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An Exploration of AI Adoption and Public Sector Operations: The Mediating Effect of Strategic Decision Making

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Abstract

Purpose: While artificial intelligence (AI) offers the potential to enhance efficiency, accuracy, and responsiveness, empirical evidence suggests that its direct impact on public sector operations remains limited. This raises important questions about the mechanisms through which AI generates value in public administration.

Methodology: This study employed primary data because primary data collection ensures control over data quality and relevance, which is crucial for testing the proposed hypotheses and generating actionable insights for government decision-makers. Quota sampling, which is a non-probability sampling technique that ensures representation from specific subgroups within a population, was used to obtain a sample size of 545.

Findings: The AI Adoption and Strategic Decision-Making path shows a strong, positive, and statistically significant effect of AI adoption on strategic decision-making. The Strategic Decision-Making and Public Sector Operations path also demonstrates a moderate-to-strong positive effect that is statistically significant. The direct path from AI adoption to public sector operations is very weak and statistically insignificant. Strategic decision-making fully mediates the relationship between AI adoption and public sector operations.

Unique Contribution to Theory, Policy, and Practice: The finding that strategic decision-making fully mediates the relationship between AI adoption and public sector operations adds theoretical depth by introducing a mechanistic pathway. This addresses a notable gap in the literature where most studies assume a direct link between digital tools and performance. The research cautions against policy approaches that focus solely on technology procurement. Instead, it encourages a shift toward policies that promote AI-supported strategic planning frameworks, ensuring that technologies are aligned with public sector priorities and competencies.

Keywords: *AI Adoption, Public Sector Operations, Strategic Decision Making*

1. Background of the Study

In recent years, the integration of Artificial Intelligence (AI) in public sector operations has emerged as a transformative force capable of enhancing strategic decision-making, improving service delivery, and increasing operational efficiency. As governments across the globe confront increasing complexities—ranging from constrained resources to rising citizen expectations—AI offers new tools for informed, data-driven decisions that align with public value objectives (Wirtz et al., 2019). The adoption of AI technologies such as machine learning, natural language processing, and predictive analytics has the potential to radically improve public sector responsiveness, transparency, and accountability (Zhang et al., 2021). However, despite the promising prospects, public institutions often lag behind private organizations in AI adoption due to institutional rigidity, bureaucratic inertia, limited technical capabilities, and ethical concerns. Strategic decision-making in the public sector encompasses the processes by which policy choices and resource allocations are made to fulfill long-term goals. AI adoption can serve as a strategic enabler by offering real-time insights, scenario planning, and automated administrative tasks that support evidence-based policy formulation (Dwivedi et al., 2021). For instance, AI-driven analytics are increasingly used in public health for outbreak prediction, in tax agencies for fraud detection, and in social services for beneficiary profiling (Sun & Medaglia, 2019). Nevertheless, the integration of AI into strategic decision-making frameworks requires more than technological acquisition; it necessitates cultural change, stakeholder engagement, robust data governance, and a clear ethical framework to manage potential biases and ensure public trust (Janssen & Kuk, 2022).

In the context of public sector operations, AI can streamline administrative workflows, enhance resource planning, and optimize service delivery mechanisms. Government agencies that successfully adopt AI report increased process efficiency and more targeted policy interventions (Kankanhalli et al., 2019). Yet, the fragmented digital infrastructure, lack of skilled personnel, and regulatory constraints in many developing economies continue to hinder the effective utilization of AI technologies. As such, understanding the intersection between AI adoption, strategic decision-making, and public sector operational dynamics is critical for unlocking the full potential of AI-driven governance (Ali et al., 2023). The adoption of Artificial Intelligence (AI) in public sector operations has garnered significant global attention due to its potential to enhance efficiency, accuracy, and responsiveness in governance. However, in the context of Ghana, the integration of AI into public administration remains at a nascent stage, characterized by low adoption rates, fragmented digital infrastructure, and limited strategic alignment with national development goals (Owusu et al., 2022). Despite policy frameworks such as Ghana's Digital Agenda and various e-governance initiatives, there is a noticeable gap between technological innovation and its practical application in decision-making processes within public institutions (Mensah & Mi, 2021). This gap raises critical concerns about the capacity of public sector entities to leverage AI tools for evidence-based planning, predictive analytics, and service optimization.

Strategic decision-making in Ghana's public sector is often hindered by bureaucratic inertia, inadequate data systems, and weak institutional coordination, which collectively reduce the ability of agencies to make timely and informed policy choices (Asamoah et al., 2023). While AI has the potential to mitigate these challenges through automation, machine learning, and real-time data analysis, the readiness of Ghanaian public institutions to adopt and integrate AI into strategic decision frameworks remains largely unexplored. Moreover, the ethical, organizational, and regulatory concerns surrounding AI use in public administration—such as data privacy, bias in algorithms, and lack of skilled personnel—further compound the problem (Adomako & Osei-Tutu, 2020). The lack of empirical research on how AI adoption influences strategic decision-making and operational effectiveness in Ghana's public sector constitutes a critical knowledge gap. Most existing studies focus broadly on digital transformation or e-government, with limited attention given to AI-specific applications and their strategic implications (Anning-Dorson, 2020). Consequently, there is a pressing need to investigate the extent to which AI adoption is being pursued, how it shapes public sector decision-making, and the operational challenges and opportunities it presents. Addressing this problem is vital for informing policy design, capacity-building interventions, and technology governance mechanisms that can enable effective public service delivery and national development in Ghana's digital era.

While artificial intelligence (AI) offers the potential to enhance efficiency, accuracy, and responsiveness, empirical evidence suggests that its direct impact on public sector operations remains limited. This raises important questions about the mechanisms through which AI generates value in public administration. Recent theoretical advancements point to strategic decision-making as a potential mediating factor, emphasizing the need for strategic alignment, data-informed governance, and managerial competence to unlock AI's full benefits. However, research exploring this mediating relationship remains sparse, particularly in public sector settings where bureaucratic structures and institutional inertia often hinder technology integration. As such, there is a critical need to examine whether and how strategic decision-making mediates the relationship between AI adoption and public sector operations, thereby advancing both academic understanding and practical guidance for AI-enabled governance. The Technology-Organization-Environment (TOE) framework, developed by Tornatzky and Fleischer (1990), provides a robust theoretical foundation for understanding AI adoption, strategic decision-making, and public sector operations in Ghana. This framework posits that an organization's decision to adopt and implement technological innovations is influenced by three key contextual dimensions: technological context, organizational context, and environmental context. It has been widely applied in recent literature to examine digital transformation initiatives in public institutions (Dwivedi et al., 2021; Asamoah et al., 2023).

2. Literature Review

2.1 AI Adoption

Artificial Intelligence (AI) adoption refers to the process through which organizations implement AI technologies such as machine learning, natural language processing, and predictive analytics to improve decision-making and operational efficiency. In the public sector, AI adoption is increasingly viewed as a strategic response to mounting pressures for transparency, efficiency, and service innovation (Dwivedi et al., 2021). The adoption process is influenced by factors such as technological readiness, data infrastructure, regulatory frameworks, and organizational culture (Ali et al., 2023). In developing countries like Ghana, AI adoption is still emerging and faces challenges including limited technical expertise, data fragmentation, and low digital maturity (Owusu et al., 2022). Nevertheless, AI adoption in the public sector holds significant potential to transform public service delivery through automation, better forecasting, and optimized resource allocation (Wirtz et al., 2019). Understanding the drivers and barriers of AI adoption is crucial for guiding public sector reforms and achieving the broader goals of digital governance.

2.1.1 Strategic Decision-Making

Strategic decision-making in the public sector involves high-level choices made by government officials and managers to allocate resources, formulate policies, and direct long-term development goals. AI can significantly enhance this process by providing decision-makers with access to real-time data, predictive analytics, and simulation models that enable proactive governance (Sun & Medaglia, 2019). Strategic decisions that traditionally relied on intuition and past experience are increasingly being augmented by algorithmic insights and scenario analyses (Zhang et al., 2021). However, in Ghana, the integration of AI into strategic decision-making is limited by institutional inertia, lack of cross-departmental data integration, and insufficient policy direction (Mensah & Mi, 2021). For AI to meaningfully contribute to strategic decision-making, public sector leaders must invest in data governance, human capacity development, and ethical AI frameworks that promote transparency and accountability (Janssen & Kuk, 2022).

2.1.2 Public Sector Operations

Public sector operations encompass the day-to-day administrative, logistical, and service-related functions performed by government entities to meet citizen needs. AI technologies are increasingly being applied to streamline operations such as tax processing, health diagnostics, urban planning, and public procurement (Kankanhalli et al., 2019). In Ghana, AI has potential applications in areas like agriculture, education, and public financial management but remains underutilized due to infrastructural and institutional constraints (Asamoah et al., 2023). AI can automate repetitive tasks, improve decision accuracy, and reduce human error, thereby increasing operational efficiency and responsiveness (Wirtz et al., 2019). However, successful integration into public operations requires clear policy frameworks, inter-agency collaboration, and public trust.

Therefore, strengthening digital infrastructure and building institutional capacity are essential for unlocking the benefits of AI in Ghana's public sector operations.

2.2 Technology-Organization-Environment (TOE) Framework

In the context of Ghana's public sector, the technological context refers to the availability, compatibility, and perceived benefits of AI tools such as machine learning and predictive analytics. For instance, limited access to infrastructure and data interoperability challenges may inhibit AI adoption. The organizational context captures factors like top management support, institutional culture, and human resource capacity. Many public agencies in Ghana struggle with digital skills gaps and bureaucratic resistance, which can impede strategic use of AI (Anning-Dorson, 2020). Lastly, the environmental context involves external pressures such as regulatory mandates, donor influences, and public demand for transparency. The government's digital transformation agenda and external funding bodies increasingly push for technology-led reforms (Owusu et al., 2022). Applying the TOE framework enables researchers and policymakers to holistically analyze the enablers and barriers to AI adoption in Ghana's public sector. It also facilitates an understanding of how these contextual elements interact to shape strategic decision-making and operational outcomes in a dynamic governance environment.

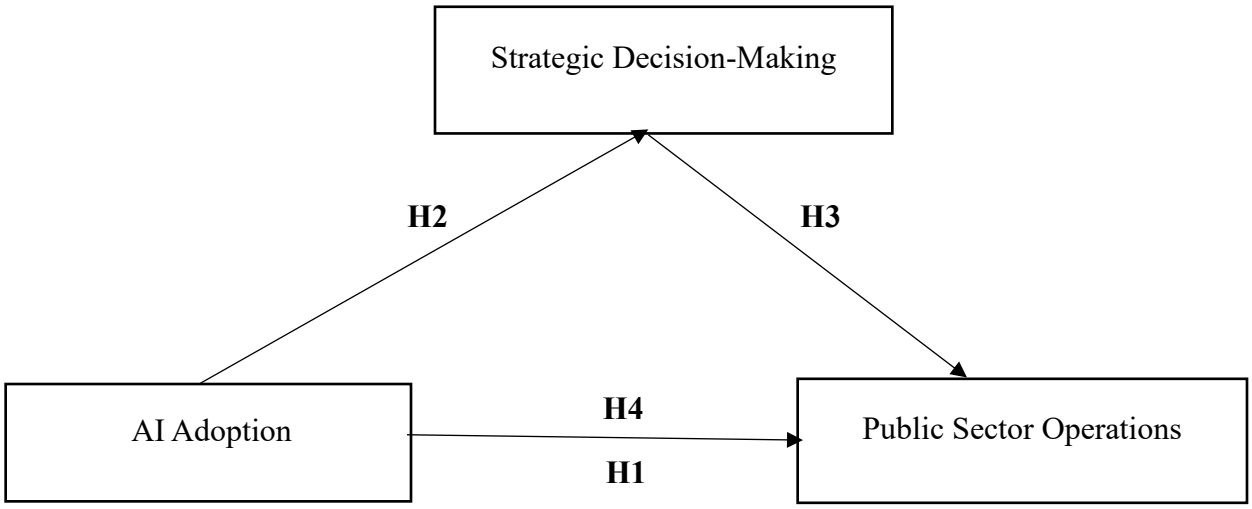


Figure 1 Conceptual framework

2.3 Relationship between AI Adoption and Public Sector Operations

The adoption of Artificial Intelligence (AI) has emerged as a transformative force in enhancing public sector operations by improving efficiency, accuracy, transparency, and citizen engagement. Governments worldwide are integrating AI technologies such as machine learning, natural language processing, and predictive analytics into service delivery, administrative processes, and policy implementation. In the context of developing countries like Ghana, AI offers immense potential to bridge institutional capacity gaps and improve operational performance across ministries, departments, and agencies.

AI adoption streamlines bureaucratic processes by automating repetitive tasks, reducing human error, and enabling real-time decision-making. For instance, AI-powered chatbots and virtual assistants have significantly improved public service delivery by offering 24/7 access to information and reducing delays in response time (Dwivedi et al., 2021). Moreover, AI systems aid in data-driven decision-making, allowing public officials to utilize predictive analytics to allocate resources effectively, assess policy impacts, and improve governance outcomes (Wirtz et al., 2019). In addition, AI adoption enhances public sector transparency and accountability. Through digital tracking and intelligent monitoring systems, AI can detect anomalies, prevent fraud, and ensure compliance in public procurement, budgeting, and auditing processes (Masiero & Das, 2022). These innovations contribute to building public trust and institutional credibility. Furthermore, AI integration supports human capacity by complementing the work of civil servants rather than replacing them. AI can assist in generating insights from large datasets, freeing up professionals to focus on strategic and policy-oriented tasks (Elia et al., 2021). In Ghana, initiatives such as AI-powered tax systems and e-governance platforms are examples of how AI is optimizing public sector operations and supporting digital transformation goals. Therefore, AI adoption significantly enhances the effectiveness, efficiency, and responsiveness of public sector operations by fostering innovation and improving service quality.

H1: AI adoption has a positive and significant relationship with public sector operations.

2.3.1 Relationship between AI Adoption and Strategic Decision-Making

Artificial Intelligence (AI) adoption is playing a pivotal role in enhancing strategic decision-making across sectors by offering advanced analytical capabilities, pattern recognition, and predictive modeling. In contemporary governance and organizational management, strategic decisions must increasingly rely on timely, accurate, and data-driven insights—capabilities that AI inherently provides. As such, the integration of AI technologies has become a strategic asset, enabling decision-makers to navigate complexity, uncertainty, and dynamic operational environments more effectively.AI supports strategic decision-making by providing tools that can analyze vast datasets, identify emerging trends, and simulate outcomes based on multiple scenarios (Wamba-Taguimdje et al., 2020). These capabilities significantly reduce the time and cognitive load associated with high-level decision processes while increasing the precision and effectiveness of chosen strategies. For instance, predictive analytics powered by AI can help public officials forecast economic indicators, model the impact of policy changes, or assess potential risks, all of which contribute to more informed strategic planning (Jarek & Mazurek, 2019).Moreover, AI enhances real-time decision-making by automating routine analysis and highlighting key performance indicators that demand executive attention. This capability improves responsiveness to change and promotes agility in strategic formulation and execution (Dwivedi et al., 2021). In sectors such as healthcare, finance, and public administration, AI-driven dashboards and decision support systems have led to more consistent and evidence-based decisions (Ransbotham et al., 2020).

AI also supports strategic alignment by integrating multiple data sources and ensuring decisions are based on comprehensive views of organizational performance and external environments. In strategic governance, AI facilitates cross-departmental collaboration and reduces silos by presenting unified data visualizations and forecasts (Haenlein et al., 2023). Consequently, AI adoption is not merely an operational enhancement but a foundational element of strategic capability.

H2: AI adoption has a positive and significant relationship with strategic decision-making

2.3.2 Relationship between Strategic Decision-Making and Public Sector Operations

Strategic decision-making is critical to the effective functioning of public sector institutions, especially in an era characterized by rapid change, technological advancement, and increasing citizen expectations. In the public sector, strategic decisions involve long-term planning, resource allocation, policy formulation, and performance management. When strategic decision-making processes are data-driven, participatory, and forward-looking, they significantly enhance the efficiency, responsiveness, and accountability of public sector operations (Bryson, Crosby & Bloomberg, 2021). Strategic decision-making ensures that public sector entities align their goals with national development priorities and societal needs. Through evidence-based planning, leaders are better able to anticipate future challenges, identify opportunities for service improvement, and prioritize limited resources effectively (Head & Alford, 2019). This alignment enables ministries and agencies to operate with greater clarity, purpose, and coordination, ultimately improving operational outcomes such as service delivery speed, policy coherence, and stakeholder satisfaction.

Moreover, strategic decision-making fosters innovation in public administration. It encourages the adoption of new technologies, re-engineering of outdated processes, and engagement with citizens and stakeholders in co-creating public value (Sivarajah et al., 2020). These innovations, in turn, contribute to operational efficiency, improved transparency, and enhanced public trust. In contexts like Ghana, where public sector performance is often constrained by bureaucratic inertia, poor planning, and fragmented systems, adopting strategic decision-making frameworks can play a transformative role. Integrating performance indicators, scenario planning, and cross-sectoral collaboration into decision-making processes equips public sector leaders to manage complexity and uncertainty more effectively (Aristigueta et al., 2022). This leads to streamlined operations, reduced wastage, and more sustainable policy outcomes.

H3: Strategic decision-making has a positive and significant relationship with public sector operations.

2.3.3 Mediating effect of Strategic Decision-Making on the relationship between AI Adoption and Public Sector Operations

Strategic decision-making plays a crucial mediating role in enhancing the impact of Artificial Intelligence (AI) adoption on public sector operations. While AI adoption brings advanced

capabilities such as automation, predictive analytics, and real-time data processing, its full potential is realized only when these technologies are strategically aligned with public sector goals, policies, and performance expectations. In this context, strategic decision-making acts as the vital link that translates AI's technological capabilities into tangible operational improvements.AI adoption by itself provides the tools for data-driven governance; however, without strategic planning and informed decisions, these tools may not yield significant improvements in service delivery, efficiency, or policy execution. Strategic decision-making helps public managers interpret AI-generated insights, prioritize initiatives, and integrate technology into key operational processes (Dwivedi et al., 2021). It ensures that AI is not deployed in isolation but is used in ways that address sector-specific challenges and align with broader public administration goals (Elia et al., 2021). Moreover, strategic decision-making facilitates effective resource allocation, risk management, and performance monitoring in AI implementation. Public sector institutions that embed AI into a strategic framework can better evaluate its impact, adapt to unforeseen outcomes, and scale solutions in a controlled, purpose-driven manner (Haenlein et al., 2023). This integrative approach enhances the operational capacity of government institutions, leading to more transparent, agile, and citizen-centric governance. In countries like Ghana, where digital transformation is a policy priority, leveraging strategic decision-making as a mediating mechanism can bridge the gap between AI innovation and public service impact. It empowers leaders to make informed**,** forward-looking decisions that harness AI for efficient public sector operations.

H4: Strategic decision-making positively mediates the relationship between AI adoption and public sector operations.

3. METHODOLOGY

3.1 Research Design

An explanatory research design is particularly appropriate for studies examining mediating or moderating effects among constructs, as it allows for a clear exploration of directional and causal pathways. This study adopted an explanatory research design because it considers the mediation effect of strategic decision-making on the relationship between AI adoption and public sector operations.

3.2 Quantitative Research Approach

A quantitative research approach is grounded in numerical measurement, statistical analysis, and hypothesis testing. It enables researchers to quantify relationships between variables and generalize findings to larger populations. This approach is ideal for studies that aim to establish measurable effects, such as the impact of AI adoption on strategic decision-making and public sector operations. Quantitative methods rely on structured instruments like surveys or questionnaires and utilize statistical tools such as regression analysis or structural equation modeling to test relationships and model fit (Bryman, 2016). The objectivity and replicability of

this approach make it particularly effective in public sector research where empirical evidence is necessary for policy recommendations.

3.3 Sampling Technique

Quota sampling which is a non-probability sampling technique that ensures representation from specific subgroups within a population. In this method, the researcher predetermines the number of respondents needed from each subgroup—such as public sector professionals from various departments or roles—and continues to sample until each quota is filled (Etikan & Bala, 2017). Quota sampling is appropriate for this study as it allows the researcher to deliberately include subgroups that are crucial to the research, such as senior management, IT officers, and policy implementers within the public sector. The quota sampling technique was utilized to obtain a sample size of 545 respondents because the quota sampling technique helped to ensure proportionate representation of different departments, regions, and roles, thereby enhancing the study's relevance and comprehensiveness (Etikan & Bala, 2017).

3.4 Primary Source of Data

Primary data is highly appropriate for this study because it allows the researcher to gather first-hand, context-specific information directly from public sector employees involved in AI initiatives and decision-making processes. Structured questionnaires ensure consistency in data collection while capturing perceptions, practices, and outcomes specific to the Ghanaian public sector environment (Kumar, 2019). The justification lies in the fact that secondary data on AI use in public institutions may be scarce or outdated. Primary data collection ensures control over data quality and relevance, which is crucial for testing the proposed hypotheses and generating actionable insights for government decision-makers.

4. Results

Table 1

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.889
Bartlett's Test of Sphericity	Approx. Chi-Square	1939.072
	df	55
	Sig.	.000

Table 1 presents the results of two key tests used to assess the suitability of the data for factor analysis. Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy, and Bartlett's Test of Sphericity. Both the KMO measure (0.889) and the significant result of Bartlett's Test ($p = 0.000$) provide strong evidence that the dataset is adequate for exploratory factor analysis (EFA). These results suggest that the underlying structure of the data can be meaningfully explored through factor extraction, and the correlations among items are sufficient to proceed with dimensionality reduction techniques.

Table 2

Reliability and Validity Results

Construct	Cronbach's Alpha	Number of Items	Composite Reliability	Convergent Validity (AVE)	Discriminant Validity
Ai Adoption	.907	10	.955	.679	.824
Strategic Decision - Making	.910	10	.948	.646	.804
Public Sector Operations	.919	10	.951	.663	.814

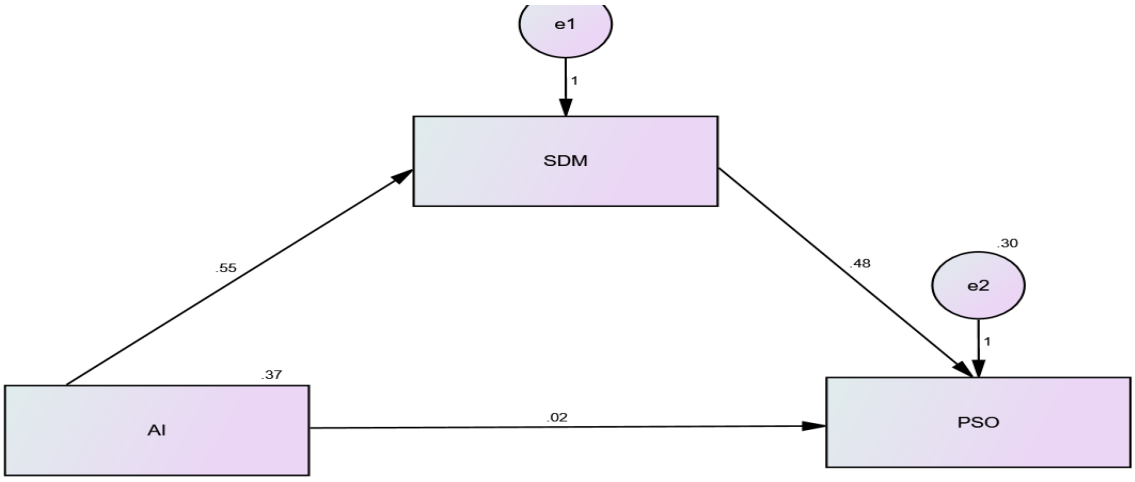
Items	Loadings	Items	Loadings	Items	Loadings
AI1	.912	SDM1	.866	PSO1	.797
AI2	.854	SDM2	.792	PSO2	.884
AI3	.740	SDM3	.753	PSO3	.903
AI4	.798	SDM4	.802	PSO4	.788
AI5	.729	SDM5	.818	PSO5	.782
AI6	.916	SDM6	.775	PSO6	.880
AI7	.655	SDM7	.664	PSO7	.851
AI8	.918	SDM8	.945	PSO8	.779
AI9	.811	SDM9	.736	PSO9	.716
AI10	.863	SDM10	.851	PSO10	.739

Table 2 presents the psychometric properties of three key constructs—AI Adoption, Strategic Decision-Making, and Public Sector Operations—based on a 10-item measurement model for each. The table provides insights into internal consistency reliability, convergent validity, and discriminant validity, which are essential to evaluating the measurement model in structural equation modeling (SEM). Internal consistency was assessed using both Cronbach's Alpha and Composite Reliability (CR). All three constructs demonstrated high reliability. AI Adoption reported a Cronbach's Alpha of 0.907 and CR of 0.955. Strategic Decision-Making had a Cronbach's Alpha of 0.910 and CR of 0.948. Public Sector Operations showed a Cronbach's Alpha of 0.919 and CR of 0.951. According to Hair et al. (2019), values above 0.70 for both indicators suggest excellent internal consistency. These results confirm that the respective items for each construct consistently measure the intended latent variable, indicating that the scales are both reliable and robust. Convergent validity was evaluated using the Average Variance Extracted (AVE). The AVE values are AI Adoption: 0.679; Strategic Decision-Making: 0.646; Public Sector Operations: 0.663. All values exceed the commonly accepted threshold of 0.50, as recommended by Fornell and Larcker (1981). This indicates that a substantial proportion of the variance in the indicators is explained by their respective constructs. These findings are further reinforced by strong standardized factor loadings, most of which exceed 0.70, affirming that individual items contribute meaningfully to the constructs. While a few items (e.g., AI7 = 0.655, SDM7 = 0.664, PSO9 = 0.716) fall slightly below the ideal threshold of 0.70, their inclusion is justified by the overall strength of AVE and CR, and their contribution to construct dimensionality. Overall, the reliability and validity results in Table 2 provide strong empirical support for the measurement

model. The constructs exhibit excellent internal consistency, strong convergent validity, and adequate discriminant validity, aligning with methodological standards for SEM and CFA. These results validate the use of the constructs in further structural modeling and hypothesis testing involving AI adoption, strategic decision-making, and public sector operational performance.

Figure 2

Structural Model Path



The path from AI Adoption to Strategic Decision-Making is strong and positive (β = 0.55), indicating that increased adoption of AI technologies significantly enhances the capacity for strategic decision-making in public sector institutions. This supports theoretical arguments that AI facilitates data-driven insights, predictive analytics, and decision automation, thus enabling more effective and timely strategic choices (Dwivedi et al., 2021; Wamba-Taguimdje et al., 2020). The strength of this path coefficient suggests that AI acts as a critical enabler of decision intelligence in the public sector. The path from Strategic Decision-Making to Public Sector Operations is also positive and moderately strong (β = 0.48). This suggests that better strategic decisions contribute significantly to improved operational efficiency, service delivery, and overall performance in public institutions. This aligns with public administration literature emphasizing that effective governance and planning are foundational to operational success (Elbanna & Fadol, 2019; Papadakis, 2022). Surprisingly, the direct path from AI Adoption to Public Sector Operations is weak (β = 0.02) and non-significant. This implies that the influence of AI on PSO is primarily indirect, channeled through strategic decision-making. In other words, AI does not directly improve operations unless mediated by improved strategic decision-making. This finding underscores the critical mediating role of SDM—suggesting that without strategic frameworks and human oversight, the mere deployment of AI tools may not translate into tangible operational outcomes (Mergel et al., 2019).

Table 3
Regression Weights Results

Relationship	Estimate	S.E.	C.R.	P
AI - - ->SDM	.552	.056	9.949	.000
SDM - - ->PSO	.480	.071	6.738	.000
AI- - ->PSO	.021	.072	.288	.773

AI Adoption and Strategic Decision-Making path shows a strong, positive, and statistically significant effect of AI adoption on strategic decision-making. The critical ratio (C.R.) far exceeds the threshold of ±1.96 (for significance at $p < 0.05$), and the p-value of .000 confirms this relationship is highly significant. The result implies that as organizations in the public sector adopt AI tools and technologies, their ability to make strategic decisions improves significantly. This supports prior research suggesting that AI enhances information processing, predictive analytics, and decision speed—key enablers of effective strategy formulation (Dwivedi et al., 2021; Wamba-Taguimdje et al., 2020). Strategic Decision-Making and Public Sector Operations path also demonstrates a moderate-to-strong positive effect that is statistically significant. The critical ratio (6.738) and p-value (.000) indicate that strategic decision-making has a significant impact on the operational performance of public sector institutions. This finding suggests that public sector operations benefit substantially when decisions are guided by structured, informed, and strategic frameworks. This aligns with the literature that posits strategic decision-making as a core driver of public sector performance and reform (Elbanna & Fadol, 2019; Papadakis, 2022).The direct path from AI adoption to public sector operations is very weak and statistically insignificant. The critical ratio (0.288) falls far below the required threshold, and the p-value (.773) confirms that this relationship is not significant. This result suggests that AI adoption alone does not directly lead to improved public sector operational performance. The practical implication is that AI must be effectively embedded within strategic frameworks to translate into operational outcomes. In other words, strategic decision-making mediates the relationship between AI adoption and PSO—highlighting the importance of institutional readiness, leadership engagement, and strategic alignment in realizing AI's potential.

Table 4.
Mediating effect of strategic Decision-Making on the relationship between AI Adoption and Public Sector Operations

R	**R-sq**	**MSE**	**F**	**df1**	**df2**	**p**
.4790	.2295	.3086	33.8008	2.0000	227.0000	.0000
Model	coeff	se	t	p	LLCI	ULCI
constant	1.8633	.2756	6.7607	.0000	1.3202	2.4064
AI	.0207	.0720	.2870	.7744	-.1212	.1625
SDM	.4801	.0716	6.7084	.0000	.3391	.6212
			Direct effect of AI on PSO			
Effect	se	t	p	LLCI	ULCI	
	.0720	.2870	.7744	-.1212	.1625	
			Indirect effect(s) of AI on PSO			
	Effect	BootSE	BootLLCI	BootULCI		
SDM	.2653	.0516	.1723	.3753		

$R = 0.4790$, $R^2 = 0.2295$, and $F(2, 227) = 33.8008$, $p < 0.001$ values indicate that the model explains approximately 22.95% of the variance in Public Sector Operations, which is statistically significant ($p = 0.0000$). According to Cohen's (1988) guidelines, an R^2 of 0.23 is considered a moderate effect size, suggesting that AI and SDM together account for a meaningful proportion of the variation in operational performance. The direct path is not statistically significant, confirming that AI adoption alone does not have a direct effect on public sector operational outcomes. The CI includes zero, reinforcing the null finding. This supports the proposition that technological adoption, in isolation, is insufficient to enhance operations without a strategic mechanism. Strategic Decision-Making and Public Sector Operations path is positive and highly significant, indicating that strategic decision-making has a strong direct impact on public sector operations. This aligns with extant literature suggesting that strategic clarity, planning, and execution are essential for effective public service delivery. Indirect Effect of AI Adoption on Public Sector Operations through Strategic Decision-Making recorded Effect = 0.2653, BootSE = 0.0516, BootLLCI = 0.1723, BootULCI = 0.3753. The bootstrapped indirect effect is statistically significant because the 95% confidence interval does not include zero. This provides strong evidence of a mediating effect: AI adoption positively affects strategic decision-making, which in turn improves public sector operations. This supports a full mediation model, wherein the impact of AI on operational performance is entirely transmitted through the enhancement of strategic decision-making capacity.

4.1 Discussion of Results

The positive and significant effect of AI adoption on strategic decision-making underscores the transformative potential of artificial intelligence in enhancing organizational governance and planning processes. As AI technologies such as machine learning, predictive analytics, and natural language processing become increasingly integrated into public and private sector systems, decision-makers are better equipped to process vast datasets, identify trends, and simulate future outcomes. This shift enables more evidence-based and timely strategic decisions (Dwivedi et al., 2021). Recent studies have affirmed that AI adoption enhances not just operational efficiency but also managerial cognition and strategic foresight, allowing leaders to reframe challenges, explore alternative scenarios, and allocate resources more effectively (Jussupova et al., 2023). AI's ability to automate routine analyses also frees up cognitive bandwidth for decision-makers to focus on higher-order strategic issues. In public sector contexts, the integration of AI into planning tools and decision dashboards fosters improved policy development, risk assessment, and service innovation (Mikalef et al., 2022). Therefore, the statistically significant path coefficient between AI adoption and strategic decision-making confirms the enabling role of AI in driving agile and intelligent decision processes. However, realizing these benefits requires not only technological capability but also organizational readiness, leadership support, and digital literacy, ensuring that AI is embedded within strategic routines (Shrestha et al., 2021). In sum, AI adoption contributes positively and meaningfully to enhancing the quality and responsiveness of strategic decision-making in today's dynamic institutional environments.

The positive and significant effect of strategic decision-making on public sector operations highlights the critical role that structured, forward-looking planning plays in enhancing institutional performance. Strategic decision-making enables public organizations to align their goals, resources, and stakeholder expectations effectively, thereby improving service delivery, policy execution, and operational efficiency (Papadakis, 2022). In dynamic and resource-constrained environments, well-informed strategic choices help public sector leaders to navigate complexity, prioritize interventions, and respond proactively to emerging societal needs. Empirical studies have shown that strategic decision-making contributes significantly to organizational agility and resilience, especially when decisions are supported by data analytics, stakeholder input, and scenario forecasting (Elbanna & Fadol, 2019). By embedding strategic thinking into administrative routines, public sector institutions are better positioned to optimize workflows, reduce redundancy, and ensure accountability in operations (Mergel et al., 2019). Moreover, the use of strategic tools—such as performance dashboards, risk assessments, and program evaluations—enhances transparency and informed action, ultimately fostering more responsive and citizen-centric public services. Thus, the statistically significant relationship between strategic decision-making and public sector operations affirms that strategic competence is a foundational driver of operational excellence and institutional success in modern governance systems.

The finding that the direct path from AI adoption to public sector operations is very weak and statistically insignificant suggests that merely implementing AI technologies does not automatically translate into improved operational performance. While AI has the potential to enhance efficiency, automate routine tasks, and support data-driven decisions, these benefits are not realized in isolation from organizational and strategic contexts (Vial, 2019). Public sector institutions often face challenges such as rigid bureaucratic structures, lack of technical skills, and resistance to change, which can inhibit the direct impact of AI on operations (Mergel et al., 2019). This result aligns with recent scholarship arguing that the success of AI adoption depends on its integration into strategic planning and managerial processes (Jussupova et al., 2023). Without strategic alignment, investments in AI may fail to address actual performance gaps or may be underutilized, leading to minimal improvements in public service delivery. Therefore, the weak direct relationship observed highlights the necessity for a mediating mechanism, such as strategic decision-making, through which AI can influence operational outcomes more effectively. Ultimately, this finding emphasizes that technology alone is insufficient; its value is contingent upon organizational readiness, leadership commitment, and the presence of strategic frameworks that can convert AI capabilities into meaningful public sector improvements. The positive mediating effect of strategic decision-making on the relationship between AI adoption and public sector operations underscores the critical role of managerial competence in translating technological potential into operational outcomes. While AI technologies offer enhanced data processing, automation, and predictive capabilities, their impact on public sector performance is not direct but channeled through improved strategic decision-making processes (Jussupova et al., 2023). This suggests that AI adoption enhances institutional capacity to make informed, forward-

looking, and agile decisions, which in turn strengthens operational effectiveness. This mediation effect aligns with digital transformation literature emphasizing that technological tools must be embedded within strategic frameworks to yield performance improvements (Vial, 2019). In the absence of such strategic integration, AI investments may remain underutilized or misaligned with institutional priorities. Strategic decision-making acts as the mechanism that guides the application of AI toward operational targets such as service delivery efficiency, responsiveness, and transparency (Mergel et al., 2019). The statistical confirmation of this mediation further implies that public sector organizations seeking to harness AI must concurrently invest in leadership development, strategic planning capabilities, and decision-support infrastructure. Thus, strategic decision-making serves as a critical bridge, enabling AI adoption to meaningfully impact the performance and agility of public sector operations.

5. Managerial Implication

The positive relationship between AI adoption and strategic decision-making highlights the need for public managers to view AI not just as a technological upgrade, but as a strategic enabler. Managers should ensure that AI tools are integrated into core planning, forecasting, and policy development processes. This requires investment in platforms that support real-time data analytics, simulations, and scenario planning. Without this integration, the benefits of AI may remain peripheral and underutilized. Given the significant effect of strategic decision-making on public sector operations, there is a clear need for capacity-building programs focused on strategic thinking and data-informed decision-making. Managers should be trained in using AI-generated insights to guide resource allocation, risk management, and program prioritization. Such upskilling can enable more agile and adaptive institutions, especially in times of crisis or uncertainty. The mediating effect implies that AI adoption alone does not automatically lead to operational improvements. For AI to make a meaningful difference, it must be channeled through strategic decision-making structures. Managers should, therefore, develop governance mechanisms—such as cross-functional strategic planning teams and digital transformation committees—that ensure AI outputs are systematically incorporated into decision processes. Public sector institutions should consider embedding AI tools into standard decision workflows, such as budgeting, performance monitoring, and policy evaluation. Doing so institutionalizes the use of AI and ensures it becomes part of the strategic DNA of the organization. Managers must also ensure ethical AI use and develop clear guidelines for transparency, accountability, and fairness in AI-driven decisions. Finally, AI-related investments must be aligned with strategic institutional goals. Managers must avoid adopting AI for its novelty or pressure to modernize; instead, decisions should be guided by clear objectives, such as improving service delivery, reducing operational delays, or enhancing citizen engagement. A strategic alignment framework can help evaluate and monitor the impact of AI initiatives on operational outcomes.

5.1 Unique Contribution to Theory and Policy

This study makes several unique theoretical contributions to the fields of public sector management, digital transformation, and decision sciences. By empirically demonstrating a positive and significant effect of AI adoption on strategic decision-making, the study extends digital transformation literature beyond operational automation to emphasize AI's cognitive and strategic roles. It reinforces the notion that AI does not merely streamline tasks but enhances organizational decision quality, thereby integrating technological innovation with strategic management theory. The study confirms that strategic decision-making significantly influences public sector operations, thus reaffirming decision-making as a central theoretical construct in performance-based governance models. It contributes to a more nuanced understanding of how public organizations translate decisions into performance outcomes—especially in complex, information-rich environments. The finding that strategic decision-making fully mediates the relationship between AI adoption and public sector operations adds theoretical depth by introducing a mechanistic pathway. This addresses a notable gap in the literature where most studies assume a direct link between digital tools and performance. The study positions decision-making as the necessary conduit through which AI generates public value, bridging the gap between technology capability and actual service delivery.

The study offers several practical and policy-relevant contributions for governments, public managers, and digital transformation policymakers. The research cautions against policy approaches that focus solely on technology procurement. Instead, it encourages a shift toward policies that promote AI-supported strategic planning frameworks, ensuring that technologies are aligned with public sector priorities and competencies. By highlighting the mediating role of strategic decision-making, the study underscores the importance of investing in decision-making capabilities, not just in digital infrastructure. Policymakers are encouraged to fund programs that build analytical, planning, and forecasting skills among public managers, ensuring AI tools are effectively utilized. The findings support the creation of institutional policies that guide AI adoption within a strategic governance framework. This includes policies that promote transparency, data governance, and accountability in AI use—ensuring that AI is not only effective but also ethically applied in public operations. Finally, the study provides a framework that can guide policy evaluation and performance metrics. Governments can use strategic decision-making as an intermediate performance indicator, helping assess whether AI adoption efforts are translating into meaningful organizational improvements. The study contributes a novel integrative perspective that combines technology, strategy, and public performance. Theoretically, it deepens our understanding of how AI affects governance through strategic processes. From a policy standpoint, it provides actionable insights for building resilient, strategically driven public sector institutions in the digital age.

5.2 Recommendations

Since strategic decision-making plays a central role in improving public sector operations, governments should invest in training programs, leadership development, and decision-support infrastructure. Building managerial and analytical competencies will enable public servants to interpret AI outputs and apply them in policy formulation, program design, and performance monitoring. To maximize the effectiveness of AI adoption, public institutions must establish clear policies and governance frameworks that guide how AI systems are procured, deployed, and integrated into operational and strategic systems. This includes establishing cross-functional committees to oversee AI-related strategic alignment, ethical use, and evaluation metrics. Public organizations must cultivate a data-driven and innovation-supportive culture that empowers decision-makers to utilize AI insights confidently. Change management programs, internal communications, and leadership advocacy are essential to shift organizational mindsets from bureaucratic rigidity to strategic agility driven by AI-informed insights. AI implementation should not be an isolated IT project but aligned with broader institutional mandates and key performance indicators (KPIs). Public managers must ensure that AI initiatives directly contribute to enhancing service delivery, transparency, responsiveness, and resource efficiency, which are core operational goals. It is essential to create performance monitoring frameworks that assess the strategic and operational impact of AI. Institutions should track both the direct outputs (e.g., reports, forecasts) and strategic outcomes (e.g., better decisions, faster policy responses) of AI integration. This will provide feedback loops for continuous improvement. Government agencies should create platforms to share best practices, tools, and lessons learned regarding AI implementation in strategic functions. Collaboration can reduce duplication, accelerate learning, and promote a cohesive public sector-wide AI adoption strategy anchored in shared strategic goals.

5.3 Limitations and suggestions for future studies

Despite the insightful findings and contributions of this study, several limitations are well acknowledged. The study focused specifically on public sector institutions within Ghana. This limits the generalizability of the findings to other countries or to the private sector, where organizational culture, digital maturity, and bureaucratic processes may differ significantly. The study employed a cross-sectional research design, capturing data at a single point in time. As a result, causal relationships between AI adoption, strategic decision-making, and public sector operations could not be definitively established. A longitudinal approach would be better suited to track changes over time. The study focused only on AI adoption, strategic decision-making, and public sector operations. Other important variables—such as organizational readiness, data infrastructure, regulatory environment, digital skills, and stakeholder resistance—were not examined, although they may influence the relationship. Future studies could explore AI adoption across multiple countries or compare public versus private sector organizations to identify contextual differences and global best practices in strategic decision-making and operational transformation. Researchers should consider longitudinal studies to assess how AI adoption evolves over time and how its integration into decision-making processes affects long-term

performance in public sector institutions. A combination of quantitative surveys and qualitative methods (e.g., interviews, case studies) could provide deeper insights into how public sector managers interpret AI-generated insights and apply them in strategic decisions.

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