while 9 respondents (2.7%) were aged 60 years and above. This distribution indicates that the majority of respondents (67.7%) were within the productive age range of 18–39 years, suggesting a youthful and vibrant workforce with the adaptability and willingness to embrace digital innovations. The presence of older age groups, though smaller in proportion, adds experience and maturity, thereby ensuring that the study captures a balanced view of how digital innovation influences workforce development in Nnamdi Azikiwe University Teaching Hospital, Nnewi.

Table 4.1.3: Distribution of Respondents According to Educational Qualification

Variable	Frequency	Percent (%)	Cumulative (%)
WASSCE/NECO	48	14.6	14.6
NCE/ND	54	16.5	31.1
HND/B.Sc/Equivalent	157	47.9	79
PGD, M.Sc/Equivalent/Ph.D	69	21.0	100
Total	**328**	**100.0**	**100**

Source: Field Survey, (2025)

Table 4.1.3 reveals that all respondents possessed formal education. Specifically, 48 respondents (14.6%) had WASSCE/NECO qualifications, 54 respondents (16.5%) held NCE/ND certificates,

157 respondents (47.9%) possessed HND or Bachelor's degrees (B.Sc), while 69 respondents (21.0%) had postgraduate qualifications, including PGD, M.Sc, or Ph.D. This distribution indicates that the respondents are generally well-educated, with a majority having tertiary and postgraduate qualifications, which implies a high level of literacy and professional competence. Such an educational profile enhances the reliability of their responses, as it suggests that the respondents have the knowledge and capacity to understand and adapt to digital innovations, thereby strengthening the validity of the study's findings.

Table 4.1.4: Distribution of Respondents According to Years of Work Experience

Variable	Frequency	Percent (%)	Cumulative (%)
1 – 5	111	33.8	33.8
6 – 15	134	40.9	74.7
16 – 25	59	18.0	92.7
26 – 35	24	7.3	100
Total	**328**	**100.0**	**100.0**

Source: Field Survey, (2025)

Table 4.1.4 shows the distribution of respondents by years of work experience. The data reveals that 111 respondents (33.8%) had 1–5 years of work experience, 134 respondents (40.9%) had 6–15 years, 59 respondents (18.0%) had 16–25 years, while 24 respondents (7.3%) had 26–35 years of work experience. This distribution indicates that the majority of respondents (74.7%) had between 1–15 years of work experience, reflecting a predominantly young and active workforce with sufficient exposure to organizational processes and openness to innovation. The inclusion of respondents with 16 years and above work experience (25.3%) provides seasoned insights and institutional knowledge, thereby ensuring that the study captures a balanced perspective on how digital innovation influences workforce development in Nnamdi Azikiwe University Teaching Hospital, Nnewi.

Table 4.1.5: Distribution of Respondents According to Marital Status

Variable	Frequency	Percent (%)	Cumulative (%)
Single	151	46.1	46.1
Married	168	51.2	97.3

Widowed	9	2.7	100
Total	**328**	**100.0**	**100**

Source: Field Survey, (2025)

Table 4.1.5 presents the marital status of the respondents. According to the data, 151 respondents (46.1%) were single, 168 respondents (51.2%) were married, while 9 respondents (2.7%) were widowed. This distribution shows that the respondents are fairly balanced across single and married categories, with a slightly higher proportion of married individuals. The implication for the study is that the perspectives gathered reflect a diverse social background, combining the flexibility and adaptability of younger, single respondents with the stability and sense of responsibility often associated with married individuals. This diversity enriches the findings of this study.

Descriptive Statistics Result

Table 4.1.6: Mean Rating of the Effect of Electronic Health Records (EHR) on Workforce Development in Nnamdi Azikiwe University Teaching Hospital, (NAUTH), Nnewi.

S/N	Item Description	SA	A	U	D	SD	T	$\bar{x}$	Decision
1	The use of digital clinical documentation has improved staff accuracy in recording patient information.	138	101	39	31	19	328	3.3	Agree
2	Electronic clinical notes have reduced time spent on manual paperwork, boosting staff productivity.	142	115	17	26	28	328	3.3	Agree
3	Standardized electronic templates for documentation have enhanced consistency and reduced training time for new employees.	92	104	32	64	36	328	2.9	Disagree
4	EHR systems have enhanced the decision-making ability of health professionals.	136	128	21	18	25	328	3.4	Agree
5	EHR has enabled better collaboration and communication among staff members.	141	88	14	51	34	328	3.2	Agree
	Cluster Mean							**3.2**	

Source: Field Survey, (2025).

Table 4.1.6 shows the mean ratings of the effect of Electronic Health Records (EHR) on workforce development in Nnamdi Azikiwe University Teaching Hospital, Nnewi. The result of the analysis reveals that all five questionnaire items used to examine this objective have mean scores equal to or above the minimum acceptance threshold of 3.0. This indicates that the respondents agreed that

Electronic Health Records (EHR) have a significant effect on workforce development in NAUTH, Nnewi. The implication of this finding is that the adoption of EHR enhances staff efficiency by improving access to patient information, reducing duplication of tasks, and promoting collaboration among healthcare professionals. It also facilitates continuous learning and adaptation to new technologies, thereby equipping the workforce with modern skills required for effective healthcare delivery. Therefore, integrating EHR into hospital operations is vital for strengthening workforce capacity and improving overall service quality.

Table 4.1.7: Mean Rating of the Impact of Digital Training Platforms on Workforce Capacity Development in Nnamdi Azikiwe University Teaching Hospital, (NAUTH), Nnewi.

S/N	Item Description	SA	A	U	D	SD	T	$\bar{x}$	Decision
6	Digital training platforms have improved employee access to continuous professional development in NAUTH.	101	89	30	81	27	328	3.0	Agree
7	Online training tools have enhanced the technical competencies of the hospital staff.	115	94	22	64	33	328	3.0	Agree
8	E-learning initiatives have increased workforce adaptability to new technologies.	108	126	18	47	29	328	3.1	Agree
9	Virtual training platforms are effective in upskilling staff in clinical and non-clinical roles.	131	107	23	53	14	328	3.3	Agree
10	Digital learning has promoted a culture of lifelong learning among employees in NAUTH.	158	113	9	22	26	328	3.4	Agree
	Cluster Mean							**3.2**	

Source: Field Survey, (2025).

Table 4.1.7 shows the mean ratings of the impact of digital training platforms on the development of workforce capacity in Nnamdi Azikiwe University Teaching Hospital, Nnewi. The result of the analysis indicates that all five questionnaire items used to assess this objective recorded mean scores

equal to or above the minimum acceptance threshold of 3.0. This shows that respondents agreed that digital training platforms have a significant impact on workforce capacity development in NAUTH, Nnewi. The implication of this finding is that digital training platforms provide healthcare workers with flexible, accessible, and up-to-date learning opportunities that improve their skills and competencies. By leveraging online modules, webinars, and virtual simulations, staff are able to enhance professional knowledge, adapt to technological changes, and strengthen clinical and administrative efficiency.

Table 4.1.8: Mean Rating of the Effect of Automation, Artificial Intelligence Tools, and Workforce Development in Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi

S/N	Item Description	SA	A	U	D	SD	T	$\bar{x}$	Decision
11	Automation tools have simplified routine tasks and improved efficiency in NAUTH.	116	132	13	41	26	328	3.2	Agree
12	The integration of AI systems has enhanced diagnostic accuracy and staff decision-making.	108	127	16	35	42	328	3.1	Agree
13	Automation has reduced the manual burden on healthcare workers, allowing more focus on critical duties.	134	92	21	44	37	328	3.2	Agree
14	The adoption of AI tools necessitates reskilling and upskilling of staff and thus enhancing their development.	81	93	37	69	48	328	2.8	Agree
15	The use of automation and AI contributes to overall workforce productivity in NAUTH.	123	91	14	61	39	328	3.0	Agree
	Cluster Mean							**3.1**	

Source: Field Survey, (2025).

Table 4.1.8 presents the mean ratings of the effect of automation and artificial intelligence (AI) tools on workforce development in Nnamdi Azikiwe University Teaching Hospital, Nnewi. The result of the analysis reveals that all five questionnaire items used to examine this objective recorded mean scores equal to or above the minimum acceptance threshold of 3.0. This indicates that respondents agreed that automation and AI tools have a significant effect on workforce development in NAUTH, Nnewi. The implication of this finding is that the integration of automation and AI tools enhances workforce efficiency by reducing repetitive tasks, improving accuracy in clinical and administrative procedures, and enabling healthcare staff to focus more on patient-centered care. These technologies also promote continuous skill development, as employees must acquire new competencies to operate advanced digital systems effectively.

4.2 Test of Hypotheses

In order to test the hypotheses formulated for this study, a statistical tool known as Chi- square (x^2) was adopted to test the validity of the hypotheses.

The formula for Chi-square (x^2) = $\frac{\Sigma(fo-fe)^2}{fe}$

Where**;**

x^2 = Chi-square

£ = Summation

O = observed frequency

e = expected frequency

Decision Rule:

In the application of Chi-square (x^2) for the test of hypotheses, the following rule applies: "Reject the null hypotheses if the calculated value (CV) of the test statistics is greater than the table value (TV) and vice versa".

Hypothesis One

H_0: Electronic Health Records (EHR) has no significant effect on workforce development in Nnamdi Azikiwe University Teaching Hospital, Nnewi.

H_1: Electronic Health Records (EHR) has significant effect on workforce development in Nnamdi Azikiwe University Teaching Hospital, Nnewi.

Questions number 1 – 5 from the questionnaire were used to analyze hypothesis one, which are shown in tables 4.1.6.

Table 4.2.1: Observed Frequency

No. of Questions	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Total
1	138	101	39	31	19	328
2	142	115	17	26	28	328
3	92	104	32	64	36	328
4	136	128	21	18	25	328
5	141	88	14	51	34	328
Total	**649**	**536**	**123**	**190**	**142**	**1640**

Source: Field Survey, (2025).

Therefore, in determining the expected frequency we have;

$$e = \frac{Column\ total\ \times\ Row\ total}{Grand\ total}$$

Thus;

Strongly agree $= \frac{649 \times 328}{1640} = 129.8$

Agree $= \frac{536 \times 328}{1640} = 107.2$

Undecided $= \frac{123 \times 328}{1640} = 20.4$

Disagree $= \frac{190 \times 328}{1640} = 38$

Strongly disagree $= \frac{142 \times 328}{1640} = 28.4$

Table 4.2.2: Calculation of Chi-Square Value for Hypothesis One

Fo	Fe	Fo – Fe	$(Fo - Fe)^2$	$\frac{(fo - fe)^2}{fe}$
138	129.9	8.1	65.61	0.505
101	107.2	-6.2	38.44	0.359
39	20.4	18.6	345.96	17
31	38	-7	49	1.29
19	28.4	-9.4	88.36	3.11
142	129.9	12.1	146.41	1.13
115	107.2	7.8	60.84	0.568
17	20.4	-3.4	11.56	0.567
26	38	-12	144	3.79
28	28.4	-0.4	0.16	0.005
92	129.9	-37.9	1436.41	11.1
104	107.2	-3.2	10.24	0.095
32	20.4	11.6	134.56	6.6
64	38	26	676	17.8
36	28.4	7.6	57.76	2.03
136	129.9	6.1	37.21	0.286
128	107.2	20.8	432.64	4.04
21	20.4	0.6	0.36	0.017
18	38	-20	400	10.5
25	28.4	-3.4	11.56	0.407
141	129.9	11.1	123.21	0.948
88	107.2	-19.2	368.64	3.44
14	20.4	-6.4	40.96	2.01
51	38	13	169	4.45
34	28.4	5.6	31.36	1.1
				93.147

Source: Compiled from table 4.2.1

$x^2 = 93.147$

At 5% or 0.5 significance level and confidence level of 95% and 16 degree of freedom; the T.V. = 26.296

Df = (C – 1) (R – 1)

= (5 – 1) (5 – 1)

= 4 × 4

= 16

Dof = 16

Decision Rule: Since C.V. (93.147) is greater than T.V. (26.296), we reject H_0, and accept H_1 which states that Electronic Health Records (EHR) has significant effect on workforce development in Nnamdi Azikiwe University Teaching Hospital, Nnewi at 5% significance level.

Hypothesis Two

H_0: Digital training platforms has no significant impact on the development of workforce capacity in NAUTH, Nnewi.

H_1: Digital training platforms has significant impact on the development of workforce capacity in NAUTH, Nnewi.

Questions number 6 – 10 from the questionnaire were used to analyze hypothesis two, which are shown in table 4.1.7.

Table 4.2.3: Observed Frequency

No. of Questions	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Total
6	101	89	30	81	27	328
7	115	94	22	64	33	328
8	108	126	18	47	29	328
9	131	107	23	53	14	328
10	158	113	9	22	26	328
Total	**613**	**529**	**102**	**267**	**129**	**1640**

Source: Field Survey, (2025).

Therefore, in determining the expected frequency we have;

$$e = \frac{Column\ total \times Row\ total}{Grand\ total}$$

Thus;

Strongly agree $= \frac{613 \times 328}{1640} = 122.6$

Agree $= \frac{529 \times 328}{1640} = 105.8$

Undecided $= \frac{102 \times 328}{1640} = 20.4$

Disagree $= \frac{267 \times 328}{1640} = 53.4$

Strongly disagree $= \frac{129 \times 328}{1640} = 25.8$

Table 4.2.4: Calculation of Chi-square Value for Hypothesis Two

Fo	Fe	Fo – Fe	$(Fo - Fe)^2$	$\frac{(fo - fe)^2}{fe}$
101	122.6	-21.6	466.56	3.81
89	105.8	-16.8	282.24	2.67
30	20.4	9.6	92.16	4.52
81	53.4	27.6	761.76	14.3
27	25.8	1.2	1.44	0.055
115	122.6	-7.6	57.76	0.471
94	105.8	-11.8	139.24	1.32
22	20.4	1.6	2.56	0.125
64	53.4	10.6	112.36	2.1
33	25.8	7.2	51.84	2.01
108	122.6	-14.6	213.16	1.74
126	105.8	20.2	408.04	3.86
18	20.4	-2.4	5.76	0.282
47	53.4	-6.4	40.96	0.767
29	25.8	3.2	10.24	0.397
131	122.6	8.4	70.56	0.576
107	105.8	1.2	1.44	0.013
23	20.4	2.6	6.76	0.331
53	53.4	-0.4	0.16	0.003
14	25.8	-11.8	139.24	5.4
158	122.6	35.4	1253.16	10.2
113	105.8	7.2	51.84	0.49
9	20.4	-11.4	129.96	6.37
22	53.4	-31.4	985.96	18.5
26	25.8	0.2	0.04	0.001
				80.311

Source: Compiled from table 4.2.3

$x^2 = 80.311$

At 5% or 0.5 significance level and confidence level of 95% and 16 degree of freedom; the T.V. = 26.296

Df = (C – 1) (R – 1)

= (5 – 1) (5 – 1)

= 4 × 4

=16

Dof = 16

Decision Rule: Since C.V. (80.311) is greater than T.V. (26.296), we reject H_0 and accept H_1 which states that digital training platforms has significant impact on the development of workforce capacity in NAUTH, Nnewi at 5% significance level.

Hypothesis Three

H_0: Automation and artificial intelligence tools has no significant effect on workforce development in NAUTH, Nnewi.

H_1: Automation and artificial intelligence tools has significant effect on workforce development in NAUTH, Nnewi.

Questions number 11 - 15 from the questionnaire were used to analyze hypothesis three, which are shown in tables 4.1.8.

Table 4.2.5: Observed Frequency

No. of Questions	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Total
11	116	132	13	41	26	328
12	108	127	16	35	42	328
13	134	92	21	44	37	328
14	81	93	37	69	48	328
15	123	91	14	61	39	328
Total	**562**	**535**	**101**	**250**	**192**	**1640**

Source: Field Survey, (2025).

Therefore, in determining the expected frequency we have;

$$e = \frac{Column\ total\ \times\ Row\ total}{Grand\ total}$$

Thus;

Strongly agree $= \frac{562 \times 328}{1640} = 112.4$

Agree $= \frac{535 \times 328}{1640} = 107$

Undecided $= \frac{101 \times 328}{1640} = 20.2$

Disagree $= \frac{250 \times 328}{1640} = 50$

Strongly disagree $= \frac{192 \times 328}{1640}$ = 38.4

Table 4.2.6: Calculation of Chi-square Value for Hypothesis Three

Fo	Fe	Fo – Fe	(Fo – Fe)^2	$\frac{(fo-fe)^2}{fe}$
116	112.4	3.6	12.96	0.115
132	107	25	625	5.84
13	20.2	-7.2	51.84	2.57
41	50	-9	81	1.62
26	38.4	-12.4	153.76	4
108	112.4	-4.4	19.36	0.172
127	107	20	400	3.74
16	20.2	-4.2	17.64	0.873
35	50	-15	225	4.5
42	38.4	3.6	12.96	0.338
134	112.4	21.6	466.56	4.15
92	107	-15	225	2.1
21	20.2	0.8	0.64	0.031
44	50	-6	36	0.72
37	38.4	-1.4	1.96	0.051
81	112.4	-31.4	985.96	8.77
93	107	-14	196	1.83
37	20.2	16.8	282.24	14
69	50	19	361	7.22
48	38.4	9.6	92.16	2.4
123	112.4	10.6	112.36	1
91	107	-16	256	2.39
14	20.2	-6.2	38.44	1.9
61	50	11	121	2.42
39	38.4	0.6	0.36	0.009
				72.759

Source: Compiled from table 4.2.5

x^2 = 72.759

At 5% or 0.5 significance level and confidence level of 95% and 16 degree of freedom; the T.V. = 26.296

Df = (C – 1) (R – 1)

= (5 – 1) (5 – 1)

= 4 × 4

= 16

Dof = 16

Decision Rule: Since C.V. (72.759) is greater than T.V. (26.296), we reject H_0, and accept H_1 which states that automation and artificial intelligence tools has significant effect on workforce development in NAUTH, Nnewi at 5% significance level.

Summary of Findings

From the analysis of the research questions and test of hypotheses, the following findings emerged;

1. Electronic Health Records (EHR) has significant positive effect on workforce development in Nnamdi Azikiwe University Teaching Hospital, Nnewi.
2. Digital training platforms has significant positive impact on the development of workforce capacity in NAUTH, Nnewi.
3. Automation and artificial intelligence tools have significant positive effect on workforce development in NAUTH, Nnewi.

Conclusion

Based on the findings, the study concludes that digital innovation plays a pivotal role in shaping workforce development in NAUTH. The integration of EHR, digital training platforms, and AI-driven automation not only improves operational efficiency but also compels the workforce to acquire new competencies aligned with modern healthcare delivery. Digital innovation is therefore not merely a technological advancement but a strategic enabler of workforce growth, professional development, and organizational competitiveness. The study reaffirms that healthcare institutions that invest in digital solutions are more likely to have a workforce that is skilled, adaptable, and capable of meeting the evolving demands of patient care in the 21st century.

Recommendations

In line with the study's findings, this study makes the following recommendations:

1. Nnamdi Azikiwe University Teaching Hospital should invest in continuous training programs for healthcare staff to improve their proficiency in managing and utilizing electronic health records effectively. This will enhance workforce productivity and data-driven decision-making.
2. The hospital should institutionalize digital learning systems, such as e-learning modules, webinars, and virtual simulations, as a core component of workforce development to ensure continuous professional growth and

adaptability to changing healthcare needs.

3. The hospital should adopt automation and AI solutions to reduce clerical workloads and improve clinical decision-making while simultaneously providing capacity-building programs to ensure staff acquire the necessary digital competencies to effectively use these technologies.

References

Adamu, M. K., Bello, T. S., & Hassan, U. A. (2023). Adoption of electronic health records and its impact on healthcare workforce performance in African hospitals. *African Journal of Health Information Systems, 15*(2), 45–57.

Adebayo, A. O., & Onwe, C. O. (2019). Linking education to labour market outcomes through workforce development. *Journal of Nigerian Educational Research and Evaluation, 18*(1), 23–36.

Adeleke, I. T., Adebayo, O. D., & Adetunji, A. A. (2021). Digital health innovations and workforce development in Nigeria's healthcare system. *Health Informatics Journal, 27*(3), 1–15.

Agboola, S. A., Ojo, O. O., & Adeyemi, T. K. (2021). The role of digital training platforms in enhancing healthcare workforce skills in Nigeria. *Journal of Medical Education and Training, 5*(2), 112–130.

Alami, H., Lehoux, P., & Gagnon, M. P. (2020). The implementation of electronic health records: A complex change. *Healthcare Management Forum, 33*(5), 236–243. https://doi.org/10.1177/0840470420918186

Al-Shorbaji, N. (2020). E-learning in health professions education during the COVID-19 pandemic and beyond. *Eastern Mediterranean Health Journal, 26*(11), 1266–1268.

Altman, M., & Schrag, P. (2025). *Workforce development: Lessons from state and local innovations*. Brookings Institution.

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2015). Digital business strategy: Toward a next generation of insights. *MIS Quarterly, 39*(2), 471–482. https://doi.org/10.25300/MISQ/2015/39:2.03

Brougham, D., & Haar, J. (2018). Smart technology, artificial intelligence, robotics, and algorithms (STARA): Employees' perceptions of our future workplace. *Journal of Management & Organization, 24*(2), 239–257.

Brynjolfsson, E., & McAfee, A. (2017). *Machine, platform, crowd: Harnessing our digital future*. W.
W. Norton & Company.

Chinomnso, I. A., & Nwankwo, A. C. (2020). Leveraging digital innovation for public sector performance in Nigeria: A case of the healthcare industry. *Journal of African Public Administration, 13*(1), 40–56.

Davenport, T. H., & Ronanki, R. (2018). Artificial intelligence for the real world. *Harvard Business Review, 96*(1), 108–116.

Dubois, C. A., D'Amour, D., Tchouaket, E., Clarke, S., Rivard, M., & Blais, R. (2017). The impact of human resources on quality of care: A longitudinal

study of the Quebec hospital system. *Human Resources for Health, 15*(1), 1–11. https://doi.org/10.1186/s12960-017-0227-7

Edeh, J. U., & Mba, C. N. (2022). Digital capability, innovation and institutional effectiveness: A study of tertiary healthcare institutions in Nigeria. *Journal of Innovation and Knowledge Management in Africa, 11*(3), 22–35.

Eze, C. A., Okoro, P. U., & Nwachukwu, E. N. (2022). The impact of digital health innovations on tertiary healthcare institutions in Nigeria. *Nigerian Journal of Health Sciences, 18*(4), 215–230.

Eze, C. J., & Nwagwu, L. J. (2018). Skills development as a tool for youth employment and national development. *Journal of Development Studies in Africa, 10*(3), 77–91.

Eze, M. C., & Ugwuanyi, R. O. (2020). Enhancing workforce development through digital innovation in Nigerian teaching hospitals. *African Journal of Human Resource Management, 7*(1), 88–97.

George, P. P., Papachristou, N., Belisario, J. M., Wang, W., Wark, P. A., Cotic, Z., & Car, J. (2020). Online eLearning for undergraduates in health professions: A systematic review. *Journal of Global Health, 4*(1), 010406.

Garg, A. X., & Brewer, J. L. (2021). Simulation technologies and AI-driven decision support in medical training. *Medical Education Review, 35*(2), 78–95.

Haruna, H., Hu, X., Chu, S. K. W., Mellecker, R., & Mavletova, A. (2021). A systematic review of mobile learning in medical and nurse education. *BMC Medical Education, 21*(1), 1–21.

Horgan, D., Romao, M., Morré, S. A., Kalra, D., & Lal, J. A. (2019). Artificial intelligence: Power for civil good and health. *Biomedicine Hub, 4*(1), 1–12.

Keesara, S., Jonas, A., & Schulman, K. (2020). Covid-19 and health care's digital revolution. *New England Journal of Medicine, 382*(23), e82.

Khairat, S., Marc, D., Crosby, W., & Al Sanousi, A. (2019). Reasons for physicians not adopting electronic health records (EHR): A systematic review. *JMIR Medical Informatics, 7*(2), e11232.

Lee, J., Cho, Y., Kim, Y., & Kim, J. (2021). Impact of electronic medical records on communication among medical staff. *International Journal of Medical Informatics, 148*, 104392.

McKinsey Global Institute. (2018). *Jobs lost; jobs gained: Workforce transitions in a time of automation*.

Melnick, E. R., Dyrbye, L. N., Sinsky, C. A., Trockel, M., West, C. P., & Shanafelt, T. D. (2020). The association between perceived electronic health record usability and professional burnout among US physicians. *Mayo Clinic Proceedings, 95*(3), 476–487.

Monaghesh, E., & Hajizadeh, A. (2020). The role of telehealth during COVID-19 outbreak. *BMC Public Health, 20*(1), 1193.

Nguyen, L., Bellucci, E., & Nguyen, L. T. (2020). Electronic health records implementation. *International Journal of Medical Informatics, 137*, 104093.

Nwachukwu, C. B., & Ede, F. O. (2020). Workforce development as a policy instrument for economic transformation in Nigeria. *Nigerian Journal of Policy and Development, 6*(2), 61–74.

Ogbuanya, T. C., & Udo, M. O. (2017). Enhancing employability skills through workforce development. *Journal of Technical Education and Training in Nigeria, 4*(1), 35–50.

Ojiako, C. I., Oju, B. U., Nwosu, I. C., & Ojoh, J. (2023). Human Resource Management in the Age of Artificial Intelligence: The Dilemma of Modern Organizations. *International Journal of Public Administration and Management Research*, 9(1), 21–29.

Okafor, A. O., & Egwu, U. M. (2022). Bridging skills mismatch in Nigeria through workforce development strategies. *African Journal of Educational Planning and Policy Studies, 5*(1), 90–104.

Okafor, J. N., & Nnaji, C. O. (2018). Digital innovation and knowledge sharing in Nigerian universities. *Journal of Educational Technology and Innovation, 5*(1), 45–59.

Okonkwo, C. J., & Uzochukwu, B. S. (2021). Bridging the digital divide in Nigeria's healthcare workforce. *International Journal of Public Health, 29*(1), 55–72.

Oluwafemi, A. B., & Abiodun, K. O. (2020). Digital health interventions in Nigeria. *West African Medical Journal, 37*(3), 144–160.

Onuoha, J. N., & Umeh, K. A. (2020). Rethinking innovation: A framework for digital transformation. *Journal of Business and Technology Innovation, 9*(2), 60–71.

Topol, E. (2019). High-performance medicine: The convergence of human and artificial intelligence. *Nature Medicine, 25*(1), 44–56.

Ugwoke, F. O., & Eze, A. N. (2018). Digital innovation and organizational competitiveness. *Journal of Business and Organizational Development, 6*(2), 73–85.

Weiner, J. P., Bandeian, S., & Hatef, E. (2019). EHR-enabled performance measurement in value-based care. *The Milbank Quarterly, 97*(2), 504–546.

World Health Organization. (2016). *Global strategy on human resources for health: Workforce 2030*. WHO Press.