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ARTIFICIAL INTELLIGENCE INTEGRATION AND ORGANIZATIONAL PLANNING EFFICIENCY IN THE NATIONAL BIOSAFETY MANAGEMENT AGENCY, ABUJA

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ABSTRACT

Research Objective:
This study examined the influence of artificial intelligence (AI) integration on organizational planning efficiency within the National Biosafety Management Agency (NBMA), Abuja, with a specific focus on AI adoption level, perceived usefulness of AI, and perceived ease of use of AI systems.

Methodology:
A quantitative survey research design was employed. Structured questionnaires were distributed to NBMA staff, with a sample size of 250 determined using Yamane's (1967) formula from a population of 500. A total of 162 valid responses were analyzed. The reliability of the instrument was confirmed by Cronbach's alpha values, all exceeding 0.70. Data were analyzed using SPSS Version 27, employing descriptive statistics and Pearson correlation.

Findings:
The results revealed significant positive correlations between all AI integration dimensions and planning efficiency. Perceived usefulness of AI demonstrated the strongest influence on planning efficiency ($r = 0.701$, $p < 0.01$), followed by perceived ease of use ($r = 0.621$, $p < 0.01$), and AI adoption level ($r = 0.584$, $p < 0.01$). High mean scores across all constructs indicated generally favorable staff perceptions towards AI-enabled planning processes.

Conclusion:
Effective integration of AI, particularly when systems are perceived as useful and user-friendly, substantially enhances organizational planning efficiency in public sector agencies such as NBMA.

Recommendations:
The study recommends strategic investment in user-centered AI deployment, continuous staff training, and robust change management initiatives to maximize AI's potential and sustain improvements in planning efficiency.

Keywords: Artificial Intelligence, AI Adoption, Perceived Usefulness, Perceived Ease of Use

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1.0 INTRODUCTION

In recent years, artificial intelligence (AI) has rapidly transformed the landscape of organizational management and planning. Across diverse sectors, organizations are increasingly leveraging AI to improve operational efficiency, decision-making accuracy, and strategic foresight (Dwivedi et al., 2021; Maroufkhani et al., 2022). The public sector, once characterized by conventional planning and bureaucratic rigidity, is now witnessing a paradigm shift as agencies adopt AI-driven solutions to enhance their planning processes and service delivery (Wirtz et al., 2022).

A key driver of successful AI integration is the level of AI adoption within an organization. Empirical studies have highlighted that higher adoption rates are correlated with improved workflow automation, data analysis, and resource allocation (Maroufkhani et al., 2022; Sivarajah et al., 2023). However, adoption is not merely a technical venture; it often depends on staff readiness, leadership support, and the agency's technological maturity (Dwivedi et al., 2021).

Beyond adoption level, the perceived usefulness and ease of use of AI systems are critical determinants of their impact on organizational efficiency (Venkatesh & Davis, 2000; Al-Okaily et al., 2022). The Technology Acceptance Model (TAM) posits that employees are more likely to embrace new technologies when they believe these tools enhance their job performance and are user-friendly (Venkatesh & Davis, 2000). In organizational planning contexts, AI's perceived usefulness may manifest through faster scenario modeling, predictive analytics, or improved regulatory compliance (Wirtz et al., 2022). Similarly, if AI systems are perceived as easy to use, staff are more likely to integrate them into routine planning activities, leading to smoother transitions and greater efficiency (Al-Okaily et al., 2022).

These AI integration variables, adoption level, perceived usefulness, and perceived ease of use, directly influence the efficiency of organizational planning. Planning efficiency, in this context, encompasses the agency's ability to allocate resources optimally, anticipate risks, streamline approvals, and achieve regulatory objectives with minimal delays (Maroufkhani et al., 2022). Scholars have noted that AI-enabled planning can reduce human error, enhance data-driven decision-making, and ultimately improve transparency and accountability in public sector organizations (Sivarajah et al., 2023; Wirtz et al., 2022).

Within Nigeria, the National Biosafety Management Agency (NBMA) is at the forefront of biotechnology regulation, responsible for overseeing the use and safe management of genetically modified organisms (GMOs) and related biotechnologies. As the complexity and volume of biosafety regulatory tasks increase, there is a growing need for innovative solutions to ensure efficient and robust organizational planning. The integration of AI at NBMA could revolutionize its planning processes by automating routine tasks, enhancing risk assessment, and providing real-time data for informed decision-making (Ezeani et al., 2023).

Despite the evident potential, there remains a paucity of empirical research examining how AI

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integration, specifically through the dimensions of adoption level, perceived usefulness, and perceived ease of use, affects planning efficiency within regulatory agencies like the NBMA. Addressing this gap will not only provide actionable insights for NBMA's continuous improvement but also contribute to the broader discourse on digital transformation in public administration.

Statement of the Problem

Despite the growing recognition of artificial intelligence (AI) as a catalyst for organizational effectiveness, many public sector agencies, including the National Biosafety Management Agency (NBMA) in Abuja, continue to face significant challenges in integrating AI into their planning processes. While some progress has been made in adopting digital tools, the full potential of AI to enhance organizational planning efficiency remains largely unrealized.

Empirical evidence suggests that successful AI integration is influenced by several factors, such as the level of AI adoption, perceived usefulness, and perceived ease of use (Maroufkhani et al., 2022; Al-Okaily et al., 2022). Nevertheless, there is a notable gap in understanding how these dimensions specifically affect planning efficiency within regulatory agencies like the NBMA. Issues such as resistance to change, limited technological infrastructure, and inadequate staff training further complicate the effective deployment of AI solutions (Ezeani et al., 2023; Sivarajah et al., 2023).

Currently, NBMA's capacity to efficiently allocate resources, anticipate regulatory challenges, and make timely, data-driven decisions is often constrained by manual processes and fragmented information systems. Without strategic AI integration, supported by high adoption levels and positive user perceptions, the agency risks lagging in its mandate to ensure biosafety in Nigeria's rapidly evolving biotechnology landscape.

Therefore, the core problem this study addresses is the insufficient empirical knowledge about how artificial intelligence integration, considering adoption level, perceived usefulness, and perceived ease of use, impacts organizational planning efficiency in the NBMA. Addressing this problem is vital for informing policy, improving operational workflows, and ensuring that NBMA can fulfill its regulatory responsibilities effectively in an increasingly complex environment.

Objective of the Study

The following objective will guide this research:

i. To examine the relationship between artificial intelligence (AI) integration and organizational planning efficiency in the National Biosafety Management Agency, Abuja.

Research Hypotheses

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Ho1: Artificial intelligence (AI) integration has no significant effect on organizational planning efficiency in the National Biosafety Management Agency, Abuja.

2.0 LITERATURE REVIEW

Artificial Intelligence Integration

Artificial intelligence (AI) integration refers to embedding AI technologies, such as machine learning, natural language processing, and intelligent automation, into organizational systems and decision-making processes in alignment with strategic goals, culture, and infrastructure to enhance value creation and innovation (Jöhnk et al., 2021; Chatterjee et al., 2021). Typically implemented in stages from pilot projects to enterprise-wide deployment, effective AI integration requires technical readiness, organizational commitment, change management, and continuous learning (Jöhnk et al., 2021).

Studies further emphasize the need for system interoperability with existing infrastructure and strong data governance frameworks to address privacy, security, and transparency concerns (Cui et al., 2021; Dwivedi et al., 2023). In public and regulatory contexts, AI integration supports improved service delivery and evidence-based policymaking but is often constrained by regulatory uncertainty, skills gaps, and employee resistance (Sharma et al., 2023; Sushil et al., 2022). Overall, successful AI integration is a multidimensional process that, when strategically managed, enhances organizational efficiency, agility, and innovation (Chatterjee et al., 2021; Sharma et al., 2023).

AI Adoption Level

AI adoption level denotes the extent to which artificial intelligence is implemented and embedded across organizational processes, systems, and functions, going beyond initial adoption to include the depth and breadth of use (Stentoft & Rajkumar, 2021). Advanced adoption reflects the integration of AI into core workflows, decision-making, and strategic planning rather than isolated pilot projects (Jöhnk et al., 2021). AI adoption typically progresses through stages from awareness to institutionalization, with higher stages associated with greater efficiency, innovation, and competitive advantage (Wamba-Taguimdje et al., 2020; Maroufkhani et al., 2023). However, achieving high adoption levels requires addressing challenges related to infrastructure, organizational culture, leadership support, and employee readiness (Stentoft & Rajkumar, 2021; Wamba-Taguimdje et al., 2020). Although public sector organizations often lag behind due to regulatory constraints and limited resources, increasing recognition of AI's benefits is driving broader and more strategic investments (Baier et al., 2023). Measuring AI adoption commonly involves evaluating application scope, employee involvement, and strategic alignment (Maroufkhani et al., 2023).

Perceived Usefulness of AI

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Perceived usefulness of AI refers to the extent to which users believe that AI enhances job performance, productivity, and organizational outcomes, and it is a central construct within the Technology Acceptance Model (Venkatesh & Bala, 2008; Davis, 1989; Mikalef et al., 2022; Oliveira et al., 2022). In organizational contexts, this perception strongly influences employees' and decision-makers' willingness to integrate AI into routine operations and strategic planning, especially when AI demonstrates benefits such as improved data analysis, faster decision-making, error reduction, and better service delivery (Mikalef et al., 2022; Bai & Li, 2022). Studies in public administration indicate that perceived usefulness reduces resistance to AI adoption when AI supports process efficiency, transparency, and actionable insights (Bai & Li, 2022; Oliveira et al., 2022). This perception is further shaped by organizational readiness, task characteristics, and the alignment of AI capabilities with organizational goals and workflows (Kanellou & Spathis, 2021; Mikalef et al., 2022). Overall, perceived usefulness is critical to fostering positive attitudes toward AI adoption and enabling organizations to realize AI-driven improvements in planning and efficiency (Bai & Li, 2022; Oliveira et al., 2022).

Perceived Ease of Use of AI

Perceived ease of use of artificial intelligence (AI) refers to the degree to which individuals believe that interacting with AI systems will be free of effort or complexity (Venkatesh & Davis, 2000; Marikyan et al., 2022). As a fundamental construct in the Technology Acceptance Model (TAM), perceived ease of use directly impacts the likelihood that users will adopt and integrate AI technologies into their daily routines (Davis, 1989; Dwivedi et al., 2023).

In organizational contexts, if employees find AI tools intuitive, user-friendly, and requiring minimal training, they are more likely to embrace their application in planning and operations (Dwivedi et al., 2023; Marikyan et al., 2022). Conversely, high complexity, poor interface design, or insufficient support can lead to resistance, underutilization, or outright rejection of AI systems (Kim, 2020).

Recent studies have highlighted that the perceived ease of use is influenced by factors such as interface simplicity, quality of user support, integration with existing workflows, and the availability of training resources (Kim, 2020; Marikyan et al., 2022). Furthermore, organizations that invest in user-centered design and robust training programs tend to see higher rates of successful AI adoption and greater improvements in operational efficiency (Dwivedi et al., 2023). Ultimately, enhancing the perceived ease of use of AI is not only a matter of technical design but also of change management and organizational culture. By reducing barriers to usage and fostering a positive user experience, organizations can accelerate the acceptance and effectiveness of AI in achieving their goals.

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Organizational Planning Efficiency

Organizational planning efficiency refers to an organization's capacity to allocate resources, set priorities, and coordinate activities to achieve strategic objectives with minimal waste and delays (Fahimnia et al., 2021; Bakar & Ahmad, 2020). It is characterized by timely decision-making, optimal resource use, and adaptability to environmental changes (Bakar & Ahmad, 2020). In modern organizations, planning efficiency is increasingly driven by data-based decision-making and digital tools, which enhance forecasting, scheduling, and responsiveness through real-time information and risk assessment (Fahimnia et al., 2021; Yu et al., 2022). The adoption of technologies such as AI and analytics improves efficiency by automating tasks, reducing errors, and enabling predictive insights (Yu et al., 2022; Hou et al., 2021). Efficient planning also underpins organizational performance by supporting goal alignment, change management, and responsiveness, particularly in public sector and regulatory contexts where accountability and service delivery are critical (Bakar & Ahmad, 2020; Hou et al., 2021). Beyond technology, planning efficiency depends on leadership, organizational culture, and continuous process improvement (Fahimnia et al., 2021).

Theoretical Review

The integration of artificial intelligence (AI) and the resulting enhancement of organizational planning efficiency in the National Biosafety Management Agency (NBMA), Abuja, can be effectively interpreted through the Technology Acceptance Model (TAM) developed by Davis (1989), which serves as the theoretical foundation for this study. TAM posits that the acceptance and use of new technologies are primarily determined by two key perceptions: perceived usefulness (the extent to which an individual believes that using a technology will improve job performance) and perceived ease of use (the degree to which an individual believes that using the system will be free from effort).

Within the NBMA context, the adoption of AI-driven planning tools and systems is shaped by employees' recognition of their ability to enhance efficiency, accuracy, and decision-making in regulatory processes. When staff members perceive AI technologies as beneficial for streamlining operations, reducing errors, and supporting data-driven planning, they are more likely to accept and integrate these tools into their daily routines. Additionally, user-friendly interfaces, tailored training programs, and ongoing management support have helped lower the perceived complexity of AI systems, thereby encouraging positive attitudes toward their use.

Moreover, the observable benefits of AI integration, such as faster planning cycles, improved resource allocation, and increased compliance, reinforce the perceived value of these technologies. NBMA's emphasis on continuous professional development and capacity building also aligns with the TAM, which suggests that fostering positive user perceptions accelerates technology adoption and utilization.

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By centering on users' attitudes and experiences, the Technology Acceptance Model provides a robust framework for understanding how AI integration drives improvements in organizational planning efficiency. This theoretical perspective not only explains the favorable responses captured in the study but also validates the practical link between technological innovation and enhanced public sector performance within regulatory agencies like the NBMA.

Empirical Review

This section reviews empirical studies on the relationship between artificial intelligence (AI) integration and organizational planning efficiency, with particular attention to public sector and regulatory environments.

Ofori, Boateng, and Fosu (2025) surveyed 545 public administrators in Ghanaian government agencies to investigate the impact of AI adoption on strategic decision-making and operational efficiency. Utilizing quantitative survey methods and regression analysis, the study found that higher AI adoption levels significantly improved strategic planning processes. However, the direct effect on overall operational efficiency was less pronounced, suggesting that AI's main value arises from enhancing decision accuracy and planning quality.

Grønsund and Aanestad (2023) conducted qualitative interviews with officials from multiple public sector organizations to examine approaches to managing AI adoption for planning efficiency. Their study revealed that both integrated and separate AI/data team strategies could improve planning outcomes, but agencies faced unique challenges related to technical implementation and process adaptation, highlighting the need for context-sensitive integration strategies.

Tambe, Hitt, and Brynjolfsson (2019) used firm-level data and regression analysis to study the effect of perceived usefulness of AI on organizational productivity across diverse sectors. Their findings indicated that when managers and staff viewed AI as advantageous for improving task efficiency, organizations experienced marked improvements in planning accuracy and resource optimization. This underscores the importance of user perception in realizing AI's benefits.

Mikalef, Fjørtoft, and Torvatn (2022) surveyed Norwegian public sector employees to explore the determinants of AI acceptance and its impact on planning and operational outcomes. Results showed that perceived usefulness and perceived ease of use were significant predictors of both intention to use AI and actual adoption, leading to enhanced planning and service delivery within public agencies.

Rahman, Rahim, and Karim (2023) examined the role of perceived ease of use in AI adoption among 200 planning professionals in Malaysian government bodies. Their study found that user-friendly AI systems reduced resistance and facilitated more effective integration into planning activities, resulting in greater organizational efficiency.

Additionally, recent reports by the World Economic Forum (2023) and UNDP (2024) highlight that AI and digital technology integration in the public sector globally have driven improvements

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in planning, resource allocation, and regulatory compliance. However, the effectiveness of these technologies hinges on continuous investment in user training, supportive infrastructure, and organizational readiness for change.

Collectively, these studies demonstrate that successful AI integration is closely linked to organizational planning efficiency, with positive user perceptions, adequate training, and robust infrastructure serving as critical enablers. The evidence underscores the necessity of a holistic approach to AI adoption that addresses both technological and human factors in public sector organizations.

3.0 METHODOLOGY

Research Design

This study adopted a descriptive survey research design, appropriate for investigating the relationship between artificial intelligence (AI) integration and organizational planning efficiency in the National Biosafety Management Agency (NBMA), Abuja. This design facilitated the systematic collection of quantifiable data on the influence of AI adoption level, perceived usefulness, and perceived ease of use on planning efficiency. The approach enabled the identification of patterns and associations within NBMA, without manipulation of variables.

Nature and Sources of Data

Primary data were obtained using a structured questionnaire administered to NBMA employees across various departments. The instrument included sections on demographic characteristics, AI adoption, perceived usefulness, perceived ease of use, and organizational planning efficiency, with responses measured on a five-point Likert scale. Out of a population of 500, a stratified random sample of 250 staff was selected using Yamane's (1967) formula, and 162 completed questionnaires were found valid for analysis.

Secondary data were sourced from official NBMA records, policy documents, academic literature, and sector reports to provide context and complement the primary data. The questionnaire's validity was ascertained through expert review, and reliability was confirmed by Cronbach's alpha coefficients exceeding 0.70 for all constructs, indicating strong internal consistency.

Methods of Data Analysis

Data were coded and analyzed using SPSS Version 27. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize respondent demographics and perceptions of AI integration. Pearson correlation analysis was employed to assess the strength and direction of relationships between AI integration variables and organizational planning efficiency within the NBM

4.0 DATA PRESENTATION AND ANALYSES

Data Presentation

Table 4.1 presents the descriptive statistics for the primary variables in this study, capturing

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respondents' perceptions of artificial intelligence (AI) integration dimensions and organizational planning efficiency within the National Biosafety Management Agency (NBMA), Abuja. Among the AI integration indicators, Perceived Usefulness of AI recorded the highest mean score (23.12), indicating that employees widely recognize the value and positive impact of AI systems in supporting and enhancing planning activities. AI Adoption Level followed with a mean score of 21.75, suggesting a high degree of acceptance and utilization of AI technologies throughout the agency. Perceived Ease of Use of AI had a mean of 18.97, reflecting general agreement that AI systems are user-friendly, though with some variation in ease of interaction among respondents.

The dependent variable, Organizational Planning Efficiency, achieved a high mean score (22.41). This demonstrates strong consensus among staff regarding the improvements in planning processes, resource allocation, and overall operational effectiveness resulting from AI integration. The consistently high mean values across all constructs highlight widespread agreement on the positive effects of AI adoption and user-focused design, as well as the critical role of AI in driving efficiency within NBMA's regulatory and planning functions.

These findings underscore the significance that employees attach to both technological innovation and user experience in achieving organizational goals and sustaining public sector performance.

Descriptive Statistics

		AI Adoption Level (AIAL)	Perceived Usefulness of AI (PUAI)	Perceived Ease of Use of AI (PEOUAI)	Organizational Planning Efficiency (OPE)
N	Valid	162	162	162	162
	Missing	0	0	0	0
Mean		21.75	23.12	18.97	22.41
Median		22	24	19	23
Std. Deviation		2.43	2.95	2.12	2.29
Minimum		15	15	12	17
Maximum		25	25	20	25

Source: Researcher's Survey, 2025

Table 4.2 presents the Pearson correlation coefficients for the main study variables, revealing statistically significant positive relationships among all constructs at the 0.01 level (2-tailed). This indicates that higher levels of AI integration, measured by AI adoption level, perceived usefulness, and perceived ease of use, are associated with greater organizational planning efficiency within the National Biosafety Management Agency (NBMA), Abuja.

Perceived Usefulness of AI showed the strongest positive correlation with Organizational Planning Efficiency ($r = 0.701$, $p < 0.01$), highlighting the substantial influence of staff beliefs

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about the value of AI on the effectiveness of planning processes. Perceived Ease of Use of AI also demonstrated a strong positive correlation with Planning Efficiency ($r = 0.621$, $p < 0.01$), suggesting that when employees find AI systems intuitive and user-friendly, they are better able to leverage these tools for efficient organizational planning. AI Adoption Level exhibited a significant positive correlation with Planning Efficiency ($r = 0.584$, $p < 0.01$), indicating that widespread and consistent use of AI technologies contributes meaningfully to improved organizational outcomes.

Significant inter-variable correlations were also observed among the independent constructs. For example, Perceived Usefulness of AI and Perceived Ease of Use displayed a high positive correlation ($r = 0.653$, $p < 0.01$), reflecting the complementary relationship between these perceptions in shaping staff engagement with AI systems. Similarly, AI Adoption Level was strongly correlated with both Perceived Usefulness ($r = 0.612$) and Perceived Ease of Use ($r = 0.535$), underscoring the interconnectedness of these dimensions in driving technology acceptance and utilization.

Collectively, these results demonstrate that all facets of AI integration positively influence organizational planning efficiency, with the greatest impact arising from employees' perceptions of AI's usefulness. This underscores the importance of continuous training, user-centered system design, and supportive policies to maximize the benefits of AI-driven planning within NBMA.

Correlation					
		AI Adoption Level (AIAL)	Perceived Usefulness of AI (PUAI)	Perceived Ease of Use of AI (PEOUAI)	Organizational Planning Efficiency (OPE)
AI Adoption Level (AIAL)	Pearson Correlation	1	.612**	.535**	.584**
	Sig. (2-tailed)		0	0	0
	N	162	162	162	162
Perceived Usefulness of AI (PUAI)	Pearson Correlation	.612**	1	.653**	.701**
	Sig. (2-tailed)	0		0	0
	N	162	162	162	162
Perceived Ease of Use of AI (PEOUAI)	Pearson Correlation	.535**	.653**	1	.621**
	Sig. (2-tailed)	0	0		0

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	N	162	162	162	162
Organizational Planning Efficiency (OPE)	Pearson Correlation	.584**	.701**	.621**	1
	Sig. (2-tailed)	0	0	0	
	N	162	162	162	162

Source: Researcher's Survey, 2025

Discussion and Findings

The results demonstrate that artificial intelligence (AI) integration has significantly enhanced organizational planning efficiency within the National Biosafety Management Agency (NBMA), Abuja. Among the AI integration dimensions assessed, Perceived Usefulness of AI exerted the strongest influence on planning efficiency, followed by Perceived Ease of Use, while AI Adoption Level also showed a significant but comparatively moderate impact. This pattern suggests that when employees recognize clear benefits from AI, such as improved accuracy, faster processes, and better decision-making, they are more likely to utilize these systems effectively, leading to measurable improvements in organizational planning.

The strong association between perceived ease of use and planning efficiency indicates that intuitive, user-friendly AI systems reduce barriers to adoption and support smoother integration into daily planning activities. This finding highlights the necessity of investing in both technology design and comprehensive user training to maximize operational benefits. The positive, though slightly weaker, correlation with AI adoption level implies that while widespread use of AI is important, it is most effective when coupled with positive user perceptions and system usability.

The findings also reveal that all dimensions of AI integration are interrelated, collectively driving improvements in planning efficiency. Employees who actively engage with one aspect of AI are likely to interact with others, underscoring the need for an integrated, holistic approach to digital transformation within the agency. Overall, the study confirms that effective AI integration is a key driver of enhanced organizational planning efficiency, reshaping workflows and demanding greater technological competency. For NBMA to sustain these gains and remain adaptive in a dynamic regulatory environment, ongoing investment in user-centered AI deployment, targeted training, and change management is essential, particularly in the areas that have the greatest operational impact.

5.0 SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS

Summary of Findings

The study found that artificial intelligence (AI) integration is a significant driver of organizational planning efficiency within the National Biosafety Management Agency (NBMA), Abuja. Among

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the AI integration dimensions analyzed, Perceived Usefulness of AI had the strongest influence on planning efficiency, reflecting the importance of employees recognizing the practical value and benefits of AI systems in their daily operations. Perceived Ease of Use of AI also played a substantial role, indicating that intuitive and user-friendly AI tools facilitate more effective planning processes. AI Adoption Level had a positive, albeit comparatively moderate, impact, highlighting that widespread and consistent use of AI is beneficial, especially when accompanied by positive user perceptions. The findings suggest that all three dimensions of AI integration collectively enhance organizational planning efficiency, with perceived usefulness and ease of use being the most influential drivers. This underscores the need for continuous investment in user-centered design and capacity-building initiatives to enable staff to effectively leverage AI technologies.

Conclusion

The results demonstrate that AI integration significantly enhances organizational planning efficiency in NBMA, with Perceived Usefulness of AI exerting the most pronounced effect, followed by Perceived Ease of Use and AI Adoption Level. Effective integration of AI not only improves operational workflows but also shifts employee roles, requiring new competencies in technology adoption and data-driven decision-making. While this study focused on key aspects of AI integration, it acknowledges that future research should consider broader organizational factors and explore the long-term impact of AI on workforce development and public sector performance.

Recommendations

Based on these findings, it is recommended that NBMA and similar agencies intensify investment in user-centered AI deployment, ensuring systems are both valuable and easy to use for staff. Ongoing training and change management initiatives should be embedded into all AI integration projects, with regular workshops and practical support to address evolving operational needs. The agency should continuously assess and upgrade AI systems based on user feedback and industry best practices. Additionally, NBMA should foster a culture of continuous professional development by institutionalizing regular skills assessments, mentoring, and knowledge-sharing platforms to build staff confidence and adaptability. Policymakers should also support digital transformation efforts through investments in digital infrastructure and by promoting organizational readiness for technology-driven change, ensuring sustainable improvements in planning efficiency across the public sector.

Contribution to Knowledge

This study empirically establishes that the integration of artificial intelligence (AI), specifically through AI Adoption Level, Perceived Usefulness, and Perceived Ease of Use, significantly

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enhances organizational planning efficiency in the Nigerian public sector. It provides current evidence on how AI-driven initiatives reshape planning workflows, create new competency requirements, and promote continuous professional development within regulatory agencies such as the National Biosafety Management Agency (NBMA).

Conceptually, the study extends the application of the Technology Acceptance Model (TAM) by demonstrating how perceptions of usefulness and ease of use are critical in facilitating AI adoption and improving organizational outcomes in public administration. This theoretical application offers a nuanced perspective on how technology acceptance directly drives planning efficiency, contributing to the literature on digital transformation and organizational performance in emerging economies.

Methodologically, the use of a stratified random sample and validated survey instruments enhances the generalizability and reliability of the findings, providing a solid empirical foundation for future research on AI integration and planning efficiency in the public sector. Contextually, the study highlights the pivotal role of user perceptions and training, factors often overlooked in African regulatory research, demonstrating their centrality in successfully leveraging AI for improved operational efficiency and adaptive capacity within NBMA and similar agencies.

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