

Industry 5.0 Readiness and Workforce Efficiency in Public Tertiary Institutions: The Mediating Role of Artificial Intelligence Capability and Digital Innovation.

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Abstract

The study examined the effect of Industry 5.0 readiness on workforce efficiency: the mediating role of Artificial Intelligence capability and digital innovation. This study adopted conceptual review method. Information was gathered using journals, published and unpublished journals, libraries and internet applications. Based on conceptual review, it was revealed that there was a positive effect of 5.0 readiness on workforce efficiency in public tertiary institutions in Nigeria's South-South geopolitical zone. Also, there was a mediating role of artificial intelligence capability and digital innovation. The study concluded that Industry 5.0 readiness has become increasingly important as organizations embrace emerging. The study recommended that public tertiary institutions should strengthen their Industry 5.0 readiness by investing in digital infrastructure, improving employees' digital competencies, encouraging human–technology collaboration and developing institutional policies that support technological transformation. Also, management of public tertiary institutions should strengthen artificial intelligence capability through regular staff training, investment in appropriate AI tools, improved data management and the development of responsible AI-use policies. This will enable academic and non-academic staff to utilize AI technologies effectively to reduce repetitive tasks, improve decision-making and enhance workforce efficiency.

Keywords: *Industry 5.0 readiness, workforce efficiency, Artificial Intelligence capability, digital innovation, data management, digital competencies, human–technology collaboration*

Introduction

The emergence of Industry 5.0 represents a significant shift in organisational transformation, emphasising human–technology collaboration, sustainability and organisational resilience alongside technological advancement. Unlike Industry 4.0, which primarily emphasises automation and digital integration, Industry 5.0 places greater emphasis on using advanced technologies to augment human capabilities and improve organisational outcomes (Ivanov, 2023). These principles are increasingly relevant to public tertiary institutions, where efficient workforce performance is essential for effective teaching, research, student administration and institutional management. Consequently, Industry 5.0 readiness may be understood as the extent to which institutions possess the technological infrastructure, employee competencies, leadership support and organisational processes required to implement human-centred digital transformation. Workforce efficiency is particularly important in public tertiary institutions because employees are expected to perform academic and administrative responsibilities accurately, promptly and economically. However, the availability of digital technologies does not necessarily translate into improved efficiency. Inadequate technological infrastructure, limited employee competencies, resistance to change and weak integration of digital systems may constrain institutional performance. These challenges raise an important question: to what extent are public tertiary institutions prepared to implement Industry 5.0 principles in ways that translate into measurable improvements in workforce efficiency? This concern underscores the need to investigate not only institutional readiness but also the mechanisms through which readiness may influence employee effectiveness. Artificial intelligence (AI) capability may provide one mechanism through which Industry 5.0 readiness improves workforce efficiency. AI capability involves an institution's ability to acquire, integrate and apply AI technologies to support decision-making, automate routine activities and improve work processes. Neiroukh et al. (2024) found that AI capability was associated with improved decision-making speed, decision quality and organisational performance. Similarly, Kassa and Worku (2025) reported that employee productivity partially mediated the relationship between AI and organisational performance. These findings suggest that AI may contribute to workforce efficiency when

technological resources are effectively translated into improved employee productivity and organisational processes. However, evidence from these studies does not establish whether AI capability performs the same mediating role in Nigerian public tertiary institutions.

Digital innovation may provide another pathway through which Industry 5.0 readiness influences workforce efficiency. It involves the introduction and implementation of digitally enabled processes, services and administrative practices that improve organisational operations. In tertiary institutions, digital innovation may support integrated student records, electronic results processing, digital financial management and improved communication. Nevertheless, institutions may possess digital infrastructure without adequately redesigning their work processes or developing the capabilities required to benefit from technological investments. The extent to which digital innovation mediates the relationship between Industry 5.0 readiness and workforce efficiency therefore requires empirical investigation. Against this background, the objective of this study is to examine the relationship between Industry 5.0 readiness and workforce efficiency in public tertiary institutions in Nigeria's South-South geopolitical zone, with particular emphasis on the mediating roles of artificial intelligence capability and digital innovation. Specifically, the study seeks to determine the effect of Industry 5.0 readiness on workforce efficiency, assess the mediating role of AI capability, and examine the mediating role of digital innovation. By addressing these relationships, the study seeks to provide evidence that can guide institutional managers and policymakers in developing human-centred digital transformation strategies that improve workforce efficiency and strengthen institutional performance.

Theoretical framework

Dynamic Capabilities Theory

The Dynamic capabilities theory was developed by Teece, Pisano, and Shuen (1997) and further developed by Teece (2007). The theory explains how organisations achieve and sustain improved performance by identifying changes in their environment, taking advantage of emerging opportunities, and reconfiguring their resources and competencies to respond to changing conditions. Unlike traditional approaches that emphasise the possession of resources, dynamic capabilities focus on an organisation's ability to adapt, integrate, and renew its resources in response to technological and environmental changes. The theory is relevant to Industry 5.0 readiness because public tertiary institutions operate in an environment increasingly influenced by artificial intelligence, digital transformation, automation, data analytics, and human-technology collaboration. Universities, polytechnics, and colleges of education must continually assess their technological environment, identify opportunities for improvement, and adapt their administrative and academic processes to emerging technologies. Industry 5.0 readiness therefore requires more than acquiring computers and digital equipment; it involves developing institutional structures, employee competencies, management commitment, and organisational processes that support the effective integration of advanced technologies. In the context of this study, the dynamic capabilities perspective suggests that public tertiary institutions can improve workforce efficiency by developing the capacity to adopt and use emerging technologies effectively. Institutions that invest in digital infrastructure, train employees in relevant technological competencies, and redesign administrative processes may be better positioned to respond to changing work demands. For instance, artificial intelligence can support data processing, student-record management, research activities, document preparation, and administrative decision-making. However, the benefits of AI depend on an institution's ability to integrate the technology into its existing operations and ensure that employees can use it effectively. The theory also provides a basis for explaining

the mediating role of digital innovation. Digital innovation enables institutions to transform existing procedures and introduce improved ways of performing academic and administrative activities. Examples include electronic records management, digital communication systems, online service delivery, and automated administrative workflows. Such innovations may translate technological readiness into improved workforce efficiency by reducing unnecessary delays, minimising repetitive tasks, and improving coordination among employees.

Resource-Based View (RBV)

The Resource-Based View is associated with Wernerfelt (1984) and was substantially developed by Barney (1991). The theory argues that organisational performance depends partly on the resources and capabilities an organisation possesses and how effectively it deploys them. Barney (1991) maintains that resources with valuable, rare, difficult-to-imitate, and non-substitutable characteristics can provide a basis for sustained competitive advantage. Although public tertiary institutions do not necessarily compete in the same manner as private businesses, the theory remains relevant because institutional resources and capabilities can influence service quality, administrative effectiveness, academic support, and employee productivity. The Resource-Based View is suitable for the present study because Industry 5.0 readiness depends on the availability and effective utilisation of technological, human, organisational, and knowledge resources. These may include reliable internet connectivity, digital infrastructure, appropriate software, information systems, employee digital skills, management support, and institutional policies governing technology adoption. Public tertiary institutions with inadequate infrastructure or limited employee competencies may find it difficult to implement Industry 5.0 practices effectively. Conversely, institutions that combine appropriate technological resources with skilled employees and supportive organisational arrangements may be better equipped to improve workforce efficiency. The theory also provides a foundation for understanding artificial intelligence capability as an institutional resource and organisational competence. AI capability extends beyond access to AI software; it includes the technical infrastructure, data resources, employee expertise, management support, and organisational processes required to deploy AI effectively. Mikalef and Gupta (2021), for example, conceptualise AI capability as a combination of technological, human, and organisational resources that enable organisations to utilise artificial intelligence for improved outcomes. This perspective is particularly relevant to public tertiary institutions, where the acquisition of AI tools must be accompanied by employee training, appropriate data-management practices, and institutional support. Furthermore, the Resource-Based View helps explain the relevance of digital innovation. Digital innovation involves the use of digital technologies to introduce new or improved processes, services, and organisational practices. Institutions may use digital resources to streamline staff communication, automate routine administrative activities, improve access to institutional information, and support faster decision-making. The effectiveness of such innovation depends on whether the institution possesses and combines the necessary resources to convert digital opportunities into practical improvements in work processes.

Literature Review

Industry 5.0 readiness has become increasingly important as organizations embrace emerging technologies to improve operational processes, employee performance, and service delivery. Unlike Industry 4.0, which emphasizes automation and technological integration, Industry 5.0 promotes a human-centred approach that combines advanced technologies with human expertise, sustainability, and organizational resilience (European Commission, 2021). In public tertiary institutions, Industry 5.0 readiness involves the capacity to integrate digital

infrastructure, employee competencies, organizational support, and emerging technologies into academic and administrative activities. Artificial intelligence (AI) capability is particularly important because it enables institutions to deploy intelligent systems for data analysis, administrative automation, decision-making, and information management. However, the availability of AI technologies does not automatically guarantee improved performance, as effective utilization depends on institutional preparedness, employee skills, and appropriate governance (An et al., 2024; Hansen et al., 2024). Similarly, digital innovation enables institutions to transform technological resources into improved processes, digital services, and innovative work practices that can enhance institutional effectiveness (Huang et al., 2024).

Workforce efficiency in public tertiary institutions refers to employees' ability to perform assigned responsibilities accurately, promptly, and with effective utilization of institutional resources. Despite the potential benefits of emerging technologies, inadequate digital infrastructure, limited employee competencies, and organizational challenges may constrain the effective implementation of Industry 5.0 principles in Nigerian public tertiary institutions. Furthermore, the extent to which AI capability and digital innovation translate institutional readiness into improved workforce efficiency remains insufficiently understood. Although AI can reduce repetitive tasks and support decision-making, its contribution depends on how effectively institutions integrate it into existing work processes and encourage digital innovation (UNESCO, 2023). This creates a need to investigate Industry 5.0 readiness and workforce efficiency in public tertiary institutions, with particular attention to the mediating roles of AI capability and digital innovation. The study is expected to provide insights into how institutional preparedness, intelligent technologies, and innovative digital practices can be combined to improve workforce efficiency and strengthen service delivery in public tertiary institutions. Public tertiary institutions are increasingly expected to improve workforce efficiency through digital technologies, yet many institutions face challenges in achieving effective digital transformation. Despite the growing availability of artificial intelligence (AI), automation, data-driven systems, and other emerging technologies, inadequate digital infrastructure, limited employee competencies, weak institutional readiness, and insufficient governance may prevent these technologies from producing the desired improvements in workforce performance. Consequently, the potential benefits of Industry 5.0, particularly its emphasis on human-centred technology and collaboration between employees and intelligent systems, may remain largely unrealized. Furthermore, the mere adoption of AI does not necessarily translate into greater workforce efficiency. Public tertiary institutions require adequate AI capability to integrate, manage, and utilize AI technologies effectively, while digital innovation may be necessary to convert these technological capabilities into improved work processes and institutional practices.

Industry 5.0 Readiness

Industry 5.0 readiness refers to the extent to which an organization possesses the technological infrastructure, human competencies, organizational structures, and strategic capabilities required to adopt and utilize emerging technologies in a human-centred, sustainable, and resilient manner. It represents an organization's preparedness to move beyond conventional automation and digitalization toward an approach that integrates advanced technologies with human creativity, professional judgment, employee wellbeing, and organizational adaptability. The European Commission (2021) explains that Industry 5.0 complements the technology-driven orientation of Industry 4.0 by emphasizing three major principles: human-centredness, sustainability, and resilience. This perspective suggests that technological advancement should not be evaluated exclusively in terms of automation and productivity but also in terms of its contribution to human development, institutional sustainability, and the capacity to respond to

changing operational conditions. Industry 5.0 readiness is particularly relevant to public tertiary institutions because universities, polytechnics, and colleges of education perform complex academic, administrative, research, and student-support functions. These activities increasingly require digital infrastructure, intelligent information systems, data-driven decision-making, and collaboration between employees and emerging technologies. An institution may possess computers and internet connectivity without necessarily being ready for Industry 5.0 if its employees lack the relevant competencies, management does not support technological transformation, or institutional processes remain largely manual. Readiness therefore involves the integration of technological resources, employee preparedness, leadership commitment, institutional policies, and the capacity to introduce innovative work practices. The human-centred dimension of Industry 5.0 readiness emphasizes the importance of designing technological systems around the needs and capabilities of employees. Rather than treating workers as passive users of technology or replacing them through automation, this principle encourages organizations to use intelligent systems to complement human expertise. In public tertiary institutions, human-centred readiness may be reflected in employee participation in digital transformation, adequate technological support, attention to staff wellbeing, and the redesign of work processes to improve employee effectiveness. The technological dimension concerns the availability, reliability, accessibility, and integration of digital infrastructure required to support intelligent institutional operations. Reliable digital systems can facilitate communication, record management, research collaboration, information sharing, and administrative processing. Organizational readiness is another important aspect because institutional leadership, policies, funding, culture, and change-management practices influence whether new technologies are accepted and effectively implemented. Public tertiary institutions require management strategies that encourage digital transformation while addressing concerns about data protection, accountability, employee resistance, and technological costs. Workforce digital-skills readiness is equally important because employees need the knowledge and practical competencies required to work effectively with digital platforms, automation systems, AI applications, and data-management tools. The European Commission (2024) reinforces the need to integrate human capabilities, technological advancement, and organizational resilience when implementing Industry 5.0 principles. Consequently, Industry 5.0 readiness in public tertiary institutions can be understood as a multidimensional institutional capability that supports the effective integration of emerging technologies into academic and administrative activities.

Artificial Intelligence Capability

Artificial intelligence capability refers to an organization's ability to acquire, integrate, deploy, manage, and utilize AI technologies to improve decision-making, work processes, innovation, and organizational performance. It extends beyond the mere availability of AI software or applications because effective utilization requires appropriate technological infrastructure, relevant data, employee expertise, managerial support, and institutional processes. AI capability can therefore be viewed as a combination of technological and organizational resources that enables an institution to derive practical value from intelligent systems. Hansen et al. (2024) examine AI diffusion through a capability maturity perspective, emphasizing the importance of organizational capabilities in progressing from initial AI adoption toward more advanced and effective utilization. In public tertiary institutions, AI capability has become increasingly relevant because academic and non-academic employees perform tasks involving information processing, research, communication, planning, student administration, financial management, and institutional decision-making. AI applications can support these activities through automated document processing, intelligent information retrieval, predictive analysis,

personalized learning support, data classification, and the automation of repetitive administrative tasks. For instance, AI-enabled administrative systems may help institutions process student records more efficiently, identify inconsistencies in institutional data, and improve access to information required for management decisions. Academic staff may also use AI-supported tools to assist with research organization, data analysis, and the preparation of instructional materials, subject to institutional policies and appropriate professional oversight. The effectiveness of these applications depends on the institution's ability to integrate AI into existing workflows and develop the competencies required for responsible use. An institution that acquires AI applications without training its employees or establishing suitable governance procedures may experience limited benefits. Similarly, poor data quality, inadequate infrastructure, weak cybersecurity, and uncertainty about ethical responsibilities may constrain AI utilization. An et al. (2024) examine the relationship between human AI skills and organizational innovation, highlighting the importance of human capabilities in translating AI-related resources into organizational outcomes. This perspective is relevant to tertiary institutions because employees must understand how AI tools operate, assess the quality of their outputs, protect confidential information, and exercise professional judgment when applying AI-generated recommendations. AI capability may also contribute to workforce efficiency by reducing the time employees spend on repetitive tasks and improving the speed and consistency of information processing. When AI is appropriately integrated into institutional activities, employees may devote more attention to complex responsibilities requiring critical thinking, interpersonal interaction, creativity, and professional expertise. However, AI should not automatically be assumed to improve efficiency in every circumstance. Poorly implemented systems may create additional workloads, introduce errors, or generate concerns about employee autonomy and job security. UNESCO (2023) consequently emphasizes the need for human-centred governance, capacity development, and responsible use of generative AI in education and research. AI capability in public tertiary institutions should therefore be understood as the capacity to use AI effectively, responsibly, and strategically to support institutional objectives and enhance employee performance.

Digital Innovation

Digital innovation refers to the development, adoption, or significant improvement of products, services, processes, and organizational practices through the application of digital technologies. It involves more than converting paper-based records into electronic formats; it includes using digital technologies to create new ways of performing tasks, delivering services, sharing information, and solving organizational problems. Digital innovation may involve process innovation, service innovation, administrative innovation, and the development of digitally enabled organizational practices. In the context of public tertiary institutions, it represents the capacity to apply digital technologies to improve academic administration, teaching support, research coordination, student services, human resource management, and institutional decision-making. Digital innovation is increasingly important because tertiary institutions operate in environments where stakeholders expect timely information, efficient administrative services, accessible learning resources, and reliable communication. Traditional manual procedures can produce delays, duplication of effort, documentation errors, and difficulties in retrieving institutional information. Through digital innovation, institutions can introduce electronic workflow systems, digital document management, online staff appraisal, virtual collaboration platforms, automated student registration, and data-driven administrative systems. These innovations can simplify institutional processes and enable employees to complete tasks more efficiently. Huang et al. (2024) investigate digital innovation capabilities in higher education, drawing attention to the importance of developing the competencies required to

generate and implement digitally enabled solutions. Digital innovation also provides a link between technological resources and practical institutional improvements. The availability of digital infrastructure does not necessarily guarantee innovation because employees and management must identify opportunities to use technology in new or improved ways. Institutional culture, leadership support, employee creativity, access to relevant information, and opportunities for experimentation can influence the development of digital innovation. Where employees are encouraged to identify operational problems and propose technology-based solutions, digital systems may be adapted to meet the specific needs of their institutions. Conversely, institutions that adopt technology without reviewing existing procedures may simply reproduce inefficient manual practices in digital form. The relationship between digital innovation and AI capability is particularly important under Industry 5.0. AI can provide analytical and automation capabilities that support the development of innovative institutional processes, while digital innovation provides opportunities to apply these capabilities to practical problems. For example, an AI-enabled student-support system represents more than the acquisition of AI software when it changes how student enquiries are received, classified, prioritized, and resolved. Similarly, an intelligent staff-performance platform may support innovation when it improves information accessibility, reduces processing delays, and strengthens decision-making. Digital innovation may consequently mediate the relationship between Industry 5.0 readiness and workforce efficiency by translating institutional preparedness and technological capabilities into improved work practices. Its contribution, however, depends on whether the innovations introduced are relevant, usable, reliable, and aligned with institutional needs.

Workforce Efficiency in Public Tertiary Institutions

Workforce efficiency refers to the ability of employees to accomplish assigned responsibilities with appropriate use of time, effort, information, and organizational resources while maintaining the required standards of accuracy and quality. It concerns the relationship between the resource's employees use and the outputs they produce. Workforce efficiency is related to employee productivity, but the concepts are not identical. Productivity generally emphasizes the quantity of output relative to inputs, whereas efficiency also considers how economically and effectively available resources are utilized to accomplish work. An efficient workforce therefore performs tasks promptly, minimizes avoidable errors and duplication, uses organizational resources responsibly, and contributes to the achievement of institutional objectives. In public tertiary institutions, workforce efficiency is essential because academic and non-academic employees jointly support teaching, research, student administration, financial management, human resource administration, infrastructure maintenance, and institutional governance. Inefficient administrative processes may delay student registration, examination processing, staff payments, procurement, record retrieval, and responses to stakeholder enquiries. Academic inefficiency may also affect research coordination, preparation of instructional materials, assessment management, and communication with students. Improving workforce efficiency therefore requires institutional systems that support timely information access, effective coordination, appropriate allocation of responsibilities, and the removal of unnecessary administrative burdens. Industry 5.0 offers a framework for improving workforce efficiency by emphasizing collaboration between employees and advanced technologies. Rather than relying exclusively on increased automation, the Industry 5.0 approach recognizes that human expertise remains essential in complex tasks involving judgment, creativity, ethical reasoning, communication, and problem-solving. In tertiary institutions, digital systems can support routine processes while employees concentrate on responsibilities that require professional knowledge and interpersonal engagement. AI

capability may strengthen this relationship by enabling intelligent analysis, automation, and decision support, while digital innovation may improve the processes through which academic and administrative work is organized and delivered. Nevertheless, workforce efficiency depends on more than the availability of technology. Employee competencies, motivation, leadership, organizational culture, workload distribution, system reliability, and access to resources can influence the outcomes achieved. If employees lack the necessary digital skills, technological systems may be underutilized. If institutional procedures are poorly designed, digital tools may reproduce existing inefficiencies. Likewise, excessive dependence on automated outputs may introduce errors where human oversight is inadequate. Public tertiary institutions must therefore combine technological investment with employee development, effective management, clear policies, and appropriate performance-monitoring systems. For this study, workforce efficiency can be assessed through indicators such as task completion time, quality and accuracy of work, effective use of institutional resources, reduction in duplicated activities, and the ability to meet assigned work targets. These indicators can help establish whether Industry 5.0 readiness, AI capability, and digital innovation are associated with practical improvements in employee performance. Examining these relationships is particularly important in public tertiary institutions, where institutional resources must be utilized responsibly and employees are expected to deliver academic and administrative services effectively. The central proposition is that Industry 5.0 readiness may create the conditions for improved workforce efficiency, while AI capability and digital innovation may explain how institutional preparedness is translated into more effective work processes.

Empirical Literature

Mikalef and Gupta (2021) examined artificial intelligence capability and its impact on organisational creativity and firm performance using survey data from 143 senior technology managers. The study found that AI capability was positively associated with organisational creativity and performance, highlighting the importance of technological resources, employee expertise, and organisational support in achieving improved outcomes. These findings suggest that artificial intelligence can contribute to organisational effectiveness when institutions possess the capabilities required to utilise it successfully. However, the benefits of AI may depend on the extent to which organisations integrate it into their work processes, making digital innovation an important related factor.

Building on the importance of technology integration, Ezeala et al. (2024) investigated digital disruption and the performance of tertiary institutions in Nigeria, using Nnamdi Azikiwe University, Awka, as a case study. The study reported that digital innovations positively influenced institutional activities and emphasised the importance of staff training in technology adoption. This finding complements Mikalef and Gupta's (2021) study by suggesting that technological resources and the capacity to introduce improved digital processes can support organisational performance. Nevertheless, Ezeala et al. focused on digital disruption and institutional activities rather than workforce efficiency or the mediating role of digital innovation, indicating the need to investigate these relationships more directly.

The relationship between technological capabilities and institutional outcomes was also explored by Mikalef et al. (2023), who examined how artificial intelligence capabilities could foster performance in public organisations. Their study highlighted the importance of organisational capabilities in translating AI investments into improved outcomes. This perspective is particularly relevant to public tertiary institutions, where AI may support administrative processing, information management, and service delivery. When considered alongside Ezeala et al. (2024), the findings suggest that both AI capability and digital

innovation deserve attention when investigating technology-driven improvements in institutional performance. However, further investigation is needed to determine whether these capabilities explain how Industry 5.0 readiness translates into improved workforce efficiency.

Hashim et al. (2024) examined Industry 5.0 in higher education, emphasising human-centred technology, innovation, and institutional development. Similarly, Supriya et al. (2024) reviewed the applications, challenges, and opportunities associated with Industry 5.0 in smart education. Both studies highlight the importance of integrating advanced technologies with human competencies and institutional objectives. Their contributions extend the findings of Mikalef et al. (2023) by situating technological capabilities within the wider transformation of educational institutions. However, these studies do not directly establish the statistical relationship between Industry 5.0 readiness and workforce efficiency in Nigerian public tertiary institutions. Ezeala et al. (2024) demonstrated the relevance of digital innovation in a Nigerian tertiary institution, while Mikalef et al. (2023), Hashim et al. (2024), and Supriya et al. (2024) provided further insights into technological capabilities and Industry 5.0 in organisational and educational settings.

Methodology

This study adopted conceptual review method. Information on industry 5.0 readiness and workforce efficiency was gathered using textbooks, journals, published and unpublished journals, libraries and internet applications.

Findings

The study examines industry 5.0 readiness and workforce efficiency in public tertiary institutions: the mediating role of artificial intelligence capability and digital innovation. Based on conceptual review of the study, it was revealed that there is a positive effect of 5.0 readiness on workforce efficiency in public tertiary institutions in Nigeria's South-South geopolitical zone. Also shown that there is a mediating role of artificial intelligence capability and digital innovation.

Conclusion

Industry 5.0 readiness has become increasingly important as organizations embrace emerging technologies to improve operational processes, employee performance, and service delivery. Industry 5.0 readiness involves the capacity to integrate digital infrastructure, employee competencies, organizational support, and emerging technologies into academic and administrative activities. Industry 5.0 readiness is the extent to which an organization possesses the technological infrastructure, human competencies, organizational structures, and strategic capabilities required to adopt and utilize emerging technologies in a human-centred, sustainable, and resilient manner. Industry 5.0 readiness is particularly relevant to public tertiary institutions because universities, polytechnics, and colleges of education perform complex academic, administrative, research, and student-support functions. These activities increasingly require digital infrastructure, intelligent information systems, data-driven decision-making, and collaboration between employees and emerging technologies.

Recommendations

Based on the findings of the study, the following recommendations are proposed:

1. Public tertiary institutions should strengthen their Industry 5.0 readiness by investing in digital infrastructure, improving employees' digital competencies, encouraging human-technology collaboration and developing institutional policies that support technological

transformation. These measures will help institutions prepare their workforce for emerging technologies and improve operational efficiency.

2. Management of public tertiary institutions should strengthen artificial intelligence capability through regular staff training, investment in appropriate AI tools, improved data management and the development of responsible AI-use policies. This will enable academic and non-academic staff to utilize AI technologies effectively to reduce repetitive tasks, improve decision-making and enhance workforce efficiency.

3. Public tertiary institutions should promote digital innovation by encouraging employees to develop and implement technology-driven solutions to administrative, teaching, research and student-service challenges. Management should provide the necessary resources, technical support and incentives to encourage innovative practices that simplify work processes and improve service delivery.

4. Institutional management should integrate Industry 5.0 readiness, artificial intelligence capability and digital innovation into a unified workforce development strategy. This should involve aligning technological investments with staff development, organizational processes and institutional performance objectives. Such integration will help institutions maximize the benefits of AI and digital innovation and improve workforce efficiency sustainably.

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